



BSc in Psychology

Mental Health among Elite Track and Field Athletes in Iceland in Relation to Training Volume and Injuries

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Foreword

Submitted in partial fulfilment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

Abstract

Mental health among athletes has gained more attention in recent years. Studies have shown that prevalence of anxiety and depressive symptoms are similar among athletes as reported for the general public. However, training volume and injuries have not been studied simultaneously. Thus, the aim of the current study was to examine the prevalence of anxiety and depressive symptoms as well as sleep quality among elite track and field athletes in Iceland in relation to training volume and injuries. From 65 eligible, 41 athletes participated in the study, both males (51.2%) and females (48.8%). Participants answered a questionnaire including questions on sleep, depressive and anxiety symptoms as well as questions concerning background information. The results of the study showed that 31.7% of the athletes had mild to moderate symptoms of depression, 34% had mild to moderate anxiety symptoms and 14.6% had bad sleep quality. Although significant differences were not found between genders, females reported higher means for symptoms of depression and anxiety as well as poorer sleep quality than males. Additionally, the results showed that injured athletes reported significantly higher means for symptoms of depression and anxiety than athletes free of injury. Training volume did not affect symptoms of anxiety, depressive symptoms or sleep quality.

Keywords: mental health, track and field, athletes, anxiety, depression, sleep quality, training volume, injury

Útdráttur

Andleg líðan meðal íþróttafólks hefur aukist í umræðu síðast liðin ár. Rannsóknir hafa sýnt að hlutfall kvíða- og þunglyndiseinkenna eru jafn algeng meðal íþróttafólks og almennings. Núverandi rannsókn var framkvæmd í þeim tilgangi að meta algengi kvíða- og þunglyndiseinkenna ásamt svefngæðum frjálsíþróttafólks í fremsru röð á Íslandi, í tengslum við æfingaálag og meiðsli. Samtals tóku 41 einstaklingur þátt í könnuninni, bæði karlar og konur. Þátttakendur svöruðu spurningalista sem innihélt spurningar um svefn, þunglyndis- og kvíðaeinkenni sem og spurningar um bakgrunnsupplýsingar. Niðurstöður rannsóknar sýndu að 31.7% íþróttafólks hafði væg til miðlungs þunglyndiseinkenni, 34% höfðu væg til miðlungs kvíðaeinkenni og 14.6% voru með slæm svefngæði. Ekki var marktækur munur á andlegri líðan karla og kvenna, þó svo að konur sýndu meiri einkenni. Nýlega meitt íþróttafólk sýndi meiri þunglyndis- og kvíðaeinkenni en þau sem voru ekki meidd. Æfingaálag hafði ekki áhrif á andlega líðan íþróttafólks.

Lykilord: andleg líðan, frjálsíþróttafólk, kvíði, þunglyndi, svefngæði, æfingaálag, meiðsli

Mental Health among Elite Track and Field Athletes in Iceland in Relation to Training Volume and Injuries

Mental health is a state of well-being and an important part of health from childhood through adulthood (World Health Organization [WHO], 2003). Mental health is a broad concept but in the current study, mental health includes symptoms of anxiety and depression as well as sleep quality.

Symptoms of anxiety and depression are one of the most common mental health problems experienced (Stebbens, Hassmén, Crisp, & Wensley, 2016; Roberts, Faull, & Tod, 2016). Among the general public, the lifetime prevalence of depression and anxiety is 20.8% and 28.8% respectively, where females are diagnosed twice as often as males (American Psychiatric Association [APA], 2013; Davey, 2008; Schaal et al., 2011). It is assumed that mental disorders have an early age of onset and typically occur with younger age groups (Patten, 2017). Similar prevalence of anxiety and depression has been reported among elite athletes but the prevalence is most likely under-reported (Roberts et al., 2016; Newman, Howells, & Fletcher, 2016). Despite mental disorders among elite athletes being as prevalent as in the general public there are few research examining the elite sport environment (Stebbens et al., 2016).

Sleep disturbances can accompany diagnosis of mental health disorders (e.g., major depression). Poor sleep quality is associated with difficulties falling asleep, daytime sleepiness and negative changes in sleep patterns (Gradisar, Gardner, & Dohnt, 2011). Studies have shown that 7-36% of the general public have poor sleep quality were it can have a negative effect on anxiety and depressive symptoms and correlate with low positive and high negative emotions (Baglioni, Spiegelhalder, Lombardo, & Riemann, 2010; Minkel et al., 2012; Gradisar et al., 2011). For elite athletes it is particularly important to ensure a good night sleep to maximize the training practice and reduce negative stress and increase well-being (Flueckiger, Lieb, Meyer, Witthauer, & Mata, 2016). Studies have shown that sleep

quality is associated with general physical activity which can lead to good quality of sleep but with higher training volume sleep can be disturbed and lead to mental health problems (Armstrong & Van Heest, 2002). However, to our best of knowledge, studies on sleep among Icelandic elite athletes have not been undertaken so far.

Among many stressors that athletes can experience, studies have shown that training volume and injuries are one of the main risk factors for mental health problems (Hammond, Gialloredo, Kubas, & Davis, 2013). Training volume is defined as how much the athlete trains, e.g. how many hours a week and number of sets performed (Mangine et al., 2015). In general, physical training is recommended to maintain and increase good mental health and well-being (Raglin, 2012; Fox, 1999). Although, training volume is supposed to be increased over an athlete's career, too much volume can lead to overtraining or injuries, whereas too little to stagnation (Mangine et al., 2015). Some athletes may become dependent on exercise and train to an excessive degree, where high training volume can sometimes result in negative mood symptoms and worsened physical health (Raglin, 2012). Thus, overtraining can lead to declining performances where the athlete may perceive mood disturbance that can lead to depressive symptoms (Purvis, Gonsalves, & Deuster, 2010; Wolanin et al., 2016).

Sport injuries and their consequences are a big risk factor of mental health problems among elite athletes (Newman et al., 2016). Most athletes get injured sometimes during their career, some only deal with minor injuries while others have to deal with serious injuries that can sometimes be career-ending (Roberts et al., 2016; Green & Weinberg, 2001). Injuries can occur to athletes while participating in their sport or even outside the sport environment and can prevent the athletes from having consistency in their training (Smith, 1996). Athletes' reactions to their injuries can be experienced as low self-esteem, anger, tension and depression and are often based on their perception of loss (e.g., career, mobility, exercise) while seeing other athletes training and carrying on as normal (Hurley, 2016; Smith, 1996).

The prevalence of mental health disorders among athletes may vary by sport type, where studies have shown that athletes competing in individual sports are at higher risk developing mental disorders than athletes competing in team sports (Nixdorf, Frank, & Beckmann, 2016; Hanrahan & Cerin, 2009). Nixdorf, Frank, Hautzinger, & Beckmann (2013) reported higher scores in depressive symptoms in individual sports compared to team sport and Schaal et al. (2011) reported that the highest scores in depressive symptoms were found in aesthetic sports and fine motor skill sports (42%) compared to team ball sports (8%). According to Wolanin, Hong, Marks, Panchoo, & Gross (2016) the highest prevalence of depression scores was found in athletes competing in track and field which is an individual sport (27%). The performances in individual sports are mainly based on the athlete himself whether he fails or succeeds. For these athletes, it is more logical to make internal attributions as they do not have teammates which can be credited or blamed for the results. However, athletes competing in team sports are likely to make external attributions, e.g. blame their teammates for failure and thus experience the failure in a complete different way (Nixdorf et al., 2016). It is important to address this problem in Iceland where mental health among elite athletes competing in individual sports haven't been studied.

Cohesion in teams and social support from teammates and family, feedback from coaches and experience of failure can also vary depending on the sport type (Evans & Eys, 2015). Support from teammates, family and friends are important for athletes where lack of it can have a negative effect on stress and anxiety (Rosenfeld, Richman, & Hardy, 1989). The relationship between athletes and coaches is essential where it can affect dropouts and athletes' performances which in turn can lead to mental health problems (Baker, Coté, & Hawes, 2000).

According to previous studies on athletes' mental health, the focus has primarily been on high school or college athletes whom are rarely at a top level in their sport (Schaal et

al., 2011). However, although studies examining mental health among athletes are rapidly increasing, so far, no study has been done among Icelandic elite track and field athletes. Until now, only few studies on depression and anxiety have been conducted among Icelandic elite team sport athletes. Pálsson (2016) did a study on the prevalence of anxiety and depressive symptoms among football players at a top level in Iceland. Although no gender difference was found the results showed that 37.9% of the players had mild to severe anxiety symptoms and 45.7% had mild to severe symptoms of depression. Similar study on Icelandic handball players showed that 56.4% had anxiety symptoms, whereof 23.6% had clinical anxiety and 58.2% showed depressive symptoms, whereof 17.9% had clinical depression (Jörundsdóttir, 2017). Viðarsdóttir (2015) did a study among Icelandic professional team ball sports athletes where 42.7% of the athletes had symptoms of anxiety and 40.2% had depressive symptoms. In this study females had higher scores for anxiety and depressive symptoms than males. Gender difference has also been found in other studies and both Yang et al. (2007) and Storch, Storch, Killiany, & Roberti (2005) reported higher scores in symptoms of depression for female athletes than male athletes.

As discussed above, elite athletes may experience several stressors in their sport environment that can affect their mental health (Smith, 1996; Appaneal, Levine, Perna, & Roh, 2009; Bruner, Noblet, & Gifford, 2002). The aim of the current study was primarily to examine training volume and injuries among elite track and field athletes in Iceland in relation to their mental health. Thus, based on the literature discussed above it was hypothesized that: (1) Female athletes have worse mental health than male athletes. (2) Athletes who have higher training volume will show worse mental health than athletes who have lower training volume. (3) Injured athletes have worse mental health than non-injured athletes. Additionally, the current study will explore if athletes' age has an effect on their mental health.

Method

Participants

The participants in the study were male and female elite track and field athletes in Iceland, training and/or competing with the Icelandic national team. Eligible participants ($N = 65$) received an email from the Track and Field Association of Iceland (Frjálsíþróttasamband Íslands [FRÍ]) that contained an information sheet (Appendix A) and a link to the survey. The athletes did not get paid for taking a part in the study and were not obliged to participate even though they were kindly requested to answer the survey questionnaire. The response rate of the total population was 63%, where a total of 41 athletes answered the survey, 21 males and 20 females. The age of the participants was 18 years or older, where most of the athletes were aged between 18-21 years.

Measures

The survey was created on a website called *Google Forms*. The questionnaire had four different aspects. Participants answered questions concerning background information, sleep quality, depressive and anxiety symptoms. It was assumed that it would take about ten minutes to answer all the questions.

Background information (Appendix B) included questions on gender, age, how many hours the athletes trained each week, their track and field event, if the athletes had been injured, their relationship with their coach, how reasonable and understanding they found their coach to be in relation to training volume and training strategies and questions about social support from teammates, family and friends. The question about participants' age had initially four possible responses (Appendix B), that were collapsed and recoded into the following categories; "18-21 years old", "22-25 years old" and "26 years and older". The question about athletes' track and field training volume was determined by; "How many hours a week do you exercise track and field specifically?" (Appendix B). Possible responses

were: “5 hours or less”, “5-10 hours”, “11-15 hours”, “16-20 hours” and “20 hours or more”. To distinguish between athletes’ training volume and to provide a better distribution between groups the responses to the question were collapsed and recoded into the following categories; “10 hours or less”, “11-15 hours” and “16 hours or more”.

Sleep quality was measured among participants with four questions concerning sleep sufficiency, sleep onset latency, sleep quality in general and nightly awakening (Appendix B). All four questions were summarized into a *Sleep Quality scale (SQ-scale)* to provide a total score with a minimum possible score of 0 and maximum of 18. The four questions were reversed where lower score represented poorer sleep quality and higher scored represented better sleep quality. The internal reliability (Cronbach’s alpha) for the SQ-scale in the current study was $\alpha = .476$.

Patient Health Questionnaire-9 (PHQ-9) was used to measure the severity of depressive symptoms (Kroenke, Spitzer, & Williams, 2001). The scale consists of 9 questions that measure how often in the last two weeks participants experienced certain depressive symptoms (Appendix C). Possible responses are on a four-point scale and range from 0 to 3 where 0 stands for “not applicable”, 1 for “few days”, 2 for “more than half of the days” and 3 stands for “almost daily”. The total score for PHQ-9 range from 0-27 where the clinical criteria are those who score 10 or higher. The internal reliability (Cronbach’s alpha) for PHQ-9 in the current study was $\alpha = .645$. Previous studies have shown that internal reliability of the scale is good and according to Jörundsdóttir (2017) the internal reliability was $\alpha = .860$ and according to Pálsson (2016) it was $\alpha = .866$. Psychometric properties of the scale have been tested both in English and Icelandic and the results have shown that PHQ-9 is reliable and valid measurement of the severity of depression (Pálsdóttir 2007; Spitzer et al., 2006).

The severity of anxiety was conducted with *General Anxiety Disorder-7 (GAD-7)*, a 7-item standardize self-reported anxiety scale (Spitzer, Kroenke, Williams, & Löwe, 2006).

GAD-7 consists of seven questions and measures symptoms of anxiety and the severity of anxiety disorders for the last two weeks (Appendix D). Possible responses are on a four-point scale and range from 0 to 3 where 0 stands for “not applicable”, 1 for “few days”, 2 for “more than half of the days” and 3 stands for “almost daily”. The total score of the GAD-7 scale ranges from 0-21 where the clinical criteria are those who score 8 or higher. The internal reliability (Cronbach’s alpha) for GAD-7 in the current study was $\alpha = .832$. Previous studies have shown that internal reliability of the scale is good with $\alpha = .867$ according to Jörundsdóttir (2017) and $\alpha = .878$ according to Pálsson (2016). Psychometric properties of the scale have been tested both in English and Icelandic and the results have shown that it has a good criterion and a good reliability (Ingólfssdóttir, 2014; Spitzer, Kroenke, Williams, & Löwe, 2006).

Procedure

The study was conducted in collaboration with the Track and Field Association of Iceland (Frjálsíþróttasamband Íslands). After an approval had been obtained from the National Bioethics Committee in Iceland (Vísindasiðanefnd) the Track and Field Association of Iceland sent an email to eligible participants of the study. The email contained an information sheet and a link to access the survey on the Google Forms website. At the beginning of the survey the information sheet appeared where it was noted that answering the questionnaire is equivalent to a written consent. It was informed that the answers were completely anonymous so there was no way to trace them back to the participants. The participants were encouraged to answer the questions conscientiously but were informed that they could however refuse to answer questions that made them uncomfortable. It was assumed that it would take about ten minutes to answer all the questions. The participants were informed that if they experienced any distress while answering the questions they could contact a psychologist one time, free of charge.

Design and data analysis

The statistical program *SPSS Statistics* was used to analyse the data and Excel and Word were used to design charts. Independent samples t-test was conducted to test the hypothesis if female athletes showed worse mental health than male athletes, and if injured athletes showed worse mental health than athletes who were not injured. One-way analysis of variance (ANOVA) was used to test the hypothesis if athletes who had higher training volume showed worse mental health than athletes who had lower training volume, and to explore if athletes' age had an effect on their mental health. The independent variables of the study were; gender, age, training volume and injuries. The dependent variable was; mental health, which included anxiety symptoms, depressive symptoms and sleep quality.

Results

Table 1 provides participants number and percent for background information. A total of 41 track and field athletes at a top level in Iceland participated in the study, 21 males and 20 females, wherein 41.5% were 18-21 years old. Most of the athletes were sprinters (51.2%) but least of them were multi events athletes (heptathlon/decathlon) (4.9%).

Table 1

Descriptive statistics for background variables; gender, age and track and field event

Variables	<i>N</i>	%
Gender		
Males	21	51.2
Females	20	48.8
Age		
18-21 years old	17	41.5
22-25 years old	14	34.1
26 years or older	10	24.4
Track and field event		
Sprinting	21	51.2
Middle- and long distance running	5	12.2
Jumping	6	14.6
Throwing	7	17.1
Heptathlon/Decathlon	2	4.9

Table 2 provides descriptive statistics for the relationship between the athletes and their coach, how reasonable and understanding they found their coach to be in relation to training volume and strategies. Social support (advices, motivation and caring) from teammates, family and friends is also described in the table. Most of the athletes had a very good relationship with their coach (61%) and thought she/he was very reasonable in relation to training volume and strategies (62.5%). The majority of the athletes experienced a lot of social support from teammates (73.2%), and from family and friends as well (78.1%).

Table 2

Descriptive statistics for relationships with coach and social support

Variables	<i>N</i>	%
Relationship with coach		
Very good	25	61.0
Good	12	29.3
Neither good nor bad	4	9.8
Bad	0	0.0
Very bad	0	0.0
Reasonable and understanding		
Very reasonable	25	62.5
Rather reasonable	10	25.0
Moderate	4	10.0
Rather unreasonable	1	2.5
Very unreasonable	0	0.0
Support from teammates		
Very much	21	51.2
Rather much	9	22.0
Neither good nor bad	9	22.0
Not much	2	4.9
Very little	0	0.0
Support from family and friends		
Very much	23	56.1
Rather much	9	22.0
Neither good nor bad	5	12.2
Not much	3	7.3
Very little	1	2.4

The study examined mental health (defined as depressive symptoms, anxiety symptoms and sleep quality) in relation to training volume and injuries among elite track and field athletes in Iceland. Table 3 provides descriptive statistics for the variables in question. Most of the athletes trained track and field for 11-15 hours a week (48.8%) where many of them trained extra 1-2 hours (36.6%). The majority of the athletes had been injured sometime over the career (92.7%) where most of the injuries happened during training (71.4%).

Table 3

Descriptive statistics for independent variables; training volume and injuries

Variables	<i>N</i>	%
Track and field training volume		
5 hours or less	1	2.4
5-10 hours	6	14.6
11-15 hours	20	48.8
16-20 hours	12	29.3
More than 20 hours	2	4.9
Extra training volume		
Do not train extra	9	22.0
1-2 hours	15	36.6
3-4 hours	11	26.8
5-6 hours	6	14.6
More than 6 hours	0	0.0
Injury sometime over the career		
Yes	38	92.7
No	3	7.3
Injured while participating in the study		
Yes	11	26.8
No	30	73.2
Out of trainings/competitions due to injury		
Yes	36	87.7
No	5	12.2
Serious injury last six months		
Yes	18	43.9
No	23	56.1
Where got injured		
During training	25	71.4
During competition	6	17.1
Somewhere else	4	11.4

Depressive symptoms

Table 4 provides participants numbers and percent, and means and standard deviations on the PHQ-9 scale. A total of 38 participants out of 41 answered the PHQ-9 scale. The minimum score obtained for the PHQ-9 scale was 0 and the maximum score was 11 ($M = 3.97$, $SD = 2.40$). The distribution in depressive symptoms category was examined with Kolmogorov-Smirnov test. The results indicated that the variance had a normal distribution among females, $D(18) = .165$, $p = .200$, and males, $D(20) = .154$, $p = .200$.

Table 4

Descriptive statistics for depressive symptoms

Variables	PHQ-9	
	<i>N (%)</i>	<i>M (SD)</i>
Gender		
Males	20 (52.6)	3.40 (2.48)
Females	18 (47.4)	4.61 (2.20)
Age		
18 – 21 years old	17 (44.7)	4.35 (2.50)
22 – 25 years old	11 (28.9)	3.81 (2.68)
26 years or older	10 (26.4)	3.50 (2.01)
Training volume		
10 hours or less	6 (15.8)	3.00 (1.67)
11 – 15 hours	20 (52.6)	4.20 (2.88)
16 hours or more	12 (31.6)	4.08 (1.78)
Injured while participating in the study		
Yes	9 (23.7)	4.44 (1.13)
No	29 (76.3)	3.83 (2.67)

An independent samples t-test was conducted to compare depressive symptoms between genders. There was a non-significant difference in depressive symptoms between male and female athletes, $t(36) = -1.585$, $p = .446$, even though higher mean was observed among females ($M = 4.61$, $SD = 2.20$) than males ($M = 3.40$, $SD = 2.48$). The results from independent sample t-test indicated that athletes who were injured while participating in the

study showed marginally significant difference in symptoms of depression compared to those who were not injured, $t(36) = .669, p = .063$, where injured athletes showed higher level of depressive symptoms ($M = 4.44, SD = 3.82$) than non-injured athletes ($M = 3.83, SD = 2.67$). A one-way ANOVA analysis was used to examine if depressive symptoms differed according to participants' training volume. The results showed that there was not a significant difference in depressive symptoms between the three training volume groups, $F(2, 35) = .582, p = .564$. Results of ANOVA showed that there was not a statistical difference in depressive symptoms between age groups, $F(2, 35) = .417, p = .662$, even though higher mean was observed among younger athletes ($M = 4.35, SD = 2.50$) than older athletes ($M = 3.50, SD = 2.01$).

Anxiety symptoms

Table 5 provides participants numbers and percent, and means and standard deviations on the GAD-7 scale. A total of 40 participants out of 41 answered the GAD-7 scale. The minimum score obtained for the GAD-7 scale was 0 and the maximum score was 14 ($M = 4.03, SD = 3.44$). Results from Kolmogorov-Smirnov test indicated that the variance was neither normally distributed for the females, $D(19) = .205, p = .034$, nor for the males, $D(21) = .205, p = .025$.

As for the depressive symptoms, an independent samples t-test was conducted to compare anxiety symptoms between genders. The difference was not significant, $t(38) = -3.237, p = .176$, even though higher mean was observed among females ($M = 5.68, SD = 3.62$) than males ($M = 2.52, SD = 2.50$). A total of 26.8% of the athletes answering the GAD-7 scale were dealing with injuries when participating in the present study. An independent sample t-test was conducted to compare anxiety symptoms between those athletes that were injured while participating in the study and those who were not injured. There was a significant difference in anxiety symptoms between the athletes who were injured and those

who were not, $t(33.73) = -.838$, $p = .048$, where injured athletes showed lower level of anxiety symptoms ($M = 3.45$, $SD = 2.02$) than non-injured athletes ($M = 4.24$, $SD = 3.85$).

Table 5

Descriptive statistics for anxiety symptoms

Variables	GAD-7 <i>N (%)</i>	<i>M (SD)</i>
Gender		
Males	21 (52.5)	2.52 (2.50)
Females	19 (47.5)	5.68 (3.62)
Age		
18 – 21 years old	16 (40.0)	5.13 (3.54)
22 – 25 years old	14 (35.0)	3.93 (3.15)
26 years or older	10 (25.0)	2.40 (3.31)
Training volume		
10 hours or less	7 (17.5)	2.17 (1.47)
11 – 15 hours	20 (50.0)	4.35 (3.86)
16 hours or more	13 (32.5)	5.69 (3.20)
Injured while participating in the study		
Yes	11 (27.5)	3.45 (2.02)
No	29 (72.5)	4.24 (3.85)

A one-way ANOVA was used to explore if anxiety symptoms were different depending on participants' training volume. The results showed that there was not a significant difference in anxiety symptoms between the three training volume groups, $F(2, 37) = 1.796$, $p = .180$. Results of ANOVA showed that there was not a statistical difference in anxiety symptoms between age groups, $F(2, 37) = 2.046$, $p = .144$, even though higher mean was observed among younger athletes ($M = 5.13$, $SD = 3.54$) than older athletes ($M = 2.40$, $SD = 3.31$).

The severity of the depressive and anxiety symptoms

Participants total score on the PHQ-9 and GAD-7 is described in table 6. The possible range was from 0-27 in the PHQ-9 scale, and in GAD-7 scale the range was from 0-21. The majority of the athletes showed little or no symptoms of anxiety and depression. A total of 25

athletes experienced minimal symptoms of depression (0-4) and 26 athletes had minimal symptoms of anxiety (0-4). There were 12 athletes that had mild symptoms of depression and 10 athletes that had mild symptoms of anxiety. There was one athlete that had moderate depressive symptoms and four athletes had moderate anxiety symptoms. Therefore, 31.6% of the athletes experienced mild to moderate depressive symptoms and 34% experienced mild to moderate anxiety symptoms.

Table 6

Severity categories for PHQ-9 and GAD-7

PHQ-9	0-4	5-9	10-14	15-21	20-27
	Minimal	Mild	Moderate	Moderately	Severe
	25 (61.1%)	12 (29.2%)	1 (2.4%)	0	0
GAD-7	0-4	5-9	10-14	15-21	
	Minimal	Mild	Moderate	Severe	
	26 (63.4%)	10 (24.4%)	4 (9.6%)	0	

Only one athlete out of 38 that answered the PHQ-9 scale scored over 10 points which is the clinical criteria for caseness, and 5 athletes out of 40 that answered the GAD-7 scored over 8 points which is the clinical criteria for caseness.

Sleep quality

Table 7 provides participants numbers and percent, and means and standard deviations for the SQ-scale. A total of 41 participants answered the SQ-scale, where the minimum score obtained for the scale was 5 and the maximum score was 13 ($M = 8.73$, $SD = 1.99$). Results from Kolmogorov-Smirnov test indicated that the variance was not normally distributed for the females, $D(20) = .230$, $p = .007$, but was normally distributed for the males, $D(21) = .139$, $p = .200$.

An independent samples t-test was conducted to examine if sleep quality differed between genders. The result showed that sleep quality was not different between men and

women, $t(39) = .410, p = .938$. The results of independent samples t-test showed that there was not a statistical difference in sleep quality between athletes who were injured while participating in the study and those who were not injured, $t(39) = 1.428, p = .700$, even though higher mean was observed among injured athletes ($M = 9.45, SD = 1.91$) than non-injured athletes ($M = 8.47, SD = 2.11$).

A one-way ANOVA analysis was used to examine if sleep quality was depending on training volume. Results showed that there was no difference in sleep quality between the three training volume groups, $F(2, 38) = .077, p = .926$. Results of ANOVA showed that there was not a statistical difference in sleep quality between age groups, $F(2, 38) = 2.769, p = .075$.

Table 7

Descriptive statistics for sleep quality

Variables	SQ-scale	
	<i>N (%)</i>	<i>M (SD)</i>
Gender		
Males	21 (52.5)	8.86 (2.03)
Females	20 (47.5)	8.60 (1.98)
Age		
18 – 21 years old	17 (40.0)	8.59 (1.87)
22 – 25 years old	14 (35.0)	8.07 (1.98)
26 years or older	10 (25.0)	9.90 (1.86)
Training volume		
10 hours or less	7 (17.5)	9.00 (3.32)
11 – 15 hours	20 (50.0)	8.65 (1.89)
16 hours or more	14 (32.5)	8.71 (1.33)
Injured while participating in the study		
Yes	11 (27.5)	9.45 (2.11)
No	29 (72.5)	8.47 (1.91)

Table 8 provides participants total score on the SQ-scale, where the possible range was 0-18. A total of 32 athletes (78%) had a moderate sleep quality and six athletes (14%) had a bad sleep quality.

Table 8

Categories for the SQ-scale

SQ-scale	0-6	7-11	12-18
	Bad	Moderate	Good
	6 (14.6%)	32 (78%)	3 (7.4%)

Discussion

The aim of the current study was to examine prevalence of depressive and anxiety symptoms, as well as sleep quality among elite track and field athletes in Iceland in relation to gender, age, training volume and injuries. The main findings of the current study were that the prevalence of depressive symptoms was 31.7% and 34% for anxiety symptoms, ranging from mild to moderate. However, most of the athletes had minimal symptoms of depression and anxiety, 61.1% and 63.4% respectively. Only one athlete scored over the caseness for PHQ-9 and five athletes scored over the caseness for GAD-7. Most of the athletes, 78%, had moderate sleep quality but 14.6% had bad sleep quality. Results showed that mental health was not significantly different between gender nor age groups. Injured athletes had more symptoms of depression and anxiety than non-injured athletes but there was not a difference in sleep quality between injured and injury free athletes. Training volume did not affect athletes' mental health.

The first hypothesis, that female athletes showed worse mental health than male athletes was rejected. This hypothesis was built on Schaal et al. (2011) findings where females were diagnosed twice as often as males with depressive and anxiety symptoms. In the current study, even though higher means were observed among female compared to males for both depressive and anxiety symptoms and lower mean among females compared to males for sleep quality, the differences were not significant. Similar results were reported in an earlier study (Pálsson, 2016) among Icelandic professional football players where non-significant

difference were found even though females scored higher than males on both PHQ-9 and GAD-7. However, the results from a study by Jörundsdóttir (2017) among professional Icelandic handball players showed that females scored higher than males on both PHQ-9 and GAD-7, although the difference between genders were only significant for GAD-7, not for PHQ-9. Out of the football players in Pálsson (2016) study, 45.7% experienced depressive symptoms and 37.9% anxiety symptoms, where 20.4% scored over the caseness for PHQ-9 and 14.6% for GAD-7. In Jörundsdóttir (2017) study among professional handball players, the prevalence of depressive symptoms was 58.2% and anxiety symptoms 56.4%, where 17.9% scored over the caseness for PHQ-9 and 23.6% scored over the caseness for GAD-7. These results might indicate that there are more severe depressive and anxiety symptoms among team sports than individual sports athletes in Iceland. These findings are not in line with previous studies (Nixdorf et al., 2016; Wolanin et al., 2016) who argued that athletes in individual sports are at higher risk for developing mental disorders than athletes in team sports. There can be many reasons for this. Firstly, the sample size of the current study was small and thus the results are not easily compared to other studies. Secondly, in light of the importance of the sport environment, the national track and field team in the current study is a small group and thus might be different from other individual sports groups. It is possible that a small sports groups where athletes are close have a better team spirit than bigger sports teams, like football and handball. Finally, it is important to note that the measure for symptoms of anxiety in the current study was the GAD-7 scale which measures general anxiety but not performance anxiety. Performance anxiety is different among athletes in individual sports than in team sports (Turner & Raglin, 1996).

The second hypothesis, that athletes who had higher training volume showed worse mental health than athletes who had lower training volume, was rejected. There was no difference between groups regarding depressive symptoms, anxiety symptoms or sleep

quality. Most of the participants trained for 11-15 hours a week while least of the athletes trained for 10 hours or less. Athletes that trained for 16 hours or more a week showed the highest mean of anxiety symptoms, but athletes that trained for 11-15 hours showed the highest mean of depressive symptoms and the lowest mean for sleep quality as well. Results reported in an earlier study (Raglin, 2012) showed that exercise dependence and high training volume can increase mental health problems. Factors like concentration and focus among athletes can affect the results of the current study. Those who trained for 16 hours or more may have clearer goals about training volume to have a good performance at competitions rather than those athletes who trained less.

The third hypothesis stated that athletes who had been injured showed worse mental health than those athletes who had not been injured. There was a significant difference in anxiety symptoms between athletes who were injured and those who were not. However, a higher mean in anxiety symptoms was found among non-injured athletes. Although these results were not expected, valid reasons might explain this. Injured athletes are not attending practices or competitions, they are resting at home and taking time off. Therefore, they do not experience performance anxiety. Furthermore, the GAD-7 scale used in the current study only measures symptoms of general anxiety, not performance anxiety. Additionally, for symptoms of depression a marginally significant difference was found between injured and non-injured athletes. This indicates that injured athletes experience more symptoms of depression than athletes who are not injured. These findings are in line with Smith (1996) that indicated that sport injuries can negatively affect mental health among athletes and their reactions to injuries can be experienced as depression. There was not a statistical difference in sleep quality between athletes who were injured and those who were not, although injured athletes had better sleep quality. These results are not in line with Armstrong & Van Heest (2002) that reported that injuries can negatively affect athletes' sleep quality.

The current study explored if athletes' age had an effect on their mental health. The results showed a non-significant difference for depressive and anxiety symptoms as well as sleep quality. However, the youngest age group, 18-21 years old athletes, had the highest mean of depressive and anxiety symptoms. These results are in line with Gulliver, Griffiths, & Christensen (2012) findings where it was pointed out that younger athletes are at more risk developing mental health issues than older athletes. In addition, Patten (2017) argued that mood and anxiety disorders have an earlier age of onset than most other disorders. Therefore, it is important to inform young athletes about mental health disorders. Furthermore, the oldest age group in the current study, athletes who were 26 years or older, had better sleep quality than younger athletes. However, it has been reported that good quality of sleep is especially important for young athletes in relation for maintaining overall health and improve performance (Watson, 2017).

The current study had some limitations. Firstly, as track and field is not a big sport in Iceland, the sample size was small with 41 athletes participating in the study. Therefore, the generalizability of the results is limited. Thus, it is questionable that the results from the current study are generalizable for other track and field population or other groups of athletes competing in individual sports. It is important to note that it can be difficult to get significant results with a small sample as in the current study. Secondly, the questionnaire was self-reported so it is difficult to know with certainty whether participants answered the questions with honesty and understood them correctly. In a cross-sectional study like this, it is impossible to conclude about the cause and effect and therefore it is important to take the results with notice. The SQ-scale and the PHQ-9 scale had a low internal reliability score. This could be due to the small sample size and high distribution. Despite those limitations the study is important as it is the first of its kind in Iceland. It observes an important topic in the sport community in Iceland which is essential to discuss.

In conclusion, the results of the current study on mental health among elite track and field athletes in Iceland showed a prevalence of depressive symptoms to be 31.7% and the prevalence of anxiety symptoms to be 34%. Also, the results showed that 14.6% of the athletes had bad sleep quality. In addition, 14.6% of the athletes scored over the caseness for either clinical depression or clinical anxiety and should be referred to a psychologist. Caseness is the threshold, the clinical criteria which is determined as appropriate to initiate treatment. These results indicate that anxiety and depressive symptoms can be found among elite track and field athletes in Iceland and 14.6% of the participants need psychological treatment for either depressive or anxiety symptoms. Future research in Iceland should put more focus on athletes competing in individual sports and also make comparisons to athletes competing in team sports. It would be interesting, in addition to anxiety in general, to examine performance anxiety among athletes in Iceland. Future research should also emphasize the importance of mental health among athletes in Iceland and aim to improve the athletes' self-awareness.

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Appendix A
Information sheet

Ágæti viðtakandi

Þér er boðið að taka þátt í rannsókn sem hefur það að markmiði að kanna áhrif æfingaálags og íþróttameiðsla á andlega heilsu hjá íslensku frjálsíþróttafólki í fremstu röð. Rannsóknin er hluti af BSc-verkefni Dórotheu Jóhannesdóttur við sálfræðisvið Háskólans í Reykjavík. Leiðbeinandi og ábyrgðarmaður rannsóknarinnar er Dr. Birna Baldursdóttir, aðjúnkt á sálfræðisviði Háskólans í Reykjavík, sími: 8608108, netfang: birnabaldurs@hr.is.

Þátttaka í rannsókninni felur í sér að svara rafrænum spurningalista með spurningum sem snúa að æfingaálagi, æfingaumhverfi, meiðslum og svefnvenjum ásamt spurningum um einkenni kvíða og þunglyndis. Að svara spurningalistanum jafngildir skriflegu samþykki fyrir þátttöku í rannsókninni. Gert er ráð fyrir að það taki um 20 mínútur að svara öllum spurningunum. Svör þín skipta miklu máli og við vonum að þú svarir af samviskusemi. Þátttakendum er frjálst að sleppa því að svara einstökum spurningum og þeim er sömuleiðis frjálst að hætta þátttöku í rannsókninni hvenær sem er, án útskýringa eða eftirmála.

Framkvæmd rannsóknar er þannig að Frjálsíþróttasamband Íslands, sem er samstarfsaðili í rannsókninni, sendir tölvupóst til afreksfólks í frjálsum íþróttum sem náð hefur 18 ára aldri. Tölvupóstinum fylgir þetta upplýsingabréf en einnig vefslóð á rafrænan spurningalista

Rannsakendur telja enga áhættu fylgja þátttöku í rannsókninni enda hafa spurningarnar verið sannreyndar í öðrum rannsóknum. Ef þátttakandi finnur fyrir vanlíðan við að svara spurningum má hann hafa samband við Brynju Björk Magnúsdóttur sálfræðing, einu sinni, sér að kostnaðarlausu (sími: 5434068, netfang: brynjabm@landspitali.is).

Farið verður með öll gögn sem trúnaðarmál og ekki þarf að gefa upp persónugreinanlegar upplýsingar. Þannig verður hvorki spurt um nafn þitt né nafn þíns félagsliðs og því engin leið fyrir rannsakendur að vita hver það er sem svarar. Svör þín verða ópersónugreinanleg og tölvuskráð á rannsóknarnúmeri. Á meðan á rannsókninni stendur verða gögnin varðveitt á læstu vefsvæði sem aðeins rannsakandi og ábyrgðarmaður hefur aðgang að. Eftir að rannsókn lýkur mun ábyrgðarmaður rannsóknar hafa umráðarétt yfir gögnunum þar til þeim verður eytt, fimm árum eftir lok rannsóknar. Rannsóknin hefur verið tilkynnt Persónuvernd og fengið leyfi Vísindasiðanefndar.

Með kveðju og von um góðar undirtekir,

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Appendix B
Background information

Vinsamlegast svaraðu eftirfarandi spurningum með því að merkja í þann reit sem á best við um þig. Merktu aðeins í einn reit.

1. Hvert er kyn þitt?
 - Karl
 - Kona
 - Annað
2. Hver er aldur þinn?
 - 18-21 ára
 - 22-25 ára
 - 26-29 ára
 - 30 ára og eldri
3. Í hversu margar klukkustundir á viku æfir þú frjálsar íþróttir á skilgreindum frjálsíþróttæfingum?
 - Færri en 5 klukkustundir
 - 5 – 10 klukkustundir
 - 11 – 15 klukkustundir
 - 16 – 20 klukkustundir
 - Fleiri en 20 klukkustundir
4. Í hversu margar klukkustundir á viku æfir þú aukalega fyrir utan skilgreindar frjálsíþróttæfingar á viku?
 - Æfi ekki aukalega
 - 1 – 2 klukkustundir
 - 3 – 4 klukkustundir
 - 5 – 6 klukkustundir
 - Fleiri en 6 klukkustundir
5. Hver er þín sérgrein innan frjálsíþróttar? (*Hér má merkja við fleiri en einn reit*).
 - Spretthlaup (60m, 100m, 200m, 400m, grindahlaup)
 - Millivegalengdarhlaup (800m, 1500m)
 - Langhlaup (3000m +)
 - Stökk (langstökk, þristökk, hástökk, stangarstökk)
 - Köst (kúluvarp, spjót kast, kringlukast, sleggjukast)
6. Hefur þú glímt við meiðsli?
 - Já
 - Nei
7. Ert þú meidd/ur núna?
 - Já
 - Nei
8. Hefur þú einhverntíman á ferlinum verið frá æfingum og/eða keppni í frjálsum vegna meiðsla?
 - Já

- Nei
9. Hefur þú orðið fyrir alvarlegum meiðslum undanfarna 6 mánuði (t.d. tognun, beinbroti, hnémeiðslum, ökkrameiðslum eða öðrum meiðslum)?
- Já, ég hef orðið fyrir alvarlegum meiðslum sem héldu mér frá æfingum/keppni
 - Nei, ég hef ekki orðið fyrir alvarlegum meiðslum sem héldu mér frá æfingum/keppni
10. Meiddir þú þig á æfingu eða í keppni?
- Á æfingu
 - Í keppni
 - Fyrir utan æfingu/keppni
11. Í hversu góðu eða slæmu sambandi telur þú þig vera við þjálfarann þinn?
- Mjög góðu sambandi
 - Frekar góðu sambandi
 - Hvorki góðu né slæmu sambandi
 - Frekar slæmu sambandi
 - Mjög slæmu sambandi
12. Ef þú hugsar um æfingaálag og þjálfunaraðferðir, hversu sanngjarn og/eða skilningsríkur finnst þér þjálfarinn þinn vera?
- Mjög sanngjarn/skilningsríkur
 - Frekar sanngjarn/skilningsríkur
 - Í meðallagi
 - Frekar ósanngjarn/óskilningsríkur
 - Mjög ósanngjarn/óskilningsríkur
13. Hversu mikinn eða lítinn stuðning (t.d. ráðleggingar, hvatningu og umhyggju) finnst þér þú fá frá æfingafélögum þínum?
- Mjög mikinn
 - Frekar mikinn
 - Hvorki mikinn né lítinn
 - Frekar lítinn
 - Mjög lítinn
14. Hversu mikinn eða lítinn stuðning (t.d. ráðleggingar, hvatningu og umhyggju) finnst þér þú fá frá fjölskyldu og/eða vinum þínum?
- Mjög mikinn
 - Frekar mikinn
 - Hvorki mikinn né lítinn
 - Frekar lítinn
 - Mjög lítinn
15. Ef þú hugsar almennt um svefngæði þín síðastliðnar 2 vikur, hve langan tíma tók þig oftast að sofna?
- Ég sofnaði um leið og ég lagði höfuðið á koddann (það tók mig aðeins örfáar mínútur að sofna)
 - Það tók mig styttra en 30 mínútur
 - Það tók mig á bilinu ½ til 1 klukkustund

- Það tók mig 1-3 klukkustundir
 - Það tók mig meira en 3 klukkustundir, eða ég sofnaði ekki
16. Sumir vakna á nóttunni, aðrir ekki. Hve oft vaknaðir þú að meðaltali á nóttu síðastliðnar 2 vikur?
- Aldrei
 - Einu sinni
 - 2 eða 3 sinnum
 - Oftar en 3 sinnum
 - Ég hef ekki hugmynd
17. Telur þú, almennt séð, svefngæði þín vera ...?
- Góð
 - Miðlungs
 - Léleg
18. Á síðastliðnum 2 vikum, hve oft finnst þér þú hafa fengið nægan svefn?
- Alltaf
 - Oftast
 - Stundum
 - Sjaldnast
 - Aldrei

Appendix C

PHQ-9

Í eftirfarandi spurningum vinsamlegast merktu við þann svarmöguleika sem á best við um líðan þína síðastliðnar tvær vikur. Merktu aðeins í einn reit.

Hversu oft hefur eftirfarandi vandamál truflað þig síðastliðnar tvær vikur?

	Alls ekki (0)	Nokkra daga (1)	Meira en helming tímans (2)	Nánast a daga (3)
a. Lítil áhugi eða gleði við að gera hluti	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Verið niðurdregin/n, döpur/dapur eða vonlaus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Átt erfitt með að sofna eða sofa alla nóttina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Þreyta og orkuleysi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lystarleysi eða ofát	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Liðið illa með sjálfa/n þig eða fundist að þér hafi mistekist eða ekki staðið þig í stykkinu gagnvart sjálfum þér eða fjölskyldu þinni	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Erfiðleikar með einbeitingu við t.d. að lesa blöðin eða horfa á sjónvarp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hreyft þig eða talað svo hægt að aðrir hafa tekið eftir því	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Hugsað um að það væri betra að þú værir dái/n eða hugsað um að skaða þig á einhvern hátt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix D

GAD-7

Í eftirfarandi spurningum vinsamlegast merktu við þann svarmöguleika sem á best við um líðan þína síðastliðnar tvær vikur. Merktu aðeins í einn reit.

Hversu oft á síðastliðnum tveimur vikum hefur þú upplifað eftirfarandi?	Aldrei (0)	Nokkra daga (1)	Oftar en helming daganna (2)	Næstum daglega (3)
1. Verið spennt/-ur á taugum, kvíðin/n eða hengd/ur upp á þráð	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ekki tekist að bægja frá þér áhyggjum eða hafa stjórn á þeim	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Haft of miklar áhyggjur af ýmsum hlutum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Átt erfitt með að slaka á	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Verið svo eirðarlaus að þú átt erfitt með að sitja kyrr	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Orðið gröm/gramur eða pirruð/pirraður við minnsta tilefni	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Verið hrædd/-ur eins og eitthvað hræðilegt gæti gerst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>