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# Mental health issues in athletes:

## Symptoms of stress, anxiety, depression, and burnout

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**Framhaldsdeild í heilbrigðisvísindum**
**Heilbrigðisvísindasvið**
**Háskólinn á Akureyri**
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60 eininga lokaverkefni [á áherslusviðinu sálræn áföll og ofbeldi]
sem er hluti af
Magister Scientiae-prófi í heilbrigðisvísindum

Aðalleiðbeinandi
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Framhaldsdeild í heilbrigðisvísindum
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# Útdráttur

**Bakgrunnur:** Aukning hefur orðið á rannsóknum á geðheilbrigðisvanda íþróttamanna undanfarinn áratug, en samanburðarrannsóknir á milli íþróttamanna og almennings eru þó fátíðar. Vegna mikils andlegs- og líkamslegs álags í keppnisíþróttum er kulnun beintengd geðheilsu íþróttamanna. Þó svo nokkrir áhættuþættir bæði íþróttasértæki og andlegir þættir geti stuðlað að kulnun íþróttamanna, hafa engar rannsóknir hingað til verið gerðar hér á landi.

Tilgangur: Markmiðið var að greina mun á geðheilsu vandamálum hjá almenningi, íþróttafólki sem glímdu ekki við meiðsli og íþróttafólki sem glímdu við meiðsli. Einnig, að skoða samband íþróttatengdra- sem og sálfræðilegra þátta við einkenni kulnunar hjá íþróttamönnum.

Þátttakendur: Hópíþróttafólk (84) (57,1% karlar, 18 - 41 ár, $M_{aldur}$=22,9, *Sf*=4.99) og 188 einstaklingar úr almennu þýði (67% konur, 20 – 45 ára, $M_{aldur}$=35,46, *Sf*=5,9) á Norðurlandi eystra. Lagður var fyrir spurningalisti þar sem spurt var m.a. um meiðsli, andlega líðan og íþróttatengda þætti.

Niðurstöður: Kruskal Wallis prófs sýndu að almenningur skorar að meðaltali hærra en íþróttamenn sem ekki glíma við meiðsli í þunglyndis- (*P* =>,001), kvíða- (*P* => ,001) og streitu (*P* =,010) einkennum. Einnig skorar almenningur að meðaltali hærra en íþróttamenn sem glíma við meiðsli í þunglyndis- (*P* =,014), kvíða- (*p*=,012) og streitu (*p*=,004) einkennum. Niðurstöður fylgniprófa sýndu að endurtekin meiðsli, það að keppa meiddur, að eiga slæmt samband við þjálfara og geðheilsuvandamál juku einkenni kulnunar.

Ályktun: Íþróttafólk á Norðurlandi eystra sýna minni þunglyndis, kvíða og streitu einkenni en almenningur á sama svæði. Niðurstöður á kulnunareinkennum íþróttafólks benda til þess að það sé mikilvægt fyrir íþróttafólk að ná fullum bata bæði líkamlega og andlega áður en snúið er aftur til keppni eftir meiðsli til þess að koma í veg fyrir endurtekin meiðsli. Gott samband við þjálfara skiptir líka máli. Það er því mikilvægt að fræða þjálfara og íþróttafólk um góð samskipti og andleg vandamál.

Lykilorð: íþróttir, íþróttafólk, almenningur, meiðsli, þunglyndi, kvíði, streita, kulnun, spurningalistar, meigindleg.

# Abstract

Background: Research on mental health issues in athletes has grown significantly in the past decade. However, few comparative studies between athletes and the general population exists. Due to high physical and mental load in competitive sports, athlete burnout is an especially relevant mental health issue in athletes. Several factors, both sport specific and psychological, can increase burnout, however, no studies to-date have explored this topic among Icelandic athletes.

Aim: was to identify differences in common mental disorders in non-injured athletes, injured athletes, and the general population. Also, to explore the relationship between sport-specific and psychological factors and burnout symptoms in athletes.

Participants: were 84 team sport athletes (57.1% men, 18-41 years, $M_{age}$=22.9,*SD*=4.99) and 188 from the general population (panel) (67% women, 20-45 years, $M_{age}$=35.46,sf=5.9) from Northeast of Iceland. A questionnaire was sent out where participants were asked about e.g., injuries, sport specific factors and mental health.

Results: Kruskal Wallis test showed that non-injured athletes scored lower than the panel in depressive (*p*=> .001), anxiety (*p*=>.001) and stress (*p*=.01) symptoms. Injured athletes also scored lower than the panel in depressive (*p*=.014), anxiety (*p*=.012) and stress *(P*=.004) symptoms. Correlation test showed that competing injured, having a recurrent injury, having a poor relationship with the coach, and higher levels of mental health issues increased athletes' burnout symptoms.

Conclusion: Athletes in Northeast of Iceland showed less symptoms of anxiety, depressive and stress symptoms than the panel. Results concerning

burnout symptoms in athletes indicated that it may be important for athletes to get the rest and help they need before returning to competition after an injury. A good relationship between athletes and coaches is important. Therefore, it is important to educate coaches and athletes on good communication and mental health issues.

Keywords: sports, athletes, general population, injuries, depression, anxiety, stress, burnout, questionnaires, quantitative

# Þakkarorð

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Mig lagnar að þakka foreldrum mínum fyrir fjárhagslegan stuðning svo verkefnið gæti orðið að veruleika ásamt hvatningu. Sérstaklega vil ég þakka Guðrúnu Lindu Pétursdóttur fyrir ómetanlega aðstoð við lokaupsettningu. Einnig vil ég þakka Jóni Grétari Guðmundssyni og Jónínu Bjarnadóttur fyrir yfirlestur á verkefninu.

Að lokum vil ég þakka vinkonum mínum fyrir yfirlestur í gegnum námið, stuðning, pepp og að telja mér trú um að þetta myndi ganga upp. Það má heldur ekki gleyma frændfólki mínu á Akureyri, Guðmundi Karli Jónssyni og fjölskyldu fyrir að taka alltaf á móti mér með opnum faðmi í gistingu þegar ég þurfti á því að halda í gegnum námið.

# Formáli

Að vera íþróttamaður er krefjandi á magvíslegan hátt. Íþróttafólk getur lent í áföllum sem hafa mikil áhrif á ferilinn, svo sem meiðsli. Íþróttafólk er þó gætt hinum ýmsu kostum en eru ekki ónæm fyrir til dæmis andlegum veikindum eða annarskonar daglegum vandamálum.

Höfundur hefur verið í íþróttum og þjálfað íþróttir til fjölda ára. Efni ritgerðarinnar varð fyrir valinu vegna mikils áhugar höfundar á íþróttum og andlegri líðan íþróttafólks. Höfundi finnst of lítið talað um andleg vandamál innan íþróttaheimsins, þó að þau aukist með hverju árinu. Einnig er lítur höfundur svo á að mikill kostur sé að geta samnýtt nám og áhugamál.

Ritgerð þessi er 60 eininga lokaverkefni í til Ms-prófs í heilbrigðisvísindum á áherslusviðinu sálræn áföll og ofbledi við Háskólann á Akureyri. Aðalleiðbeinendur voru Dr. Nanna Ýr Arnardóttir og meiðleiðbeinandi var Dr. Richard Eiríkur Taehtinen.

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# 1 Background

World Health Organization (WHO) considered it a global priority that the general population remain active and participate in physical activity and/or sports (World Health Organization, n.d.). According to WHO physical activity can decrease the likelihood of heart and vascular disease and have positive affect on individual mental well-being. Although a range of studies have suggested that sports and other physical activity may improve mental health, recent studies have also suggested that there may be aspects to sport participation that could undermine mental health of athletes (Putukian, 2016). In fact, research has suggested that an increased number of athletes drop out of their chosen sports temporarily, for prolonged amounts of time, or even permanently due to mental and physical illnesses (Hughes & Leavey, 2012; Malm et al., 2019; Rist et al., 2020). This may be especially relevant among elite athletes considering that research has shown that performance failure had more negative impact on top ranked elite athletes than lower ranked elite athletes (Hammond et al., 2013).

Competitive athletes are experiencing an increased demand and pressure to consistently perform well and deliver results to meet a certain expectation (Hughes & Leavey, 2012; Rist et al., 2020). Our culture and the athletic environment promotes the idea that top tier athletes are resilient individuals who don't let adversity break them, which often leads to delays in these athletes seeking help or treatment from a specialist when serious issues arise (Hughes & Leavey, 2012). For example, stigma within athletes' community on mental ill-health and that the athletes are supposed to be mentally tough and deal with everything on their own can affect athletes' decision to seek help from professional (Lebrun et al., 2018). Consequently, when they do seek help, the mental issues they are facing may have often become more serious in nature as opposed to if the individual would have sought help sooner (Hughes & Leavey, 2012).

A review by Kuettel and Larsen (2019) noted that elite athletes are exposed to unique risk factors that have the potential to make them more susceptive to mental health problems. To-date performance-related aspects, for example risk of failure or subpar performance and fear of injury have been at the forefront of research into athletes' mental wellbeing, whereas less focus has been devoted to sport–specific factors such as injuries and burnout that may increase the risk of mental health issues (Hughes & Leavey, 2012; Malm et al., 2019; Rist et al., 2020). Athletes that have suffered an injury report more symptoms of general anxiety and depression when compared to non-injured athletes (Reardon et al., 2019; Rice et al., 2019).

While the risk of injury can be attenuated (Wiese-Bjornstal, 2010) it can never be completely removed. This may be especially true within elite sports where training and competition often takes place at the most extreme levels. With this backdrop, the overall aim of this thesis was to explore common mental health issues in injured and non-injured athletes in comparison to participants drawn from the general population, and to explore the relationship between sport-specific risk factors and mental health issues among athletes in North-eastern part of Iceland.

## 1.1 Athletes' mental health issues

Athletes experience a range of stressors that are unique and can make them vulnerable to mental health issues. Key factors are the psychological impact of injuries, over training and burnout, pressure from the public, media, and the competitive pressure to perform (Rice et al., 2016). The specific mental health issues that were looked at in the study that this thesis discusses were depression and anxiety, perceived stress, and burnout.

## Depression and anxiety

While scarcely discussed in the media or amongst the public, depression and anxiety are a common experience for the elite athlete (Rice et al., 2016). Research conducted among Swedish elite athletes showed that the prevalence of mental health concerns was 51.7%. Result also showed that depression and eating disorders were the most common problems that athletes reported (Åkesdotter et al., 2020).

The main symptoms of depression are consistent sadness or negative mood and lack of enjoyment and interest in things that used to be rewarding and enjoyable (American Psychiatric Association, 2013). It can also affect sleep, appetite and concentration (Tolentino & Schmidt, 2018). Depression is a psychological state that can affect anyone and is defined as a consecutive two-week period where the individual experiences at least five depressive symptoms for more days than not (American Psychiatric Association, 2013). Hammond et al. (2013) found that female varsity swimmers were more likely to experience depression than male swimmers. Results also showed that athletes in the top rank of their sport were more likely to report depressive symptoms than lower ranked athletes, this happened especially when athlete experienced competitive failure. The nature of some sports puts more pressure on individuals and may therefore make them more vulnerable to mental health issues when they fail to meet their performance goals (Hammond et al., 2013).

The main symptoms of anxiety are over thinking and worrying about things and situations in a way that significantly impairs emotional social , and behavioral functioning (American Psychiatric Association, 2013). While anxious responses during competitive situations is normal, when symptoms remain daily for a prolonged period of time, symptoms may develop into one of several anxiety disorders (American Psychiatric Association, 2013). In the context of competitive sports, how athletes interpret anxiety symptoms is critical when considering the impact these symptoms have on athlete functioning (Rice et al., 2016). If an athlete interprets anxiety symptoms negatively it can have a negative effect on performance rather than if they look at it in positive manner that anxiety can improve performance, it can have a positive effect on athlete (Rice et al., 2016). In addition, characteristics that are non-sport related have shown to be associated with increased anxiety levels in athletes, for example younger age and being a woman as well as sport specific factors like dissatisfaction with career and injury (Rice et al., 2019).

Across the literature studies have explored depression and anxiety simultaneously. Findings by Rice et al. (2019) suggest that high level athletes may be at risk of high prevalence of anxiety and depression compared to the general population. It is yet to be found if injured athletes report higher symptoms of depression and anxiety compared to the general population (Rice et al., 2016).

In an Irish study on jockeys, horseracing, and common mental disorders (CMD), it was shown that 79% of athletes met the threshold for at least one CMD. More specifically, 35% met the criteria for depression, 27% generalized anxiety disorder, 19% psychological distress, and 61% for adverse alcohol abuse (King et al., 2021). That is in accordance with research done by Gouttebarge et al. (2015) on former footballers in France, Ireland, and South

Africa. There the results showed that CMD, like depression, anxiety, sleep disturbance, adverse nutrition behavior was quite common within this population where 28% of participants showed symptoms of depression and anxiety, 29% reported sleeping disturbance, and 62% reported adverse nutrition-related behavior. Results also showed that athletes that had dealt with more life events stressors scored higher on CMD questionnaires (Gouttebarge et al., 2015). Nevertheless, comparative research is lacking on the differences between the general population and athletes in the same geographical area, and majority of research has focused on college athletes in comparison with college students. Therefore, to address this gap in literature, in the current study the sample was athletes and general population from the same area.

A study conducted on sport related concussion and prediction for mental health symptoms found that the strongest predictor was baseline depression (Yang et al., 2015). Research have found that athletes that reported depressive symptoms were 1.8 times more likely to sustain orthopedic injury and they were also 10% less likely to stay free from injuries compared to athletes that did not report depressive symptoms (Yang et al., 2014). Athletes that reported depressive symptoms before concussion were 4.59 times more likely to report depressive symptoms after concussion. They were also 3.4 times more likely to report anxiety after their concussion compared to athletes that did not report depression prior to concussion (Yang et al., 2015). Research by Piussi et al. (2022) showed that it is possible for athletes that face a serious injury such as anterior cruciate ligament (ACL) injury to develop depression and anxiety symptoms. In comparison between recreational athletes and elite athletes' self-reported depression symptoms appeared to be more severe among elite athletes. Depressive symptoms decreased over time from the time of reconstruction surgery up to two years post operation (Piussi et al., 2022). Jansen et al. (2019) conducted a study of 419 soccer players in the fourth-seventh division in Germany. The aim of the study was to examine the prevalence of depression and anxiety, as well as self-compassion in different samples of non-professional male soccer players. In addition, they wanted to examine the connection between injuries and psychological factors among the athletes. The results showed that athletes reported more anxiety symptoms in higher level leagues, but there was no significant difference in depressive symptoms between higher and lower-level leagues (Jansen et al., 2019). Furthermore, playing time, especially in higher level of soccer can affect mental health of athletes where research has shown that athletes with less playing time report more symptoms of depression and anxiety (Junge & Prinz, 2019).

## Stress and burnout

In recent years stress has become a more popular topic of interest, however, little is known about in what way accumulated lifetime stress affects mental health and well–being in the environment of elite sports. Research have shown that there is a significant association between accumulated lifetime stress exposure and well-being, results also showed that athletes that had repeatedly been exposed to lifetime stress had higher score for symptoms of depression and anxiety (Junge & Prinz, 2019). Review done by Pal et al. (2021) on injured athletes, showed that the level of stress and anxiety can predict injury and can also increase the incidence of sport injuries. Those results indicate that stress and anxiety can influence the risk of injury, injury frequency and severity of the injury that the athletes suffer (Pal et al., 2021). The psychological factor that has most often been proved to be directly related to the risk of injury in sports is stress and the previous history of stressors (Ivarsson et al., 2014; Wiese-

Bjornstal, 2010). Stress occurs when athletes are in a situation where the demands placed on them within the sport are greater than the athlete can handle. Elite athletes can experience two types of stressors, 'profession–specific' stressors and 'normal life' stressors, things similar to what the general population is dealing with (Souter et al., 2018). Athletes who are in stressful situations on and off the field are at greater risk of suffering sports injuries, stress can cause increased muscle tension and disruption of coordination, all of which can increase the risk of injury to the athlete (Wiese-Bjornstal, 2010). It has therefore been noted that it is important to teach athletes stress management as it can reduce the risk of injury. Research has shown that athletes who have high resilience, optimism, high self-efficacy, and a good support network, have more resources to deal with stress (Wiese-Bjornstal, 2010). Little is known, however, about athletes' levels of perceived stress in comparison to the general population. Therefore, in this thesis the aim was to compare athletes and the general population in perceived stress to strengthen current knowledge in the field.

Burnout may be a result of chronic stress in a person's life, and can have several negative consequences on individual mental and physical health (Salvagioni et al., 2017). Athlete burnout is defined as a multidimensional syndrome that is mainly characterized with emotional and physical exhaustion were the main symptom is mental and physical fatigue. Athletes can also experience decreased sense of accomplishment where they have negative perception of their performance, and negative attitude towards their sport (Gustafsson et al., 2017; Raedeke, 1997; Raedeke & Smith, 2001). Symptoms of burnout are countless but fatigue is often defined as the core component in burnout (Gustafsson et al., 2011). During pre-season in sports there is often less demand, less stress and less pressure to perform and therefore research has shown that symptoms of burnout go down in the pre-season among football players (Sarmento et al., 2021).

Burnout does not only have serious effects on athletes, but it is also, a significant health risk for sports in general. The athlete environment of extreme motivation and commitment to training has also shown to increase the risk of burnout (Gustafsson et al., 2011). When athletes are emotionally and physically exhausted, they feel a decrease in resources both physically and emotionally due to competition and/or training (Gustafsson et al., 2017).

The first conceptual model was proposed as Cognitive-Affective Stress Model where Smith (1986) stated that athletes developed burnout with a stress-based process that is influenced by motivational and personality factors of each athlete. This is explained by three steps; First step is that athlete gets exposed with stressors such as high demand, in the second step the athlete evaluates the situation relative to his/her ability to cope with the demands, leading to the third and final step, where a psychological response triggers behavioral and coping responses (Smith, 1986). Burnout may be the result if athletes' cognitive conception of the stressors is a lack of ability/resources to deal with the situation. This model has been the most used model due to research findings that perceived psychological stress is consistently a positive predictor for burnout symptoms (Gustafsson et al., 2017)

The second conceptual perspective of burnout came out with Coakley (1992), he stated that stress does not cause burnout rather it is a symptom of burnout. Coakley approach was that the social organization of sport causes difficulties for athletes concerning the development of a multi-faceted identity and leading to a constricted identity where the person perceives oneself only in terms of their role as an athlete. That will then lead to lack of control and those factors together will lead to burnout (Coakley, 1992). Alternative model to stress models is sport commitment model that is also an important factor in burnout. According to this model, when athletes are in sport because they must, rather than want to, athletes are more likely to develop burnout symptoms (Raedeke, 1997).

Most recent theory to understand athlete burnout is Self–Determination Theory (SDT). According to SDT it is important for athletes' psychological well-being and functioning that the core human needs of autonomy, ability and relatedness are met (Li et al., 2013; Ryan & Deci, 2000). When an athlete is lacking control of these needs it can lead to a negative outcomes for health and well–being including burnout (Li et al., 2013; Ryan & Deci, 2000). Research has shown support to SDT model where according to the model, burnout is positively associated with a extrinsic motivation and intrinsic motivation is negatively associated with burnout (Lemyre et al., 2007; Lonsdale & Hodge, 2011).

It is not uncommon for athletes to feel fatigue or exhausted after a long season or difficult practice. After recovery and some time off the desire to work hard and get better comes again. In one to two percent of athletes that feeling does not come back and can possibly lead to withdrawal from the sport (Gustafsson et al., 2011). Being exposed to negative life events stress, injuries or daily hassles are things that athletes go through many times over their careers, and it is important how athlete responses to negative life event stress (Gustafsson et al., 2011).

The most important thing to prevent overtraining and injury is controlling the training load in sport. A study by Grylls and Spittle (2008) showed that injured athletes had lower score of burnout than non-injured athletes, which might be explained by lower training pressure. However, athletes that had experienced multiple injuries did score higher in burnout, and that might be explained by cumulative stress effect on burnout (Grylls & Spittle, 2008; Ströhle, 2019). Because of negative discussion about burnout in athlete's environment athletes might report symptoms of burnout late so it makes it very difficult to catch athletes in the early state of burnout to prevent it from becoming a more debilitating problem (Grylls & Spittle, 2008; Ströhle, 2019).

Communication and relationships between athletes and coaches are important and can affect athletes' well-being in a negative way if communication is not good. It has been shown that social support and a good relationship between athlete and coach are factors that are negatively associated with burnout (DeFreese & Smith, 2013). Also, negative social interaction and controlling behavior from coaches have been shown to increase symptoms of burnout (Barcza-Renner et al., 2016; DeFreese & Smith, 2013; Isoard-Gautheur et al., 2016; Smith et al., 2010). It has been shown that autonomy-supportive coaching style has a positive effect on communication and controlling coaching style had negative affect on communication between athlete and coach. Study by Choi et al. (2020) showed that autonomy–supportive coaching showed significantly positive relation to athlete and coach relationship, and athletes that had good relationship with their coach showed significantly less burnout symptoms. On the other hand, controlling coaching had a negative effect on athlete and coach relationship as well as increase in athlete's burnout symptoms (Choi et al., 2020). Similar results were shown by Yukhymenko-Lescroart (2022) where athletes were split into four groups based on their gratitude and relationship with their coach. They were measured in three dimensions of burnout, a sense of reduced accomplishment, emotional and physical exhaustion, and sport devaluation. Group one was athletes that were ungrateful in life and sport and disconnected to their coach, group two was grateful in life and sport and had a good relationship with their coach, group three was generally less grateful in life than group two but also connected with their coach and group four were grateful in life but disconnected to their coach. Results showed that group one, where athletes were both ungrateful in life and sport and had bad relationship with their coach had highest level of burn out (Yukhymenko-Lescroart et al., 2022). Up to date few if any, research has looked at several different sport specific factors such as injury, recurrent injury and playing injured, as well as psychological factors in connection to burnout within the same athlete population.

When considering burnout and life satisfaction in athletes it is also important to understand the influence of individual-level factors such as perfectionism and self–perception. Result show that athletes that are perfectionistic with maladaptive self-perceptions and athletes that are perfectionistic that is parent–driven and have maladaptive self–perception score relatively high on burn out scales and score low life in satisfaction(Raedeke et al., 2021). Athletes that have high personal standards and evaluative concerns also have lower basic self-esteem and higher contingent self-worth when compared to their peers. Athletes with these personal traits also score higher on burnout, especially in the reduced sense of accomplishment dimension of burnout and they also report lower life satisfaction (Raedeke et al., 2021).

Research has shown that early specialization in sports increases the probability of burnout in athletes (Giusti et al., 2020) and is also a risk factor for injury (Bush et al., 2021). Research on young elite athletes with a mean age of 16.8 years showed that every eight athlete showed symptoms of burnout or depression. Results showed that when athletes were under significant levels of stress, they showed more psychological health problems (Gerber et al., 2018).

### Mental illness stigma

It has been noted that athletes often fear seeking help within their sport clubs because of perceived stigma (Gervis et al., 2019). As shown in a study by Gervis et al (2019) both professional football players and counsellors who they talked to agreed that athletes do not receive adequate psychological help even though all athletes thought they could benefit from more attention to the psychological aspects. Because of stigma associated with mental illness within the athlete’s environment, athletes may consciously or subconsciously mask their trauma related symptoms, or they might avoid getting help (Aron et al., 2019). For example, athletes may not admit experiencing depression symptoms due to fear of de-selection (Gervis et al., 2019). Research has also shown that only a third of players who wanted to seek help due to mental illness received the help they needed. This could be due to prejudice against mental illness in the sports world, individuals’ not seeking help, available help being difficult to find and lack of mental health education available to athletes (Junge & Prinz, 2019).

This stigma may make mental health issues even more severe later for athletes than it otherwise would be, as a lot of mental illnesses similar to physical diseases are easier to treat if they are caught and handled early.

## 1.2 Injury as a risk factor for athletes’ mental illness

When an athlete comes across major negative life events such as an injury it can increase the risk of mental health issues of the athlete if not dealt with in the right way, for example managing attention from the public eye and constant competitive pressure to perform (Rice et al., 2016). The literature suggests that injuries are a risk factor of poor mental health and adverse behaviors (Reardon et al., 2019; Rice et al., 2016; Souter et al., 2018). A study by Jansen (2019) found that, injuries at the start of a competitive season contributed to an increase in anxiety symptoms throughout the season when compared to non-injured athletes regardless of the level of skill which athletes played at. More high quality epidemiological and intervention studies are needed for the assessment and management of mental health needs of an athlete to be on par with the physical needs (Rice et al., 2016).

Increased engagement and dedication to sport-related goals and lifestyle may increase the likelihood of identity foreclosure. This means that the individual begins to view their identity solely in terms of their role as an athlete (Hughes & Leavey, 2012; Rist et al., 2020). Subsequently, there is a risk that these highly skilled athletes lose the opportunity to develop in their personal life and start to see themselves only as athletes. This view of oneself, that is the sole identity of an athlete, becomes especially harmful in the event of a serious injury or at the end of an athlete's career (Hughes & Leavey, 2012; Rist et al., 2020). When high level athletes like professional football players get injured, it is possible that they lose a significant part of their identity (Gervis et al., 2019). Because of this, it is possible that when athletes get injured, they lean towards risky behaviors such as substance abuse and may be more susceptible for developing depression (Gervis et.al, 2019). In Gervis et.al (2019) study it was reported by counsellors working with the players that that sustaining a long-term injury may be an important trigger for developing depression, and identity crisis where athletes start raising critical question such as "then who am I?". This may often result in a lack of purpose, and these athletes tend to experience increased levels of stress and other mental issues compared to the general population (Hughes & Leavey, 2012; Rist et al., 2020).

However, these notions should be interpreted carefully as reference groups from the general population have commonly not been included in the studies that have been conducted so far (Gouttebarge et al., 2019).

## Definition of athletic injury

One definition of sport injury that has been put forward is that sport injury is a medicinal process that can disturb training and/or competitions. Athletes may end up seeking medical help (Micheo & Sánchez, 2018). Bolling et al. (2019) did a qualitative study on athletes from both individual and team sports, athletes were both experienced and not experienced but all had competed internationally, coaches and physiotherapists to explore how they defined sport injury. They defined sport injury as a fluid phenomenon. Athlete, coaches, and physiotherapists defined that performance level, perceived pain, and availability for sports participation are all factors that define injury. However, circumstantial factors can interfere with athletes' perception and therefore, athletes' definition of a sports injury (Bolling et al., 2019). Findings by Bolling et al. (2019) show that sport injury is not only defined by symptoms but also by its consequence on athletes' performance in sports, and therefore, athletes' performance is an essential component in the definition of a sport injury for athletes. For example, a soccer player may perceive an ankle sprain as an injury as it negatively impacts their ability to perform, while the same physical injury may not be perceived as an injury in the same way by a pistol shooter or a rower, as the injury does not significantly interfere with their athletic performance. Following the principles of these findings, sports injuries should considered reciprocal action of physical damage and contextual factors (Bolling et al., 2019). one single definition cannot address the different approaches to injuries across different academic fields (e.g., medicine, psychology, sociology) (Bolling et al., 2019; Fuller et al., 2006; Joseph & Finch, 2017; Micheo & Sánchez, 2018). Across the literature different measures have been used that provide different data, concerning, severity, location and type of injury, for example injuries have been measured as the time lost from practice, athletes need of medical attention and even any physical complain that athletes has (Joseph & Finch, 2017). According to Fuller (2006) athletic injury should be measured if an athlete has any type of physical complaint that the athlete sustained in match or in a training, and injury severity (Fuller et al., 2006). The severity of an injury is different in each case and severity is defined by Fuller as the number of days that an athlete is unable to return fully to participation and/or competitions (Fuller et al. 2006). Athletes main goal when injured, is getting back to training and competition as soon as possible. It is very important though that the athlete goes through the process of returning to training and competitions in a healthy and safe manner.

According to Fuller, when injuries are being measured it is important to document the location of an injury (e.g., head or neck, shoulder, elbow, knee, ankle etc.) and, where the injury happened(e.g., in a competition or training) (Fuller et al., 2006). According to Fuller et al (2006) it is important to document also what type of injury for example fracture or other bone damage, ligaments, muscle, and tendons etc. According to Chéron et al. (2017) and Fuller et al (2006) injuries can be classified by type, location, body side and mechanism of the injury, such as it being acute or an overuse injury and whether the injury was recurrent. The definition of acute injuries is strained muscles or ligaments and are the types of injuries that occur suddenly and are the result of a single action, such as a twisted ankle (Chéron et al., 2017; Fuller et al., 2006). Overuse injuries are injuries which occur without any identifiable trauma and occur where pressure is excessive, and the athletes' body does not get the sufficient rest which it needs and is therefore not able to recover properly. An example of this would be a stress fracture (Chéron et al., 2017). Another type of injuries is a recurrent injury which is where an old injury reoccurs after an athlete returns to full participation in their sport (Fuller et al., 2006; Joseph & Finch, 2017). Recurrent injuries are categorized into three different groups; Early recurrence, which is when the injury reoccurs within two months of an athlete returning to their sport. Late recurrence is classed as two to twelve months after an athlete has fully returned. The final group is delayed recurrence when an injury reoccurs more than 12 months after the athlete has fully returned (Fuller et al., 2006; Joseph & Finch, 2017). A common definition of long-term injuries is when injuries affect the individual for eight weeks or longer (Lemoyne et al., 2017; Ruddock-Hudson et al., 2014). Suffering a long-term injury as an elite athlete often prevents the athlete from playing for a whole season, or even longer, and in the worst-case scenario, can put an end to the athlete's career (Lemoyne et al., 2017; Ruddock-Hudson et al., 2014)

Participation in sport is not risk free and injuries are relatively common. In 2018 18.4% of Denmark's adult athlete population reported an injury in the past 12 months (Bueno et al., 2018). Muscle injury was the most common injury amongst athletes that participated in both team sports as well as individual sports. Out of those injuries, it was found that lower limbs such as hamstring, calves, adductors and rectus femoris were the most common body parts to sustain a muscle injury (Palermi et al., 2021). Injuries can have both long and short-term adverse effects. Sport injuries can affect athletes' whole body and, because athletes are under a lot of physical demands athletes' bones, cartilage, ligaments, muscles, and tendons are therefore under a lot of pressure (Chéron et al., 2017). With time, when the body is under significant stress, the athletes' body will reach its limit, and athletes can start to develop damage and/or injuries to bones, ligaments, cartilage, muscles, and tendons

In this study the Fuller´s definition of an injury is used, and injury questionnaire is built on Fuller et. al (2006) on definition and collection of injury data guideline.

## Risk factor for injuries

Physical, psychological, biological, and social factors can contribute to an increased risk of injury in elite athleticism (Von Rosen et al., 2017). Physical factors such as the type of sport being played (Bell et al., 2018), and the athlete's physique must be considered. Psychological factors such as anxiety, hypervigilance, lack of coping resources, risk taking behavior, life event stress and lack concentration level necessary to execute the sport in a safe way correlate to increased risk of injury (Ivarsson et al., 2017; Reardon et al., 2019; Wiese-Bjornstal, 2010). It has become more common in recent years that athletes choose at young age one sport that they will but their full focus on (Jayanthi et al., 2020). Research has shown that early specialization, as in when one heavy emphasis is put on one sport as opposed to a child practicing a lot of different sports/skills, leads to an increased risk of injury, especially overuse injuries in young athletes (Bell et al., 2018).

Overall risk of injury is higher in team sports and therefore contact sports such as American football opposed to non-contact sports due to the increased impact from opposing athlete (Theisen et al., 2013). This count particularly for acute and overuse injuries (Haugen, 2022; Joseph & Finch, 2017; Theisen et al., 2013). In a study among young elite athletes, Theisen et al. (2013) showed that with in different sports pattern of participation when it comes to intensity, competition volume and volume of training is different. Competitions were a risk factor for injury in team sports but were protective in individual sports (Theisen et al., 2013). Similar results were found when injuries from summer Olympic Games in 2008 were analyzed. Team sports had the highest prevalence of injured athletes which was in contrast with individual sports (Junge et al., 2009). Research has also shown that higher level athletes who experience more pressure and more commitment than lower-level athletes, are at an increased risk of getting injured opposed to athletes which play the same sport at a lower level (Luiggi & Griffet, 2019).

Risk of injury has shown to be different between genders and that this may be explained by different biomechanical, hormonal, anatomic, and psychological factors (Gianakos et al., 2022). Men and women are built in different ways and women for example have greater static internal rotation alignment and increase pelvic and hip width this can increase the risk of injury (Simoneau et al., 1998; Yoshioka et al., 1989). Studies have also shown that men's and women's body work mechanically different in running and landing (Hewett et al., 2007). Hormonal difference may cause increase in ligamentous laxity in women compared to men (Frank et al., 2017; Gianakos et al., 2022). There are also biological factors like physical fitness and nutrition. It is very important for athletes to have good and the right nutrition for them to help their body recover efficiently and to have the strength and power to go through hard trainings (Ivarsson et al., 2017; Reardon et al., 2019; Wiese-Bjornstal, 2010).

Social factors, such as the pressure to perform well, can increase stress and anxiety and therefore increase the risk of injury (Reardon et al., 2019). Sociocultural risk factors that can increase risk of injury in sports are for example history of abuse, social pressure, pressure within the sports club, stress related to negative self-efficacy of athletic and academic performance, coaching quality, and culture of sports and teams (Ivarsson et al., 2017; Reardon et al., 2019; Wiese-Bjornstal, 2010). A Review done by Kuttel and Larsen (2020) showed that if an athlete is injured, it often results in changes in the social activity levels in their daily life, so they lose an important outlet that is playing sports to cope with stress and other worries like when it is safe for him to return to play (Kuettel & Larsen, 2020).

Psychological risk factors are increasingly being recognized as an important factor for injury risk and in preventing a sport injury. William and Andersen (1998) came forward with the stress and injury model which is a multi-element model that focuses on stress and athletic injury. This model claims that athletes that experience more psychological arousal in stressful situations are more likely to sustain injuries, as according to the model the stronger the response is to stressful circumstances the higher the risk of injury becomes. According to the model psychological risk factors can be categorized into history of stressors, coping resource and personal stressors. Understanding how these factors affect the risk of injury could help with investing in a suitable prevention program (H. Li et al., 2017; J. M. Williams & Andersen, 1998). Multiple mental health factors can be a risk factor for athletes' injury, and it can also interfere with recovery outcomes (Olmedilla et al., 2022). Research has shown that stress, anxiety and depression are strongly associated with number of injuries (Olmedilla et al., 2022). When an individual is feeling anxious the muscles tend to tense up and that alone can highly increase the risk of injury (Haugen, 2022). A long-term study carried out over five seasons on collegiate athletes showed that 28.8% of athletes reporting anxiety symptoms during the pre-season and 21.7% reporting depressive symptoms, however 48.5% reported both anxiety and depressive symptoms during the pre-season. Athletes with pre-season anxiety symptoms had significantly higher injury incidence rate compared to those athletes that did not report anxiety symptoms. There was no increase in injury risk in male or female athletes that reported only depressive symptoms. Therefore, it is important to be especially aware of anxiety symptoms in athletes and it would prove to be beneficial to develop a program that focuses on psychological health and injury prevention for athletes (H. Li et al., 2017). A study done by Li et al., (2017) showed that athletes that had symptoms of anxiety in a pre-season period were two times more likely to suffer from injury during the season when compared to athletes that did not experience anxiety during pre-season. Only male athletes with depressive symptoms during pre-season were significantly more likely to sustain an injury. This did not show for female athletes (H. Li et al., 2017). These findings could potentially suggest that when athletes experience anxiety symptoms it can affect their concentration and attention and therefore increase the risk of an injury (H. Li et al., 2017; J. M. Williams & Andersen, 1998). In recent years it has become clear within the literature that life events and daily struggles can increase symptoms of depression and anxiety and that those symptoms among environmental, and physical equipment of an athlete can all be risk factors for an injury of the athlete (Ivarsson et al., 2014; Ivarsson & Johnson, 2010).

Re–injury worry, confidence and attention have also shown to increase athletes' risk of injury. For example, Christakou et al. (2022) showed that re-injury worry, confidence, and attention predicted re-injury at the beginning and in the middle of a competitive season among injured male athletes (Christakou et al., 2022). Similar results were shown in Conti et al. (2019) qualitive study, when athletes believed in the abilities of their rehabilitation practitioners and the work completed by the rehabilitation program athletes felt more confident when they returned to competition. Athletes believed that when they would return to competition that their training and rehabilitation program was the key factor for achieving the capability to train and compete at the same level of high physical performance as well as increasing the confidence of the injured part of their body. Results also showed that low confidence prevents athletes from returning to the same physical level during the first game after an injury occurred (Conti et al., 2019).

Counsellors working with professional football players in England think that mental health problems are no less risk for being unfit to compete than a consequence of an injury (Gervis et al., 2019). These finding demonstrate that depressive symptoms do not only contribute to depression post-injury, but symptoms of depression can also increase the risk of injury (Gervis et al., 2019; Yang et al., 2014).

It is known that mental health concerns can occur at any point during athletes' recovery (Kuettel & Larsen, 2020). The onset of new symptoms or the worsening of an athlete's mental health can occur in the rehabilitation process (Åkesdotter et al., 2020; Haugen, 2022). It is important to address psychological factors early in the rehabilitation process because it is possible it will improve the outcome of the rehabilitation(Åkesdotter et al., 2020; Haugen, 2022). During the rehabilitation period following an injury it is important to understand the psychological impact and therefore the state of an athletes' mental health as there seems to be a correlation between mental health and sport injury (Haugen, 2022). When an athlete suffers a career ending injury it can make the transition of ending a career more difficult for an athlete do to the fact that they did not choose to quit but rather they are forced to quit and therefore might not be at a time in their life where they are ready to leave their sport (Kuettel & Larsen, 2020).

## Psychological consequences of injuries

Athletic injury is a sport specific risk factor for mental health and has become the most researched risk factor for concerns of mental health of elite athletes

(Kuettel & Larsen, 2020). Research has shown that approximately 10-20% of athletes who are injured seek clinical help as a result of the traumatic experience for example an injury and the impact it has had on their mental well-being (Hughes & Leavey, 2012). It is common for elite athletes to be exposed to physical or emotional trauma, for example injury, risk of an injury or witnessing an injury and trauma that occurs outside of sport participation (Aron et al., 2019). Sport specific inciting can cause trauma related disorders or even post-traumatic stress disorder (PTSD) in athletes and for that the rate of those disorders may be higher than within the general population (Aron et al., 2019). Research shows that it might be important to have a routine screening for trauma related symptomatology to prevent athletes from developing PTSD following a trauma (Aron et al., 2019).

Injuries do not only affect mental health of athletes on an elite level but also the regular exerciser (Lichtenstein et al., 2019). A study was done on regular exercisers presenting to a sports medicine clinic with musculoskeletal injury. The research showed that depression symptoms were reported by 12% of injured exercisers but only 5% of a non-injured control sample. 30% of injured exercisers showed symptoms of clinical stress and 22% of the non-injured exercisers (Lichtenstein et al., 2019).

Injuries may have negative psychosocial outcomes such as reduced quality of life, increased mental health issues such as anxiety and depression and it can be economically burdening for athletes (Joseph & Finch, 2017; Rice et al., 2016; Souter et al., 2018). When an athlete is injured and forced to restrict his movement due to pain, it can affect both physical abilities and psychosocial well-being (Kvist & Silbernagel, 2022). When an athlete gets injured, there will be a change in the social life of an athlete. However, it is important to supply a social support. Aron et al. (2019) found that with greater satisfaction with social support, depressive and anxiety symptoms decreased post–injury. These results show that social support to the injured athlete is important through the whole process from onset of the injury until athletes return to competition (Aron et al., 2019). Experiencing a full spectrum of emotions within a short period of time is common in sports, especially as athletes move up the ladder of achievement (Gervis et.al, 2019). When athletes get injured, some may feel the need to seek these emotional experiences through alternative ways, for example through some form of addiction, gambling and substance is being common addictions (Gervis et.al, 2019). Negative reactions to injury such as sadness, anger, lack of motivation, isolation, sleep disturbance and fear are common among injured athletes and can appear also in recovery phase of injury if recovery is not going according to plan (Putukian, 2016; Reardon et al., 2019; Ruddock-Hudson et al., 2014). With the main goal of returning to competition after an injury, the focus of the rehabilitation has been on the physical aspect, but recently the focus has moved more towards the importance of psychological factors of returning to competition after an injury (Kvist & Silbernagel, 2022).

It is common that athletes experience fear alongside an injury, fear of reinjury being the most common barrier injured athletes deal with when returning to competition (Kvist & Silbernagel, 2022; Nwachukwu et al., 2019). A study done on elite cricket players both retired and still playing showed that athletes that keep playing when injured have lower health related quality of life (HRQoL), are more likely to develop osteoarthritis and continuous joint pain when compared to athletes that did not participate when they were injured. Playing injured also had an effect on the mental components of HRQoL in elite athletes (Bullock et al., 2020). Fear of not being able to return to the sport at the same level they were on previously, and even a fear of experiencing lifelong pain and symptoms due to the injury are also something athletes experience following an injury (Kvist & Silbernagel, 2022; Nwachukwu et al., 2019). This shows that it is important to assure athletes that fear is a normal reaction to injury and to support them when they are dealing with emotions and fears following an injury as well as working with the athlete in choosing the right treatment for them (Kvist & Silbernagel, 2022). The field is however lacking in understanding the specific psychological risk of injury when looking at fear of re-injury and re-injury anxiety. Counsellors working with football players think that athletes may not be the same after sustaining an injury, they develop a new playing style that is more careful and guarded compared to the style which the athlete adopted prior to the injury. Adjusting to a different playing style which is unfamiliar to the athlete may lead to recurrent injuries (Gervis et al., 2019).

With athletes' daily life routine changing when an injury occurs, athletes can develop unhelpful habits during the recovery process when it comes to nutrition and sleep (Reardon et al., 2019). Both of these factors can have a big effect on the recovery. Cognitive responses to injury are concerns about reinjury, athletes can have doubts about competency, athletes can have low self–efficacy and loss of identity (Reardon et al., 2019). Research suggests that individual differences in how athletes respond to difficult emotions following an injury predict differences in post–injury outcomes (Rist et al., 2020). Therefore, promoting adaptive strategies to respond to difficult emotions may attenuate the risk for more severe and long–term mental health issues (Rist et.al, 2020).

Study done by Ruddock-Hudson et al. (2014) showed that it is equally important for athletes to recover mentally as it is for them to recover physically to successfully return to the sport and to minimize the fear of sustaining a recurrent injury (Ruddock-Hudson et al., 2014). If athletes get full support from their community with both mental and physical treatment post injury it makes it easier for the athlete to return to full training and competitions (Ivarsson et al., 2017)

## 1.3 Other risk factors for athlete's mental illness

Insight into the prevalence of poor mental health among elite athletes and help seeking behavior comes from past research making it clear that stressors impact athletes mental health and increases mental illness within athlete populations (Poucher et al., 2021). Factors like performance, career termination, type of sport and injury can predict symptoms of depression within athletes' community (Pluhar et al., 2019). Career dissatisfaction was a significant predictor of signs for depression, anxiety and distress (Foskett & Longstaff, 2018). Research by Lebrun et al. (2018) reveals that because of the pressure, demands, and expectations experienced by top tier athletes in sports, of the intense feels of stress, criticism, bullying, and injuries lead to depression become more and more common among research participants.

Like in the general population burnout has become more common within athlete community and it has been discovered that athletes with severe athletic burnout were at three to four times more risk of developing moderate to severe depression symptoms when compared to athlete that were not dealing with severe athletic burnout (Kamimura et al., 2020).

A study done in 2019 determined that the major risk factor for anxiety disorders among athletes were young age, while the biggest risk factor for depression was rarely or never being in the starting line-up (Junge & Prinz, 2019)

### Perfectionism in athletes as a risk factor

Perfectionism is cognitive–motivational psychological variable that can be looked at in two ways, maladaptive and adaptive. It is a personality trait that can be beneficial or harmful for athletes, both mental health and injury (Olmedilla et al., 2022). Maladaptive perfectionism can be and is unhealthy and negative for individual health. Where expectations are maximized and if the slightest things go wrong individuals consider that they are not able to perform the task. On the other hand, it is adaptive perfectionism that is a path that individual takes to continue to improve. Those individuals are always looking for improvement and think that there is no perfect achievement (Olmedilla et al., 2022).

Study by Olmedilla et al. (2022) on female soccer players to assess the association between perfectionism and depression, anxiety, and stress. Investigators also looked at the association between perfectionism and injuries. Results showed athletes that had an adaptive perfectionism personality trait had lover stress, anxiety, and depression. On the other hand, athletes with maladaptive perfectionism personality traits had higher scores in stress, anxiety, and depression. It was also shown that higher stress, anxiety and depression score was positively correlated with more injuries in the past two years (Olmedilla et al., 2022).

Burnout, career dissatisfaction, level of social support and contemplation of retirement were associated with increased odds of meeting the criteria for CMDs (King et al., 2021).

## 1.4 Aim of this study

The first aim of this study is to identify the difference in common mental health problems (i.e., anxiety, depression, and stress) in non-injured athletes, injured athletes, and the general population in the same area. Based on previous literature it is expected that athletes have better mental health when compared to the general population, but injured athletes score closer to the general population.

The second aim is to explore whether sport specific factors (i.e., athlete coach relationship, injury, recurrent injury, and playing injured) and psychological factors (depression, anxiety, and perceived stress) is related to athlete burnout (physical and emotional exhaustion, sport devaluation, sense of reduced accomplishment. Based on previous literature it is expected that all these factors can increase athlete's burnout symptoms in different groups of burnouts.

# 2 Methods

## 2.1 Participants

Participant were team sport athletes in Northeast of Iceland and a comparison group of the general population from the same area which is called panel in this study. The athlete's age ranged from 18-41 years old, and the mean age was 22.9 (*SD* = 5.01). The estimated athlete population based on official team roster and information's from coaches for the time of the study was total of 392 athletes, and initially 115 (29%) athletes responded to the questionnaire (see Appendix 1, p. 75). However, 31 athletes out of those 115 that responded reported being younger than 18 years old and were therefore not eligible to participate in the study. Of those that completed the questionnaire (n=84), 48 identified as male (57.1 %) and 36 (42.9%) as female. The athletes came from five different sports; 40.5% came from soccer (n=34), 21.4% from handball (n=18), 17.9% from basketball (n=15), 9.0% from volleyball (n=10) and 3.3% came from ice hockey (n=7). A questionnaire (see Appendix 3, p.92) was also sent out to 895 people that is 8.48% of estimated population of individuals 20 – 45 years old in Northeast of Iceland. Initially 218 (24.36%) answered the questionnaire. However, 29 people were currently athletes or had quit sports within the last five years and could therefore still have the mentality of an athlete and therefore not eligible to participate in the study. Of those that completed the questionnaire, 62 identified as male (33%) and 126 identified as female (67%). The panel age range was from 20 – 45 years old, and the mean age was 35.36 *(SD* = 6.11*).* Considering that athletes and the panel significantly differed in mean age (*P* = .008) it was decided to attempt to make the groups more comparable by lowering the age in the sample to 32 and younger for the statistical analysis. By doing that the variance in mean age between groups was less. The mean age for athletes was 22.21 (*SD* = 4.00) and for the panel the mean age was 28.59 (*SD* = 3.12). Despite choosing merely the younger participants, there was still a significant mean age difference between groups. (*P* = .008)

## 2.2 Measures

### Demographic/team demographic questions

Both athletes and the panel sample were asked about their age and gender. Athletes were then asked what sport they were competing/coaching in, what team they were in and what their role in their sport were. The panel were asked about age, gender, and questions regarding current and former sport participation, what sports they participated in if they were participating and if an individual was not participating in a sport they were asked if they used to and if so, they were then asked for how long they participated and how long ago they stopped doing their sport.

### Injury-specific questions

Questions that were specific on injury were ten. Questions used in this study for statistical analysis were five. Athletes were asked if they were currently dealing with an injury. If the answer was yes, the athletes, then got directed to more specific questions about their injury; if the injury was recurrent injury and what type of injury, they were dealing with and the severity of the injury. Also, athletes were asked if they were competing even though being injured. In this study the injury questions were based on Fuller´s report about injury and how they should be documented (Fuller et.al 2006).

## Sport specific questions

Questions that were sport specific were nine. Two questions were used in this study for statistical analysis. That were the questions concerning athletes' relationship with their head coach and assistant coach.

## Patient Health questionnaire (PHQ-9)

The Icelandic translation of Patient Health questionnaire (PHQ-9) was used. PHQ-9 is a self-reported questionnaire that measures all nine symptoms of depression in the DSM-V and the score can range from 0 – 27 (Kroenke et al., 2001). PHQ-9 has nine items and is designed to assess the presence of depressive symptoms in the past two weeks. Symptoms include sadness, depressed mood, lack of interest (anhedonia), issues with sleep, appetite disruption, concentration, feeling insecure about themselves and towards their family and friends, difference in speech and thoughts about self-harm (Spitzer et al., 2014).

The answers are on four-point Likert scale with response options being "not at all", "several days", "more than half of the days" and "nearly every day". Each item can be scored from zero (not at all) to three (nearly every day). Scores higher than ten points refers to clinically significant depressive symptoms (Spitzer et al., 2014). Internal reliability of the questionnaire is reported being excellent with Cronbach $\alpha = 0.89$ (Spitzer et al., 2014). The internal reliability in this athlete sample was $\alpha = 0.85$ and in the panel sample the internal reliability was $\alpha = 0.88$. For the total sample the internal reliability was $\alpha = 0.87$.

## General anxiety disorder questionnaire (GAD-7)

The Icelandic translation of Generalized Anxiety Disorder (GAD-7) questionnaire was used. GAD-7 is a self-reported questionnaire that can be used to measure severity of general anxiety symptoms and the scores can range from 0 - 21 (N. Williams, 2014). GAD-7 has seven items and is designed to assess the presence of anxiety symptoms in the past two weeks. Symptoms include degree of irritability, of feeling anxious, nervous or on edge. It asks if the patient has not been able to stop or control their worrying, checks if participants worry too much about different things, become easily annoyed, have been feeling restless and have been having trouble relaxing or feeling afraid that something terrible might happen. Scores for each symptom range from zero to three and the total score can be up to 21 points.

The answers are on a four-point Likert scale with response options being “not at all”, “several days”, “more than half the days” or “nearly every day”. Each item can be scored from zero (not at all) – three (nearly every day). Scores five, ten and 20 are the cut off points for mild, moderate, and severe anxiety, respectively. Score higher than ten points refers to clinically significant anxiety symptoms (N. Williams, 2014). It has been shown that the internal reliability of the GAD – 7 is very good with Cronbach $\alpha = 0.92$ (Spitzer et al., 2006) in this athlete sample the internal reliability was $\alpha = .90$, in the panel sample the internal reliability was $\alpha = 0.89$ and in the whole sample the internal reliability was $\alpha = .90$.

## Perceived stress scale – 4 (PSS – 4)

The Icelandic translation of The Perceived Stress Scale (PSS-4) was used. PSS-4 is a self-reported questionnaire that can be used to measure perceived stress and score can range from 0 – 16 (Cohen et al., 1983) was used in Icelandic the questionnaire measures how individuals perceive situations in their daily life as stressful for the past month. The questionnaire is measured on a five - point Likert scale where answers options are “never”, “almost never”, “sometimes”, “fairly often” and “very often”. Each item can be scored from zero (never) –

four (very often) (Cohen et al., 1983). The internal reliability of PSS-4 has been found to be Cronbach α = .72 The internal validity of the questionnaire in this athlete sample was rather low α = .69, in the panel sample the internal reliability was α = .79 and in the whole sample the internal reliability was α = .76.

## Athlete burnout questionnaire (ABQ scale)

Icelandic translation of the Athlete burnout questionnaire (ABQ) was used. Only athletes were asked to fill out this questionnaire. ABQ is a self-reported measurement for athlete burnout developed by Raedeke and Smith (2001). It is the most commonly used questionnaire to measure athlete burnout in research today (Gustafsson et al., 2017). Each theme has five questions with a five-point Likert scale. Scores are only given for each group not in total of all groups. The athlete is asked to answer how often they felt or thought a certain way in the season. Answers were on five-point Likert scale with answering options being “almost never”, “rarely”, “sometimes”, “frequently” and “almost always” (Raedeke, 1997; Raedeke & Smith, 2001).

The list has 15 items across three sub-dimensions including; that is mental and physical exhaustion, (e.g., being over tired and having trouble partaking in any activities other than sports due to lack of energy), a reduced sense of accomplishment (e.g., not feeling confident about their ability, feeling of their performance not being up to athletes ability), and devaluation of sport (e.g., the effort but into sport is better spent doing other things, negative feelings toward athletes sports, athlete wonders if time and effort but into sports is worth it). It has been shown that the internal reliability of the ABQ is very good with Cronbach α = 0.92 with subscale reliability ranging from α = .78 - .80 (Gerber et al., 2018). In this athlete sample internal reliability for the total scale was good with Cronbach α = .85 with subscale reliability ranging from α

= .73-.87. Physical and emotional exhaustion α = .87, devaluation of sport participation α = .73 and lack of accomplishment α = .78. One restriction that the ABQ questionnaire has is that it has no cut-off point in order to classify athletes according to the severity of burnout (Gustafsson et al., 2017).

## 2.3 Research design and statistical analyses

The study design was cross – sectional. The first part of the study was a comparison study, the dependent variables were mental health outcomes (i.e., depressive, anxiety and stress symptoms). The independent variables were participant status (i.e., general population, non – injured athletes and injured athletes). Also, comparison was done where the independent variables were athletes injury status in relation to competition (i.e., non – injured athletes, athletes that were injured and competing and athletes that were injured and not competing) and dependent variables were the three dimensions of athlete burnout. Next part of the study was correlation testing. Independent variables were sport specific factors; injuries, recurrent injuries, athlete - coach relationship and psychological factors like depressive and anxiety symptoms and perceived stress. The dependent variables were the three different dimensions of athlete burnout.

For statistical analysis the computer program SPSS was used (28.0.0.0 (190)). Descriptive statistics were used to get an overview of the data for gender, age, injuries, and sports being played.

Assumptions for ANOVA were tested; assumptions of dependent variable being measured at the interval level was met. Independent variable should consist of two or more independent groups and independence of observation where there are no participants in two groups were met in this study. The assumption for no significant outliners was violated since there were outliners in all variables. Assumption for normal distribution was violated since Kolmogorov – Smirnov test was greater than .05 in all variables. And lastly assumptions of homogeneity of variance were met for two of the variables the GAD - 7 and PSS – 4 where Levane test was greater than .05 but for PHQ - 9 assumption for homogeneity of variance was violated because results of Levane test were greater than .05. The sample in this study was small and did not meet the three most important assumptions for ANOVA, therefore a non-parametric test was used. The Kruskal Wallis test was used to compare the difference in scores from injured athletes, non – injured athletes and the panel on PHQ – 9, GAD – 7 and PSS - 4 questionnaires and then adjusted for multiple comparison using Bonferroni adjustment for pairwise comparison to see the difference in each group. Every participant older than 32 were eliminated from the study with the aim of making the groups athlete and panel more equal in terms of age. Non-parametric test was done with the whole sample, those results were lacking significance in comparison between groups on PHQ – 9, GAD – 7 and PSS - 4. Therefore, it was decided to use the younger sample of the panel for results. It was calculated with Kruskal Wallis test how many participants of the panel and athletes scored clinically significantly on PHQ – 9 and GAD – 7.

Kruskal Wallis test was also used to look at the relationship between competing injured, being injured and not competing and not being injured and three dimensions of athletes' burnout.

Pearson correlation was used to measure injuries, recurrent injuries, coach-athlete relationship, depression and anxiety symptoms and perceived stress in correlation to athlete burnout

## 2.4 Procedure

The questionnaire was sent to head coaches in every sport of all sport clubs in the Northeast part of Iceland. Coaches were then asked to forward the link to athletes making sure all athletes got the link to the questionnaire. The athlete questionnaire as well as cover letter (see Appendix 2, p.89) was first sent out to coaches in April 2022 and a follow-up reminder was sent twice after that. For a comparison a different questionnaire as well as cover letter (see Appendix 4, p.101) was sent out the panel in Northeast part of Iceland by University of Akureyri Research Centre (RHA) in April the same year. It was not mandatory for participants to answer all questions and they were free to quit at any given point.

## 2.5 Ethical Considerations

Participant gave informed consent for participating and were told that no personal information would be attached to the questionnaires and the study is fully anonymous where it is not possible to track any answers to a specific athlete. Researchers in the research group NICSER, a group of researchers that collect data about psychological well-being and health issues in Northeast of Iceland, had access to the data and RHA collected the data. The study was approved by the Icelandic Bioethics Committee (application number 22-002) (see Appendix 5, p.103).

# 3 Results

## 3.1 Descriptive statistics for athletes´ injuries

In total, 38 athletes (45.2%) reported being injured at the time of the study. Of those who reported being injured, 18 athletes (21.4%) reported having more than one injury and 31 (81.6%) of the injured athletes were competing or would be competing (if currently being in off-season) regardless of being injured. Injuries were categorized into what body part was injured and as shown in Table 1. athletes' most common injury is on the knee (12.2%).

Table 1: Descriptive statistics table of injury location

| Injury location | Total | % |
|---|---|---|
| Head/face | 3 | 2.6 |
| Neck/neck area | 2 | 1.7 |
| Lower back/ pelvis/sacrum | 7 | 6.1 |
| Shoulder/shoulder frame | 9 | 7.8 |
| Elbow | 1 | 0.9 |
| Wrist | 2 | 1.7 |
| Hand/fingers/thumb | 2 | 1.7 |
| Groin area | 5 | 4.3 |
| Knee | 14 | 12.2 |
| Lower part of leg/achilles tendon | 4 | 3.5 |
| Ankle | 10 | 8.7 |
| Foot/toes | 3 | 2.6 |
| Chest/ribs/upper back | 0 | 0 |
| Stomach | 0 | 0 |
| Thigh | 0 | 0 |

Total injured athletes (*n* = 38). Athletes could be injured in more than one body part, (total injury locations *n* = 62)

A total of 20 (74%) injured athletes had been injured for more than 50 days. Seven of the injured athletes (18.4%) were not competing due to an injury and three of the non-competing injured athletes assessed that they would need more than 50 days before they would be able to return to full training and competing. One of the injured athletes reported having a career ending injury.

## 3.2 Non-parametric tests on the mean rank differences in mental health issues between non-injured athletes, injured athletes, and panel

The panel (31.7%) were significantly more likely to have clinically significand score in PHQ-9 ($P$ = .010) when compared to athletes (16.7%). The panel was not significantly more likely to have clinically significant score in GAD-7 ($P$ = .173) when compared to athletes.

A non-parametric test was performed to compare mean rank differences in depression, anxiety, and stress symptoms between the panel, injured athletes, and non-injured athletes.

Figure 1 shows the mean score for PHQ-9, GAD-7, and PSS-4. In all three questionnaires the panel sample scored significantly higher than both injured and non – injured athletes. In depressive symptoms the Kruskal Wallis test showed statistically significant difference in depressive symptoms between groups H (2) = 19.85, $P$ = <.001. More specifically, after significance values had been adjusted by the Bonferroni post hoc comparison, pairwise comparison test found that the panel scored significantly higher ($M$ = 9.11, $SD$ = 5.67) than injured athletes ($M$ = 6.63, $SD$ = 5.35) $P$ = .04, $r$ = .21 and non-injured athletes ($M$ = 4.79, $SD$ = 5.26) $P$ = .000, $r$ = .32 on depressive symptoms. There was no significant difference between injured and non-injured athletes ($p$ < 0.05).

The Kruskal Wallis test showed statistically significant difference in anxiety symptoms between groups H (2) = 16.06, *P* = <.001. More specifically after significance values have been adjusted by the Bonferroni post hoc comparison, pairwise comparison test found that the panel scored significantly higher (*M* = 7.76, *SD* = 4.92) than injured athletes (*M* = 5.31, *SD* = 4.56) *P* = .035, *r* = .20 and non-injured athletes (*M* = 4.53, *SD* = 4.93) *P* = .000, *r* = .36 on anxiety symptoms. There was no significant difference between non-injured and injured athletes.

Lastly the Kruskal Wallis test for stress showed statistically significant difference in stress symptoms between groups H (2) = 10.29, *P* = .006. More specifically, after significance values have been adjusted by the Bonferroni post hoc comparison, pairwise comparison test found that the panel showed significantly higher stress symptoms (*M* = 7.79, *SD* = 2.95) than injured athletes (*M* = 5.65, *SD* = 52.85) *P* = .012, *r* = .26 and non-injured athletes (*M* = 6.2, *SD* = 3.14) *P* = .029, *r* = .23. There was no significant difference between injured and non-injured athletes. The mean rank difference between groups was despite statistical significance was low – medium (r = .20 - .36), the strongest difference being in anxiety symptoms between the panel and non-injured athletes.

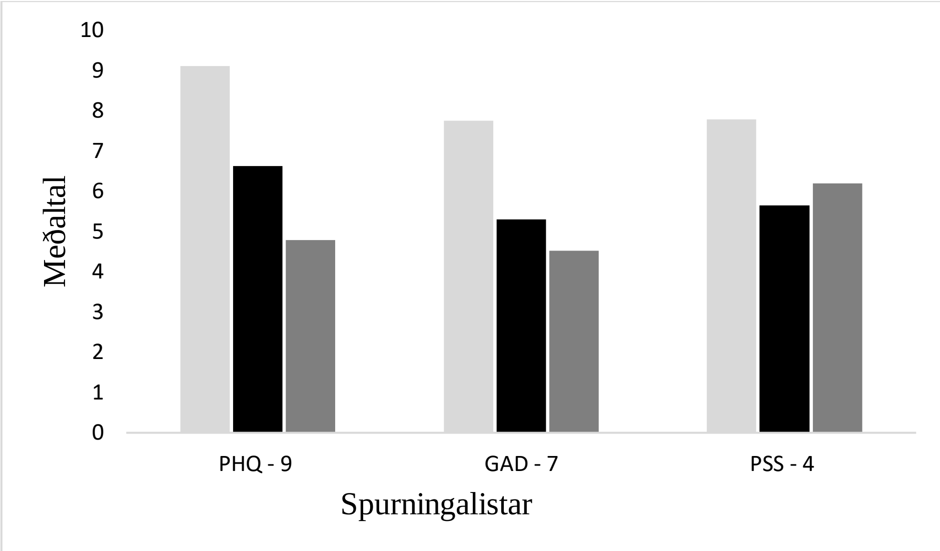


**Figure 1:** Mean score for all three questionnaires shown for the panel, injured athletes, and non-injured athletes
PHQ-9 = Patient Health questionnaire, GAD-7 = Generalized anxiety disorder, PSS-4 questionnaire

## 3.3 Relationship between athlete burnout and sport specific factors

A non–parametric test was done to see if there was a significant difference in the relationship of playing injured and athlete burnout symptoms. Kruskal Wallis test on athletes competing injured showed statistically significant difference in burnout symptoms between competing injured athletes, non-competing injured and non-injured athletes H (2) = 6.76, *P* =.034. More specifically after significance values have been adjusted by the Bonferroni post hoc comparison, pairwise comparison test found that competing injured athletes scored significantly higher (*M* = 2.41, *SD* = 1.10) on physical and emotional exhaustion dimension of athletes' burnout symptoms compared to non-competing injured (*M* = 1.46, *SD* = .60) *P* = .041, *r* = .74. There was no significant difference between other groups or other dimensions of athletes' burnout symptoms.

The Pearson correlation test on sport specific factors showed that there was no significant relationship with being injured and athlete burnout.

Table 2: Correlation table for sport specific and psychological factors in correlation to athlete burnout

| | Exhaustion | Accomplisment | Sport devaluation |
|---|---|---|---|
| Injury (*n*=83-84) | -.12 | -.08 | -.03 |
| Recurrent injury (*n*=83-84) | -.48* | -.10 | -.40* |
| Athlete-coach relationship (*n*=83-84) | -.40** | -.47** | -.48** |
| Depression (PHQ – 9) (*n*=83-84) | .45** | .41** | .28* |
| Anxiety (GAD – 7) (*n*=83-84) | .48** | .39** | .24* |
| Stress (PSS – 4) (*n*=83-84) | .36** | .48** | .23* |

*a.* Injured, 1 = yes 2 = no. Competing injured 1 = yes, 2 = no. Recurrent injury 1 = yes, 2 = no. Athlete – coach relationship 1 = very dissatisfied, 4 = very satisfied.
b.* $p < 0.05$ ** $p < 0.01$

The Pearson correlation test on recurrent injury vs. a new injury was significantly related to higher burnout symptoms in two dimensions of athlete burnout; physical and emotional exhaustion r (38) = -.48, *P* = .02 and sport devaluation r (38) = - .40, *P* = .013.

The worse the relationship athlete had with their head coach of the team the higher the burnout symptoms were in all three dimensions of athletes' burnout. Physical and emotional exhaustion r (84) = -.40, *P* = .001, sport accomplishment r (84) = .47, *P* = .001 and sport devaluation r (84) = -.48, *P* = 0.01. The relationship with the assistant coach of the team did not significantly relate to athletes' burnout symptoms.

## Relationship between mental health issues and athlete burnout.

When relationship between athletes' burnout symptoms and psychological factors; depression (PHQ-9), anxiety (GAD-7) stress (PSS-4) was explored, Pearson correlations showed that athlete depression and anxiety symptoms had significant relationship with all three dimensions of athletes' burnout. Physical and emotional exhaustion; PHQ-9; r (84) =.45, *P* = .001, GAD-7: r (84) = .48, *P* = .001, sport accomplishment PHQ-9; r (84) = .41, *P* = .001, GAD-7; r (84) = .39, *P* = .001 and sport devaluation PHQ-9; r (84) = .28, *P* = 0.03, GAD-7; r (84) = .24, *P* = .041. Perceived stress also had a significant relationship in all three dimensions of athletes' burnout. Physical and emotional exhaustion r (84) = -.36, *P* = .001, sport accomplishment r (84) = -.48, = *P* = .001 and sport devaluation r (84) = -.23, *P* .039.

# 4 Discussion

In this study, the aim was to see if injured and non-injured athletes scored on average higher on depressive and anxiety symptoms and perceived stress scale when compared to the general population in the North-east of Iceland. The aim was also to see if sport specific factors such as injury and athlete's relationship with their coach and psychological factors such as depression, anxiety symptoms and perceived stress influenced athlete burnout symptoms.

The key findings of the study were that the general population scored significantly higher than both injured and non-injured athletes in depressive and anxiety symptoms and perceived stress when the general population, injured athletes and non-injured athletes was compared. Also, sport specific and psychological factors did have a significant relationship with an increase in athlete burnout symptoms.

## Depression, anxiety, and perceived stress

The general population scored significantly higher than the athlete groups in depression, anxiety, and perceived stress. When compared, the general population and athletes significant difference effect size showed that the actual mean rank difference was above small to medium for all significant variables. This tells us that the difference in the mean score in depressive, anxiety and stress symptoms between the groups was small to medium. Also, the general population was significantly more likely to meet the clinically significant score on depressive symptoms than athletes, which tells us that the general population may potentially be more likely to meet clinical criteria for depression than athletes. The difference was not, however, significant when it came to anxiety symptoms. These results are in contrary with results by Rice et.al (2019) where it was suggested that high level athletes are at risk for high prevalence of anxiety and depression compared to the general population.

The study results showed no significant difference between injured and non-injured athletes. That is also in contradiction to past research where it has been shown that injured athletes show more symptoms of depression and anxiety than non-injured athletes (Jansen et al., 2019; Rice et al., 2019). The reason for these contradictions might be that the athlete sample in this study was small and rather few athletes were injured. It might also play a role that the athletes in our study did not necessary play in the highest league of their sport. Previous research has shown that anxiety and depressive symptoms are more common when athletes' playing at more elite levels (Jansen et al., 2019; Piussi et al., 2022). Additionally, most of the injured athletes in our study were still playing despite injuries so they might not have experienced as many symptoms of mental illnesses because they were not dealing with the side effects of identity foreclosure and social isolation that often comes with not being able to play and contributes to mental ill-health (Hughes & Leavy, 2012; Rist et al., 2020).

In a study by Lebrun et al., (2018) one athlete described that due to several injuries and pressure to play despite being injured, he was forced to quit the sport altogether and subsequently developed clinical depression. He described how having to leave the sport due to his injury also meant that he lost his job, his career, and his best friends all at the same time. This can be a traumatic experience for athletes and therefore once again demonstrates how important it is to ensure athletes have an opportunity to develop coping mechanisms and resources available to promote better mental health and well-being (Lebrun et al., 2018).

The literature has yet to conclude whether injured athletes score higher than general population in depressive and anxiety symptoms (Rice et al., 2019) and this study as well failed to show a significant difference between those two groups. With a bigger sample of injured athletes, perhaps dealing with more debilitating injuries a significant difference might have been found.

Our study showed that the general population scored significantly higher than both injured and non-injured athletes on perceived stress and significant difference affect size showed that the actual mean difference in perceived stress was between small and medium for both groups. But the difference between injured and non-injured athletes was not significant which again could be explained by the size of the athlete sample, especially for injured athletes. The above results suggest that participating in team sports in might be a protective factor for athletes' depressive, anxiety, and perceived stress symptoms, despite dealing with occasional injuries.

Despite the fact that due to prejudice athletes may consider themselves perceived as weak if seeking help concerning psychological problems, there is a sign of an improvement in attitude towards help-seeking in elite sports (Souter et al., 2018). This could also contribute to the findings of this study, where less mental illness was shown among athletes. If the prejudice and stigma is decreasing towards athletes' help seeking, the mental health problems might be getting dealt with sooner, before issues become more severe. Athletes' education on mental illness and the effect it can have on athlete's career is certainly still needed. By encouraging athletes to be more open about their mental health, share their experience and first and foremost help them enjoy greater sense of emotional wellbeing (Souter et al., 2018).

## Sport specific factors in relation to athlete burnout

Athlete's injuries can never be prevented completely but it is possible with effective management to control or reduce risk levels in sports (Fuller, 2007). Injuries were one of the sport specific factors looked at in relation to athletes' burnout.

In our study, being injured was not significantly related to increased burnout symptoms but dealing with recurrent injuries was related to the physical and emotional exhaustion and sport devaluation dimensions of burnout. When comparing athletes that are competing injured and athletes that are injured but not competing, results showed that athletes that are competing injured have significantly higher burnout symptoms than injured athletes that are not competing. These results simulate to results from a study done by Grylls and Spittle (2008) where injured athletes showed a lower score of burnout symptoms than non-injured athletes, which can be explained by lower training pressure, but their results showed that when athletes had multiple injuries, they did score higher in burnout symptoms, which could be explained by cumulative effect on burnout (Grylls & Spittle, 2008).

This study also showed that if an athlete reported being dissatisfied with his relationship with the head coach of his team, the athlete scored significantly higher in all three burnout symptom dimensions, that is physical and emotional exhaustion, devaluation of sport participation and lack of accomplishment. This is in accordance with Choi et al. (2020) where results showed that good communication between an athlete and his coach was negatively related to athlete burnout symptoms. This is also in accordance with the results from a study done by Yukhymenko-Lescroart (2022) when the athletes that were ungrateful towards things in in life and sport and reported being dissatisfied with their relationship with their coach, had high levels of burnout symptoms in all dimensions of burnout (Yukhymenko-Lescroart et al., 2022). This highlights the importance of good communication within sporting clubs and the value of creating an atmosphere where coaches and athletes feel comfortable with each other. A coach's communication skills and emotional intelligence is something that might be beneficial to investigate when recruiting coaches into the club.

## Psychological factors in relation to burnout

Correlation with psychological factors and athlete burnout symptoms showed that athletes that scored higher in depressive and anxiety symptoms had increased symptoms of burnout, especially in the physical and emotional exhaustion, and lack of accomplishment dimensions. Athletes that had a higher perceived stress score had increased burnout symptoms in all three dimensions and like with depression and anxiety symptoms the increase was especially in physical and emotional exhaustion and lack of accomplishment dimensions of athlete burnout. These results are consistent with the Cognitive-Affective Stress Model which states that if athletes´ cognitive conception of the stressors in their life is greater than their ability to deal with the stressors it could lead to burnout. Research has also shown that perceived psychological stress is consistently a positive predictor for burnout symptoms (Gustafsson et al., 2014).

The above results indicate that there are many factors that can affect athlete's burnout and it is important for athletes, coaches, and sports club managers to be aware of the risks. The results indicate that it is especially important to be aware of the effect that the relationship between athlete and head coaches can have on burnout as well as athletes' mental health issues.

## Strengths and limitations

The strengths of this study is that this is the only study on mental health issues comparing athletes and the general population in Iceland as well as the first study to look at such a broad sample of factors that can affect an athlete's burnout. It can also be considered a strength that the study was done in confined area of Iceland, where all athletes and panel sample were living in the Northeast of Iceland. This can be important since it is likely they live under the same contextual circumstances when it comes to for example daylight, weather conditions and travel distances, reducing the influence of potential unmeasured external factors on the observed effects.

There were some limitations to the study. The sample was rather small, especially the athlete sample. Injured athletes were very few and almost all were playing despite being injured. This could affect the statistical analysis results. Also, the estimated population for athletes was found on the web site for each sports club and coaches estimated number of athletes which might not be accurate. For the general population, the estimated total population was found on Hagstofa Íslands' (Statistics Office of Iceland) website and information there was from 2021.

There was a significant gender difference between the athlete and panel sample. In the panel sample there were more female participants than male participants, which could affect the results as former research have shown women reporting more depressive symptoms than males in born athletes and general population. Herrero et al. (2021) says that symptoms of depression and anxiety are higher in the female general population compared to the male general population and that the same goes for the athlete population.

The athlete sample had more male participants than female participants. Due to small sample size, it was not possible to control for gender difference in the analysis. There was also a significant age difference between the panel and athletes, that was controlled for by lowering the sample´s age to 32 and younger in the comparison for mental health, which gave more equal sized comparison groups, however the difference between the athletes’ and the general population’s age was still significant. It should however be noted that younger age has often been linked with more mental health issues, hence, if age effects would have been significant, the athlete sample that was on average younger than the panel group, would have been expected to show higher scores on mental health outcomes. This was however not the case.

## Future research

For future studies it could be beneficial to have a larger sample especially athlete sample and it would be beneficial to have larger sample of injured athletes. Future research should consider comparing individual sports athletes and team sports athletes in relation to depression, anxiety, and stress as well as burnout. There are some indications in the literature that adolescent athletes participating in individual sports are more likely to report depressive symptoms compared to team sport athletes (Pluhar et al., 2019). Studies done on collegiate athletes by Wolanin et al. (2016) show similar results. Also, it could be interesting to compare athletes that either play professionally at the highest level of their sport or are in the national team of their sport with the general population.

# 5 Conclusion

Based on the result of this study athletes show less symptoms of depression, anxiety, and perceived stress than the general population in the Northeast part of Iceland. Therefore, it is important to educate the population on how sports participation can be beneficial to prevent mental health issues.

Results pertaining to burnout symptoms indicate that it is important for athletes to regain full mental and physical health before returning to competition to prevent recurrent injuries. Results showed that athletes that compete injured or have recurrent injuries have increased burnout symptoms. It is important to educate coaches and athletes about these findings, to prevent that athletes pushing themselves too much and to stop coaches from putting too much pressure on athletes, but rather give them rest when needed.

It is important that athletes are satisfied with their relationship with the head coach of their team to prevent an increase in burnout symptoms and for that reason also vital sport clubs educate their coaches as well as athletes on the importance of good communication between athletes and coaches. It is also important to educate both athletes and coaches on symptoms of mental health issues like depression, anxiety, and stress so that measures can be taken as soon as an issue arises to help the athletes that are suffering.

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# Appendix

## Appendix 1

Cover letter that was sent to the athlete population

Háskólinn á Akureyri

Kynningarbréf til þátttakenda í rannsókninni:

*Sálræn vanlíðan og vellíðan hjá íþróttamönnum á Norðurlandi eystra: Langtímarannsókn á áhættu- og verndandi þáttum*

**Ágæti viðtakandi**

Tilefni bréfsins er að óska eftir þátttöku þinni í rannsókn á *Sálræn vanlíðan og vellíðan hjá íþróttamönnum á Norðurlandi eystra: Langtímarannsókn á áhættu- og verndandi þáttum.* Rannsóknin byggist á spurningalista sem inniheldur 125 spurningar. Ábyrgðarmaður rannsóknarinnar er Dr. Richard Eiríkur Taehtinen lektor í klínísk íþróttasálfræði við Háskólann á Akureyri.

Málefni tengd andlegri líðan afreksíþróttafólks hafa verið í brennidepli upp á síðkastið. Rannsóknir hafa sýnt að ýmsir þættir eins og væntingar um velgengni, ofþjálfun og meiðsli, geta haft neikvæð áhrif á líðan afreksíþróttafólks. Með niðurstöðum rannsóknarinnar er vonast til að hægt verði að bjóða upp á betri fræðslu á áhættu- og verndandi þáttum sem spá fyrir um andlega líðan og í framhaldinu getað þróað sérsniðnar forvarnir og íhlutanir hjá afreksíþróttafólki.

**Þátttakendur og skilyrði fyrir þátttöku**

Þátttakendur í þessari rannsókn eru einstaklingar sem æfa hópíþróttir á Norðurlandi eystra á efsta stigi/í meistaraflokki keppnistímabilið 2021/2022,

18 ára og eldri, ásamt þjálfurum þeirra. Einnig verður
fenginn samanburðarhópur úr almennu úrtaki.

## Hvað felst í þátttöku og birting niðurstaðna

Þú svarar spurningalista sem er að finna á vefslóð neðst í þessu bréfi. Með því að svara spurningalistanum veitir þú upplýst samþykki fyrir því að leyfa rannsakendum að nýta gögnin sem fást með svörun á spurningalistanum, sem þó verða ópersónugreinanleg. Áætlað er að það taki ekki meira en 20 mínútur að svara og við biðjum þig að svara ekki seinna en tveim vikum eftir að þú færð þetta bréf. Spurningalistann færðu svo sendan þrisvar sinnum til viðbótar að ná sem bestri yfirsýn yfir íþróttatengda streituvalda sem eru til staðar á mismunandi álagstímum í íþróttagreininni þinni. Rannsóknarniðurstöður verða birtar í meistaraverkefnum, tímaritsgreinum og fyrirlestrum á viðeigandi stöðum. Ef þú svarar spurningalistanum í öll fjögur skiptin færðu umbun, gjafabréf á Glerártorg að verðmæti 4000 krónur.

## Úrvinnsla gagna

Öll gögn verða ópersónugreinanleg og fara í gegnum Rannsóknarmiðstöð Háskólans á Akureyri (RHA) sem tryggir enn frekar að gögnin verða ópersónugreinanleg. Farið verður að íslenskum lögum varðandi persónuvernd og vinnslu gagna í tölfræðiforritum, en rannsóknin hefur verið samþykkt af Vísindasiðanefnd.

## Að taka þátt

Til að taka þátt ferð þú inn á spurningalistann hér (*vefslóð*). Þér ber engin skylda til að taka þátt í rannsókninni og getur hætt í rannsókninni á hvaða stigi sem er án útskýringa og án nokkurra afleiðinga fyrir þig. Þú getur einnig sleppt því að svara hluta spurninganna ef þú kýst. Það er hins vegar mikilvægt fyrir rannsóknina að sem flestum spurningum sé svarað. Hluta þátttakenda verður boðið að taka þátt í heilarafritsrannsókn (EEG) á rannsóknarstofu í Háskólanum á Akureyri. Í spurningalistanum verður sérstaklega spurt um hvort rannsakendur megi hafa samband við þig til að kynna þér þann hluta verkefnisins.

Ef þú finnur fyrir vanlíðan við þátttöku í rannsókninni getur þú haft samband við Sólveigu Rósu Davíðsdóttur, sálfræðing (netfang: solveigrosad@gmail.com), þér að kostnaðarlausu.

Hafir þú spurningar eða ef þú vilt koma á framfæri athugasemdum í tengslum við rannsóknina er þér velkomið að hafa samband við undirritaða:

Richard Eiríkur Taehtinen *sími:* 460-8000; richard@unak.is

*Kærar þakkir fyrir að gefa þér tíma til að lesa þetta bréf. Með von um góða þátttöku.*

# Appendix 2

Cover letter that was sent to the general population

Háskólinn á Akureyri

Kynningarbréf til þátttakenda í rannsókninni:

*Sálræn vanlíðan og vellíðan á Norðurlandi eystra: Langtímarannsókn á áhættu- og verndandi þáttum*

**Ágæti viðtakandi**

Tilefni bréfsins er að óska eftir þátttöku þinni í rannsókn á *Sálræn vanlíðan og vellíðan á Norðurlandi eystra: Langtímarannsókn á áhættu- og verndandi þáttum.* Rannsóknin byggist á spurningalista sem inniheldur 92 spurningar. Ábyrgðarmenn rannsóknarinnar eru Dr. Richard Eiríkur Taehtinen lektor í sálfræði við Háskólann á Akureyri og Dr. Nanna Ýr Arnardóttir lektor í lífeðlisfræði við Háskólann á Akureyri.

Málefni tengd andlegri líðan hafa verið í brennidepli upp á síðkastið. Með niðurstöðum rannsóknarinnar er vonast til að hægt verði að bjóða upp á betri fræðslu á áhættu- og verndandi þáttum sem spá fyrir um andlega líðan meðal íbúa á Norðurlandi eystra.

**Þátttakendur og skilyrði fyrir þátttöku**

Þátttakendur í þessari rannsókn eru einstaklingar 18-40 ára búsettir á Norðurlandi eystra. Einnig verður fenginn samanburðarhópur sem æfa hópíþróttir á efsta stigi/í meistaraflokki keppnistímabilið 2021/2022.

### Hvað felst í þátttöku og birting niðurstaðna

Þú svarar spurningalista sem er að finna á vefslóð neðst í þessu bréfi. Með því að svara spurningalistanum veitir þú upplýst samþykki fyrir því að leyfa rannsakendum að nýta gögnin sem fást með svörun á spurningalistanum, sem þó verða ópersónugreinanleg. Áætlað er að það taki ekki meira en 15 mínútur að svara og við biðjum þig að svara ekki seinna en tveim vikum eftir að þú færð þetta bréf. Spurningalistann færðu svo sendan þrisvar sinnum til viðbótar að ná sem bestri yfirsýn yfir líðan á mismunandi tímum. Rannsóknarniðurstöður verða birtar í meistaraverkefnum, tímaritsgreinum og fyrirlestrum á viðeigandi stöðum. Ef þú svarar spurningalistanum í öll fjögur skiptin færðu umbun, gjafabréf á Glerártorg að verðmæti 4000 krónur.

### Úrvinnsla gagna

Öll gögn verða ópersónugreinanleg og fara í gegnum Rannsóknarmiðstöð Háskólans á Akureyri (RHA) sem tryggir enn frekar að gögnin verða ópersónugreinanleg. Farið verður að íslenskum lögum varðandi persónuvernd og vinnslu gagna í tölfræðiforritum, en rannsóknin hefur verið samþykkt af Vísindasiðanefnd.

### Að taka þátt

Til að taka þátt ferð þú inn á spurningalistann hér *(vefslóð).*

Þér ber engin skylda til að taka þátt í rannsókninni og getur hætt í rannsókninni á hvaða stigi sem er án útskýringa og án nokkurra afleiðinga fyrir þig. Þú getur einnig sleppt því að svara hluta spurninganna ef þú kýst. Það er hins vegar mikilvægt fyrir rannsóknina að sem flestum spurningum sé svarað. Ef þú finnur fyrir vanlíðan við þátttöku í rannsókninni getur þú haft samband við Sólveigu Rósu Davíðsdóttur, sálfræðing (netfang: solveigrosad@gmail.com), þér að kostnaðarlausu.

Hafir þú spurningar eða ef þú vilt koma á framfæri athugasemdum í tengslum við rannsóknina er þér velkomið að hafa samband við undirritaða:

Richard Eiríkur Taehtinen *sími:* 460-8000; richard@unak.is
Nanna Ýr Arnardóttir *sími:* 460-8558 ; nanna@unak.is

*Kærar þakkir fyrir að gefa þér tíma til að lesa þetta bréf. Með von um góða þátttöku.*

# Appendix 3

Approval from Icelandic Bioethics Committee

VÍSINDASIÐANEFND
Borgartúni 21 - 4. hæð
105 Reykjavík,

Sími: 551 7100

netfang: vsn@vsn.is www.vsn.is

Richard Eirikur Taehtinen, lektor
Háskólinn á Akureyri
richard@unak.is

Reykjavík 12. janúar 2022
Tilv.: VSNb2021120015/03.01

Efni: VSN-22-002- Sálræn vanlíðan og vellíðan hjá íþróttamönnum á Norðurlandi eystra: Langtímarannsókn á áhættu- og verndandi þáttum.

Umsókn þinni til vísindasiðanefndar hefur verið gefið númerið **VSN-22-002**. Við förum vinsamlegast fram á að það númer verði notað í samskiptum vegna þessarar umsóknar.

Á fundi sínum þann 11. janúar 2022 fjallaði vísindasiðanefnd um umsókn þína vegna ofangreindrar rannsóknaráætlunar. Meðrannsakendur þínir eru: *Nanna Ýr Arnardóttir (ábyrgðarmaður), lektor í lífeðlisfræði við Háskólann Akureyri, Próf. Yvonne Höller (meðrannsakandi), prófessor við sálfræðideild Háskólans á Akureyri, Próf. Ragnar Pétur Ólafsson (meðrannsakandi), prófessor við sálfræðideild Háskóli Íslands, ragnarpo@hi.is, Dr. Göran Kenttä (meðrannsakandi), The Swedish School of Sport and Health Sciences, Goran.Kentta@gih.se, Dr. Johanna Belz (meðrannsakandi), German Sport University Cologne, J.Belz@dshs-koeln.de Próf. Jens Kleinert (meðrannsakandi), German Sport University Cologne, Kleinert@dshs-koeln.de, Ásgerður Ragnarsdóttir, meistaranemi í heilbrigðisvísindum og Fríða Rún Einarsdóttir, nemi í rannsóknartengdu meistaranámi í sálfræði.*

Í B-1 segir eftirfarandi um rannsóknarúrtakið: *Allir iðkendur hópíþrótta á efsta stigi (meistaraflokki) á Norðurlandi eystra, 18 ára og eldri, skráðir til keppni í sinni íþrótt, tímabilið 2021-2022 ásamt þjálfurum þeirra. Einnig verður 700 manna samanburðarhópur úr almennu úrtaki á vegum RHA notaður. Þátttakendum verður skilmerkilega gert grein fyrir því að með því að svara fyrirlögðum spurningalista, samþykki hann þátttöku sína í rannsókninni. Fylgt verður persónuverndarstefnu RHA, sjá hér: https://www.rha.is/is/um-okkur/ persónuverndarstefna-rha. Eins verður skilmerkilega tekið fram að við hann verið aftur haft samband til að svara spurningalistanum endurtekið (þrisvar til viðbótar). Sérstök spurning verður lögð fram í spurningalistanum um það hvort hafa megi samband og bjóða þátttöku í EEG hluta rannsóknarinnar. Einungis verður haft samband við þá, sem gefa leyfi til þess. Þeir sem gefa leyfi fyrir EEG hluta rannsóknarinnar hitta rannsóknaraðila sem kynnir þátttakanda gaumgæfulega fyrir rannsóknarhlutanum áður en upplýsts samþykkis er aflað. Samþykki hefur áður fengist hjá Vísindasiðanefnd fyrir sambærilegri EEG rannsókn hjá Dr. Yvonne Höller (19-090-V1-Are seasonal changes in affect associated with EEG-biomarkers and cognitive vulnerabilities for depression).*

Vísindasiðanefnd sér því ekkert til fyrirstöðu að umsækjandi fái aðgang að þeim upplýsingum sem upp eru taldar í kafla B-2 í umsókn. Með vísan til 1. mgr. 12. gr. laga nr. 44/2014, um vísindarannsóknir á heilbrigðissviði, er rannsóknaráætlunin endanlega samþykkt með þeim almenna fyrirvara að lögbundið samþykki skráarhaldara skv. 2. mgr. 27. gr. laga nr. 44/2014 verður að liggja fyrir áður en vinna með heilbrigðisgögn viðkomandi stofnunar/skráarhaldara hefst.

Vakin er athygli á að innan gildistíma leyfis nefndarinnar er gert ráð fyrir gagnaöflun, úrvinnslu gagna og birtingu niðurstaðna. Einnig er vakin er athygli á að leyfi nefndarinnar miðast við rannsóknarlok sem tilgreind eru í umsókn, nema sótt verði um framlengingu á gildistíma leyfis innan þess tíma. Rannsóknarlok skv. umsókn eru 28.02.2023.

**Vísindasiðanefnd áréttar að ábyrgðarmaður rannsóknarinnar ber ábyrgð á að sótt sé um viðeigandi leyfi fyrir rannsókninni hjá þeim stofnunum sem við á. Óheimilt er að hefja framkvæmd rannsóknarinnar fyrr en þau liggja fyrir. Afrit leyfa/samstarfsyfirlýsinga þurfa að berast nefndinni. Áréttað er að allar fyrirhugaðar breytingar á þegar samþykktri rannsóknaráætlun þurfa að koma inn til nefndarinnar til umfjöllunar. Jafnframt ber ábyrgðarmanni að sækja um breytingar til þeirra stofnanna, sem veitt hafa leyfi vegna framkvæmdar rannsóknarinnar eða öflunar gagna, um framangreint, ef við á. Vísindasiðanefnd bendir rannsakendum vinsamlegast á að birta VSN tilvísunarnúmer rannsóknarinnar þar sem vitnað er í leyfi nefndarinnar í birtum greinum um rannsóknina. Minnt er á að tilkynna rannsóknarlok til nefndarinnar.**

Með kveðju og ósk um gott rannsóknargengi, f.h. vísindasiðanefndar,

Sunna Snædal

Sunna Snædal, læknir, formaður