



**Háskólinn  
á Akureyri**  
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# **Habitual Negative Thinking and depressive symptoms in Icelandic team sport athletes and the general population**

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Sálfræðideild  
Hug- og félagsvísindasvið  
Háskólinn á Akureyri  
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Adam Eiður Ásgeirsson

12 eininga lokaverkefni  
sem er hluti af  
Baccalaureus Artium-prófi í sálfræði

Leiðsögukennari/-ar/ráðunautur  
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Sálfræðideild  
Hug- og félagsvísindasvið  
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Akureyri, maí 2023

Titill: Habitual Negative Thinking and depressive symptoms in Icelandic team sport athletes and the general population

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# Útdráttur

**Bakgrunnur:** Geðræn vandamál eru ríkjandi meðal íþróttafólks, og mikilvægi þess að skoða undirliggjandi ferli þessara geðrænu vandamála er gífurlegt.

**Tilgangur:** Í þessari rannsókn var leitast við að skoða samband venjubundinna neikvæðra hugsana, almennra þátta og íþróttatengdra þátta, við þunglyndiseinkenni hjá íþróttafólki og almennu þýði.

**Aðferð:** Gögn úr spurningalista íslenskrar rannsóknar, sem var framkvæmd árið 2020, voru notuð í þessari rannsókn. Þátttakendur voru 285 talsins, þar af 84 sem stunduðu íþróttir og 201 sem ekki stunduðu íþróttir. PHQ-9 þunglyndisskalinn var notaður til að mæla þunglyndiseinkenni og Habit Index of Negative Thinking (HINT) skalinn var notaður til að mæla tilhneigingu til venjubundinna neikvæðra hugsana.

**Niðurstöður:** Íþróttafólk var almennt með lægri skor á þunglyndisskalanum heldur en almenna þýðið í þessari rannsókn. Niðurstöður sýndu að venjubundnar neikvæðar hugsanir spáðu fyrir um þunglyndisskor meðal íþróttafólks, frekar heldur en almennir þættir og íþróttatengdir þættir. Venjubundin neikvæð hugsun sýndi fylgni við 8 af 9 stökum þunglyndiseinkennum.

**Umræða:** Rannsóknir hafa sýnt að íþróttafólk er viðkvæmt fyrir geðrænum vandamálum og þetta vandamál virðist oft á tíðum vera vanrækt. Í ljósi streituvaldandi aðstæðna íþróttafólks er einkar mikilvægt að koma á fót aðferðum sem hjálpa íþróttafólki að koma í veg fyrir, draga úr og meðhöndla þunglyndiseinkenni.

**Ályktun:** Niðurstöðurnar sýna að venjubundnar neikvæðar hugsanir eru mikilvægt undirliggjandi ferli í geðheilbrigði íþróttafólks, og framtíðarrannsóknir gætu skoðað hvernig venjubundnar neikvæðar hugsanir spá fyrir um þunglyndi yfir tíma.

*Lykilhugtök:* Íþróttafólk, þunglyndiseinkenni, venjubundnar neikvæðar hugsanir

# Abstract

**Background:** Negative mental health outcomes are prevalent in the population of athletes, and it is critical to investigate the underlying processes of those negative mental health outcomes.

**Aims:** The present study aimed to assess the relationship between habitual negative thinking, as well as generic and sport-specific factors, and depressive symptoms in athletes and non-athletes.

**Methods:** Data from an Icelandic questionnaire on athletes and non-athletes from 2020 was used in this study. The sample consisted of 285 participants, including 84 athletes and 201 non-athletes. The PHQ-9 depression scale was used to assess depressive symptoms and the Habit Index of Negative Thinking (HINT) was used to measure habitual negative thinking.

**Results:** Athletes reported significantly lower depression scores than non-athletes in the current sample. The present study found that habitual negative thinking was a predicting factor in depression scores among athletes, rather than generic and sport-specific factors. Habitual negative thinking correlated significantly with 8 out of 9 individual depressive symptoms.

**Discussion:** Athletes have shown to be vulnerable to negative mental health outcomes, and it seems to be a neglected issue. It is important, considering the stressful environments of athletes, to determine methods to help athletes prevent, reduce and treat depressive symptoms.

**Conclusion:** The current findings show that habitual negative thinking is a key underlying process in athletes' negative mental health outcomes, and future research could investigate further how it predicts depressive symptom in athletes over time.

*Keywords:* Athletes, depressive symptoms, habitual negative thinking

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# Introduction

There is robust evidence supporting the beneficial mental health outcomes of physical activity (Mikkelsen et al., 2017). This evidence has been generated through research among children (Moeijes et al., 2018), adolescents (Wegner et al., 2020), and young and older adults (Herbert et al., 2020; Kadariya et al., 2019). This evidence would intuitively suggest that athletes who are known to be highly physically active would also show superior mental health compared to the general population. However, recent research suggests that negative mental health outcomes are just as common in the population of athletes as in the general population (Beable et al., 2017; Gerber et al., 2018). As research in this area is a relatively recent phenomenon, most studies have remained at a descriptive level and focused largely on demographic factors such as age, gender or the type of sport (Nixdorf et al., 2020; Tahtinen et al., 2021). While the knowledge of descriptive data (e.g., gender differences in athletes' mental health outcomes) is important, there is also a need to explore the underlying processes to better understand individual differences in depression (Nixdorf et al., 2020). This could potentially enhance future prevention and treatment of mental health issues such as depressive symptoms in athletes.

Depression is a common and serious mental disorder which influences how one feels, thinks and acts (National Institute of Mental Health, 2020). The World Health Organization (2023) estimates that 3,8% of the world's population will experience depression at some point, including 5% of adults. Furthermore, women (5,1%) are more likely to experience depression than men (3,6%) (World Health Organization, 2017). Although depression rates vary between age groups, the disorder is relevant among people of all ages (World Health Organization, 2017).

The vulnerability-stress theories (diathesis-stress model) of depression assume that different psychological and cognitive makeup of individuals influences how life-events are interpreted, meaning that the same event can be interpreted in different ways by different individuals (Hankin et al., 2004). Studies have suggested and empirically demonstrated that individuals with tendencies of negative thinking patterns, such as worrying and rumination, are more vulnerable to depression (Nolen-Hoeksema et al., 2008). Nixdorf et al. (2020) found

that dysfunctional attitudes predicted depressive symptoms in young elite athletes over one sport season. Similar to findings among the general population, their findings supported the vulnerability-stress model in that individual differences in interpretation of life events in athletes predict how they react to stress. Furthermore, scholars have proposed that the habitual aspects of negative thinking may be the centerpiece in the onset and recurrence of depressive symptoms (Verplanken et al., 2007). These findings have brought to light the need of examining more thoroughly how habitual negative thinking plays a role in negative health outcomes. It is particularly necessary to investigate the habitual nature of the negative thinking process, rather than the sole content of the thoughts (Verplanken & Orbell, 2003; Watkins & Noel-Hoeksema, 2014; Ólafsson et al., 2020).

Studies on general populations as well as clinical populations have showed empirical evidence that it is a significant factor in understanding severe distress, yet research on habitual negative thinking is notably limited in the population of athletes (Verplanken et al., 2007; Hjartarson et al, 2021; Tahtinen et al., 2021). Thus, to gain further understanding of the underlying processes of mental health in athletes, the aim of this thesis was to further investigate habitual negative thinking in athletes in relation to depressive symptoms.

## Depression

The Diagnostic and Statistical Manual of Mental Disorders: Fifth Edition (DSM-5) defines depression as a medical illness that negatively affects how an individual feels, thinks and acts. DSM-5 lists nine core symptoms of depression: a) lack of interest/anhedonia, b) depressed mood, c) issues with sleep, d) lack of energy, e) appetite, f) worthlessness/guilt, g) trouble with concentration, h) psychomotor issues, i) suicidal thoughts (DSM-5; American Psychiatric Association, 2013). To be diagnosed with major depressive disorder (MDD), five or more of these symptoms must have been present during the same 2 week period, and at least one of the symptoms needs to be either „little interest or pleasure in doing things“ or „feeling down, depressed, or hopeless“ (DSM-5; American Psychiatric Association, 2013).

Even though research in this field is fairly young, there is some evidence that depression is just as prevalent in athletes as in the general population (Junge & Fedderman Demont, 2016; Beable et al., 2017). In a study performed on Swiss football players as well as non-athletes, Junge & Fedderman Demont (2016) concluded that there was no difference in prevalence of depression between football players and the general population, and supporting

that notion, Beable et al. (2017) found that 21% of athletes reported symptoms consistent with depression.

Although depression has shown to be prevalent in all ages, some research has pointed towards the notion that athletes in their young adulthood are more vulnerable to depression than older athletes. When examining young elite athletes, Gerber et al. (2018) found that 9% of athletes had clinically relevant depressive symptoms. Junge & Fedderman Demont (2016) found male U-21 football players to have higher prevalence of depression than other athletes and the general population. In the study by Beable et al. (2017), 13 out of 16 athletes that were above the cut off score to reflect a possible major depressive episode, were under the age of 25. However, the researchers were not able to test for statistical significance since the sample size was too small (Beable et al., 2017).

Furthermore, there is robust evidence that depression is more prevalent in women than men (World Health Organization, 2017; Bijl et al., 2002). These findings have been supported in research in athletes as well. In Junge & Fedderman Demont's (2016) study, the prevalence of depression was 13% among female and 9% among male players. Likewise, Wolanin et al. (2016) showed in their study a significant gender difference in clinically relevant depressive symptoms, with female athletes being significantly more at risk than male athletes. Contrary to those findings, Beable et al. (2017) found no difference between genders in depressive symptoms in athletes.

Several sport-specific risk factors for increased depressive symptoms have also been identified, such as injuries, coach-athlete relationship, fatigue and performance concerns, among others (Beable et al., 2017; Simons & Bird, 2022). Injury is an especially relevant risk factor for increased depressive symptoms among athletes. In the study by Junge & Fedderman Demont (2016) performed on Swiss football players, injured players had higher depression scores than uninjured players. Gerber et al. (2018) also concluded that athletes with a current injury perceived more depressive symptoms than those not currently injured. Another highly relevant factor for depressive symptoms in athletes is the coach-athlete relationship. Powers et al. (2020) showed coach-athlete relationships to be significantly correlated to depression in athletes. In a study performed on 153 student athletes, Simons & Bird (2022) found that the coach-athlete relationship correlated positively with well-being in athletes, regardless of sport. These findings support the premises that athletes' mental health is significantly related to the quality of their relationship with their coach.

## The underlying processes in depression

Individuals who are more vulnerable to depression tend to have a more inflexible and passive way of responding to life-events (Nolen-Hoeksema et al., 2008). This inflexible and passive response style was defined by Nolen-Hoeksema (1991) as depressive rumination - a repetitive thought process focusing on the meaning and implications of one's negative mood and distress. Treynor et al. (2003) later proposed two components of rumination: brooding rumination and reflective rumination. Brooding rumination is defined as an automatic thinking process, whereas reflective rumination is defined as goal-oriented response style (Treynor et al., 2003). Studies have shown that brooding rather than reflective rumination is a more robust predictor of depression (Ólafsson et al., 2020; Hjartarson et al., 2021). Still, the actual measure of rumination by Nolen Hoeksema (1991), and later Treynor et al. (2003), does not explicitly measure the habitual characteristics of negative thinking processes. Furthermore, although the original theory of rumination proposed by Nolen-Hoeksema defines depressive rumination as a habitual response to distress, the theory did not explicitly discuss how rumination becomes habitual. In order to improve on this gap, Watkins and Nolen-Hoeksema (2014) extended the theory and proposed the habit-goal framework of rumination, acknowledging the habitual nature of depressive rumination.

Habits can be defined as “learned sequences of acts that have become automatic responses to specific cues and are functional in obtaining certain goals or end-states” (Verplanken & Aarts, 1999). This definition suggests that repetition is a fundamental characteristic of habits – a history of repetition allows a behavior to become habitual. Yet, the psychological construct of habit includes more elements – specifically automaticity (Verplanken & Orbell, 2003). In addition to repetition, Verplanken & Orbell (2003) assumed that three features of automaticity – uncontrollability, lack of awareness, and efficiency – would characterize the experience of habits in everyday life. They developed a 12-item instrument, the Self-Report Habit Index (SRHI), which measures habit strength by three main features of habit – history of repetition, automaticity, and expression of one's identity (Verplanken & Orbell, 2003). The SRHI, with high internal reliability, correlated consistently and significantly with the automatic features of habit, showing evidence that habits are not only a measure of history of repetition, but also automaticity (Verplanken & Orbell, 2003).

These findings by Verplanken & Orbell (2003) are essential elements in the Habit Index of Negative Thinking (HINT), a metacognitive instrument proposed by Verplanken et al. (2007) to assess negative self-thinking as a mental habit. The authors found that the

habitual aspects of negative self-thinking may significantly impact self-evaluative processes and predict anxiety and depressive symptoms as well as implicit low self-esteem (Verplanken et al., 2007).

Although habitual negative self-thinking and rumination were shown to be correlated, the study showed evidence of distinction between the two constructs, as well as (absence of) mindfulness (Verplanken et al., 2007). The distinction between the two mainly lies in the fact that while the construct of brooding rumination (Treynor et al. (2003)) focuses solely on the content of negative thoughts and one's discrepancy between current situation and a desired situation, habitual negative self-thinking is specifically focused on the habitual nature of negative thoughts, rather than the content of the thoughts (Verplanken et al., 2007).

The existing research on the habitual characteristics of depression in the population of athletes has mostly focused on the significance of rumination on depressive symptoms (Tahtinen et al., 2021). To date, there is little empirical evidence for the effect of habitual negative thinking in athletes, and sports psychology scholars have proposed the need for more specific measures to assess habitual negative thinking in athletes (Tahtinen et al., 2021).

## Existing research on habitual negative thinking and mental health in athletes

Negative thought processes and in particular rumination have proven to play a significant role in athletes' mental health. Tahtinen et al. (2021) suggested that rumination correlated with depressive symptoms in Icelandic elite athletes (Tahtinen et al., 2021). Moreover, rumination has a significant impact on not only mental health, but athletes' performance as well. Two psychological disorders of control; the yips (defined by loss of ability to perform a particular movement pattern, and the symptoms of involuntary jerks, spasms, tremors and freezing; Bawden & Maynard, 2001) and the lost move syndrome (LMS; defined by loss of awareness of one's body positioning and limbs locking, decreasing ability to execute a specific skill, and involuntary twists, rotations or unwanted body positions; Day et al., 2006), have been associated with rumination. Bennett et al. (2016) proposed evidence that the tendency of rumination is correlated with vulnerability to the yips and LMS, which are disorders that decrease performance and provoke stress in athletes.

Brooding rumination Treynor et al. (2003) has shown to be more reflective of negative health outcomes than reflective rumination, which was supported by Ólafsson et al. (2020). However, that study tested only Icelandic university students. To test the findings of Ólafsson

et al. (2020) in the population of athletes, Tahtinen et al. (2021) performed a study on Icelandic elite athletes, which showed that athletes with higher levels of brooding rumination were significantly more likely to report depressive symptoms, rather than athletes with lower levels of brooding rumination. To explore the effects of brooding on depressive symptoms over time, Tahtinen et al. (2021) performed a longitudinal research design study on Icelandic elite athletes and found that athletes who reported higher brooding tendencies in the beginning of the study were significantly more likely to report a greater increase in depressive symptoms with raised stress levels during the period of the study, showing empirical evidence that brooding rumination predicts depressive symptoms in athletes over time.

Nonetheless, traditional rumination measures do not explicitly measure the habitual characteristics of negative thinking processes, and although brooding rumination might be similar to, and has shown correlation with the Nolen-Hoeksema's (2014) habit-goal framework of depressive rumination, these measurements may not fully capture the habituality of these negative thinking processes.

Conversely, the Habit Index of Negative Thinking (HINT) is specifically designed to measure the habitual aspect of negative thinking, e.g., with items such as "I do unintentionally", measuring the unintentionality and automaticity of thoughts. The HINT has shown to predict depressive symptoms in the general and clinical population, but research in the population of athletes is severely lacking, to gain better understanding of how habitual negative thinking affects athletes' mental health.

## Aims

The first aim of this study was to investigate whether athletes differentiated from the general population in depressive symptoms, as well as habitual negative thinking. In line with recent research suggesting that depressive symptoms are notably relevant in the population of athletes, it was hypothesized that no significant difference would be found in those measures between athletes and non-athletes (Beable et al., 2017; Gerber et al., 2018).

The second aim of this study was to explore the correlation between generic factors, such as gender and age, sport-specific factors, such as injury and coach-athlete relationship, habitual negative thinking, and depressive symptoms in athletes. In line with earlier research showing that depression is more common among female athletes than male athletes, it was hypothesized that women would report to be more vulnerable to depressive symptoms (Junge & Fedderman Demont, 2016; Gerber et al., 2018). Additionally, earlier research has pointed

to the notion that younger athletes are more vulnerable to depression than older athletes, and thus it was hypothesized that age would lead to a significant difference in depressive symptoms (Junge & Fedderman Demont, 2016; Gerber et al., 2018). According to what research has suggested, it was also hypothesized that injury and poor coach-athlete relationship would significantly predict depressive symptoms (Junge & Fedderman Demont, 2016; Gerber et al., 2018; Powers et al. (2020). Lastly, in line with the findings of Verplanken et al. (2007) findings on the general population, it was hypothesized that habitual negative thinking would be a predicting factor for depressive symptoms.

The third and final aim of the present study was to assess the association between habitual negative thinking and the core depressive symptoms in athletes. Based on the findings of Verplanken et al. (2007) concerning the general population, it was hypothesized that increasing habitual negative thinking in athletes would significantly predict increases in depressive symptoms, assessed with the PHQ-9 module.

## Participants

Participants for the study included team sport athletes in the Northeast region of Iceland, and the study included 285 valid participants. Of the total participants, the mean age was 36.6 years ( $SD=8.2$ ). 40% of participants ( $n=114$ ) identified as male, and 60% ( $n=171$ ) of participants identified as female. Within the sample, 40.3% ( $n=115$ ) were athletes, and within the athlete sample, the mean age was 22.9 ( $SD=5$ ). 57.1% ( $n=48$ ) of the athletes in the sample identified as male, and 42.9% ( $n=36$ ) identified as female. Non-athletes made up 59.7% ( $n=202$ ) of the sample. Within the non-athlete sample, the mean age was 35.3 ( $SD=6.2$ ), and 32.8% of non-athlete participants identified as male, while 67.2% identified as female.

## Measures

### Habit index of negative thinking (HINT)

The habitual quality of negative thinking was assessed with the Habit Index of Negative Thinking (HINT; Verplanken et al., 2007). HINT is a 12 item self-report scale which measures the core habitual qualities of negative thoughts: their frequency, they are initiated without awareness, are unintentional, difficult to control and self-descriptive. The HINT captures the repetitive and automatic nature of thoughts by a 7-point scale in response to the general prompt. Verplanken et al. (2007) have shown that habitual negative thinking is, although related, empirically distinct, as HINT has shown to contribute to feelings of low self-

worth to a degree that rumination does not. The Icelandic version of the HINT has shown high internal consistency and good discriminant validity (Ólafsson et al., 2019). The internal consistency of the scale in the current sample was  $\alpha = 0.96$ .

## Depressive symptoms

Depressive symptoms were measured with the Patient Health Questionnaire 9 (PHQ-9), proposed by Kroenke & Spitzer (2002). The PHQ-9 assesses the presence of the nine depressive symptoms listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) over the course of the past two weeks. Each of the nine items are scored on a range from 0 to 3, with 0 = “not at all”, 1 = “several days”, 2 = “more than half the days”, and 3 = “nearly every day”. The PHQ-9 assesses depression severity on a scale from 1 to 27, where score of 0-4 equals none, 5-9 equals mild depression severity, 10-14 equals moderate severity, 15-19 equals severe symptoms, and score of 20-27 suggests severe depressive symptoms (Kroenke & Spitzer (2002). For this study, a cut-off score for clinically relevant depressive symptoms was set at the score of 10 or more, in line with earlier research of recommended cut-off scores (Manea et al., 2012). The PHQ-9 has shown to have good psychometric properties amongst clinical (Kroenke & Spitzer, 2002) and general populations (Martin et al., 2006). As well, Ágústsdóttir & Daníelsdóttir’s (2018) study showed that the psychometric properties of the Icelandic version of the PHQ-9 are satisfactory. The internal consistency of the scale in the current sample was  $\alpha = 0.81$ .

## Procedures

Recruitment of team sport athletes in the Northeast region of Iceland was done by utilizing a non-probability (convenience) sampling method. Coaches from the teams in the area meeting inclusion criteria were contacted via email and asked if their athletes were interested in participating in the research. Then, all potential participants received a letter introducing the research and explaining it thoroughly, as well as receiving a link to the questionnaire.

The non athlete participants (panel sample) were contacted via existing contact information by the University of Akureyri Research Centre (RHA), which has an existing participant pool gathered consisting of a random sample of the general population in the X region. This panel sample receives various surveys (2-3 per year) on the subject of local societal matters. In total, 895 individuals aged 18-45 years received an invitation to participate in this study.



## Ethical considerations

When the study was sent to participants online, the participants were provided all relevant information regarding the study, its purpose, voluntariness of participation, and anonymity. Data from the study was stored safely by RHA as well as researchers were blinded to any information that could possibly provide identifiable information. By participating in the study, participants would get a chance of winning a lottery with the price of a gift certificate from local shopping center. The study gained approval from the Icelandic Bioethics Committee (application number VSN-22-022).

## Statistical analyses

For this thesis, all calculations were performed with the IBM SPSS Statistics software, version 28.0.1.1 (14). To construct tables, Microsoft Excel and Microsoft Word were utilized. The Independent Samples T-test was used to assess differences between athletes and non-athletes in mean depressive symptoms and habitual negative thinking scores. To investigate the correlation between generic and sport-specific factors, as well as habitual negative thinking, with mean depressive symptoms, hierarchical linear regression was utilized. Hierarchical regression is a form of multiple regression, which allows assess which factors best predict for a dependent variable when taking into consideration all other variables in the model. In this study, it was used to assess how habitual negative thinking would predict for and explain variance in depression scores in athletes, compared with generic and sport-specific factors. Further, multiple regression allows testing for multiple independent variables, whereas a linear regression only has one independent variable impacting the dependent variable. Pearson correlation test was utilized to assess the correlation between habitual negative thinking and depressive symptoms. The Pearson correlation test calculates whether there is a statistically significant difference between categorical variables, or if they are related. In the present study, correlation was interpreted in the light of Dancey & Reidy's (2007) guide to correlation coefficients. Dancey & Reidy (2007) concluded that values from 0.1-0.3 are weak correlation, values from 0.4-0.6 are moderate correlation, values from 0.7-0.9 are strong correlation, and 1 is perfect correlation.

# Results

## Descriptive analysis (aim 1)

The Independent Samples T-test was used to evaluate differences in depression scores between athletes and non-athletes. The total PHQ-9 depression score of athletes (N=115, M=5.7, SD=4.6) was significantly lower than that of non-athletes (N=202, M=20.1, SD=5.51,  $t(271) = -3.1$   $p = .003$ ). Consistently, habitual negative thinking measured with the Habit Index of Negative Thinking (HINT) score, was significantly lower among athletes (N=115, M=43.52, SD=19.4) than among non-athletes (N=149, M=50.9, SD=20.1) ( $t(271) = -2.8$ ,  $p = .006$ ).

**Table 1:** Descriptive statistics for the participants of the sample.

<b>Factor</b>	<b>N</b>	<b>M</b>	<b>SD</b>
<b>Athletes</b>	115		
HINT		43.52	19.4
PHQ-9		5.7	4.6
<b>Non-athletes</b>	202		
HINT		50.93	7.8
PHQ-9		20.1	5.51

Note. HINT= Habitual Index of Negative Thinking total score, PHQ-9= Patient Health Questionnaire 9 total score.

Tables 1 and 2 present descriptive statistics for PHQ-9 and HINT total scores, as well as clinically relevant symptoms, injury and coach athlete relationship. As seen in Table 2, 30.7% of non-athlete participants report to have clinically relevant depressive symptoms, while 16.7% of athletes showed clinically relevant symptoms. 54.8% of athletes reported to have no injury, while 23.8% reported more than one injury, and 21.4% reported more than one different injury. 9.5% of athletes reported to be quite unhappy with their relationship with their head coach, and 3.5% reported to be very unhappy with their relationship with their head coach. 20.2% reported to be neither happy or unhappy with their relationship with their head coach.

**Table 2:** Descriptive statistics for clinically relevant symptoms, injury, and coach-athlete relationship.

<b>Factor</b>		<b>N</b>	<b>%</b>
<b>Athletes</b>			
Clinically relevant symptoms		14	16.7
Age	18-27	11	15.7
	28-37	2	16.7
	38+	1	50
Injury	One	20	23.8
	> one	18	21.4
	None	46	54.8
Coach-athlete relationship	Very unhappy	3	3.6
	Quite unhappy	8	9.5
	Neither	17	20.2
	Quite happy	29	32.1
	Very happy	84	34.5
<b>Non-athletes</b>			
Clinically relevant symptoms		61	30.7
Age	18-27	9	32.1
	28-37	32	34.7
	38+	20	25.3

## Habitual negative thinking, generic, and sport-specific factors predicting for depression total score (aim 2)

To test the relative importance of correlation between generic factors, sport-specific factors, and habitual negative thinking in predicting a variance in depression total score, a hierarchical multiple regression was conducted with two blocks of variables. The first block included generic predictors (age and gender), and sport-specific predictors (injury and coach-athlete relationship). To test the significance of how habitual negative thinking predicted for depressive symptoms, the second block included habitual negative thinking as an additional predictor variable.

The results showed the first model to be significant (Table 1) explaining in total 14 % of variance in depressive symptoms. Gender ( $B=2.04$ ,  $p=.04$ ) and coach-athlete relationship ( $B=-1.04$ ,  $p=.02$ ) were significant predictors, but age and injury did not have a significant impact. The second model, which included the habitual negative thinking total score, showed significant improvement from the first model with increased overall variance explained ( $R^2$  change=.24) with overall variance explained 39%. In the final model, habitual negative thinking was the only significant predictor of depressive symptoms ( $B=.13$ ,  $p=.000$ ).

**Table 3:** Hierarchical regression showing effects of different factors on depression.

Factor	B	SD	Sig.	R <sup>2</sup>	R <sup>2</sup> change
<b>Model 1</b>	8.15	3.29	0.01	0.14	0.14
Age	-0.01	0.1	0.9		
Gender	2.04	0.98	0.04		
Injury	-0.49	0.58	0.41		
Coach-athlete relationship	-1.04	0.45	0.02		
<b>Model 2</b>	3.64	2.92	0	0.39	0.24
Age	0.05	0.09	0.55		
Gender	-0.23	0.93	0.8		
Injury	-0.73	0.5	0.15		
Coach-athlete relationship	-0.75	0.39	0.06		
HINT	0.13	0.02	0		

## Correlation between habitual negative thinking and depressive symptoms in athletes (aim 3)

Pearson's bivariate Correlation was used to assess the correlation between habitual negative thinking and individual depressive symptoms.

HINT showed moderate correlation with “lack of interest/anhedonia ( $r=.36$ ), “depressed mood“ ( $r=.44$ ), “ sleep“ ( $r=.44$ ), “fatigue“ ( $r=.48$ ), “appetite“ ( $r=.53$ ), and

“worthlessness“ ( $r=.47$ ). A weak correlation was found between HINT and „concentration“ ( $r=.23$ ). As shown in Table 4, 8 out of the 9 individual PHQ-9 symptoms of depression correlated with habitual negative thinking, where a higher HINT score significantly predicted higher score on these PHQ-9 symptoms. The sole symptom that did not correlate significantly with habitual negative thinking was psychomotor issues.

**Table 4:** Correlation among HINT total score and individual PHQ-9 symptoms.

	1	2	3	4	5	6	7	8	9	10
1 HINT										
2 Lack of interest	.36**									
3 Depressed mood	.44**	.71**								
4 Sleep	.44**	.17	.11							
5 Fatigue	.48**	.30**	.47**	.42**						
6 Appetite	.53**	.33**	.45**	.37**	.48**					
7 Worthlessness	.47**	.37**	.46**	.29*	.52**	.61**				
8 Concentration	.23*	.36**	.35**	.42**	.40**	.42**	.57**			
9 Psychomotor	.2	.38**	.42**	.25*	.38**	.42**	.55**	.59**		
10 Suicidal thoughts	.3**	.31**	.23*	.33**	.29**	.31**	.32**	.44**	.38**	

*Note.* \*\*. Correlation is significant at the 0.01 level (2-tailed). \*. Correlation is significant at the 0.05 level (2-tailed). HINT = Habit Index of Negative Thinking total score.

## Discussion

Several studies have shown that depression is just as prevalent among athletes as in the general population (Beable et al., 2017; Gerber et al., 2018). However, research on depression

in the field of athletes has stayed mostly on the descriptive level (Nixdorf et al., 2020). Therefore, investigation of the underlying processes of negative mental health outcomes in athletes is lacking. Habitual negative thinking has been found to predict negative health outcomes in the general population as well as clinical populations (Verplanken et al., 2007). However, research and empirical evidence on the effect of habitual negative thinking in athletes is nonexistent. Hence, this study aimed to assess the relationship between habitual negative thinking and depressive symptoms in athletes.

The present study showed significant differences between athletes and non-athletes in both depressive symptom and habitual negative thinking scores, in that athletes scored on average significantly lower on both measures. These results are contrary to recent findings of sport-psychology scholars, which have stated that depressive symptoms are similarly prevalent in athletes as the general population (Beable et al., 2017; Gerber et al., 2018). Of the athletes in the current sample, 16.7% reported clinically relevant depressive symptoms scores, which is closely in line with the findings of Beable et al. (2017) and Gerber et al. (2018), who concluded that 21% and 12% of athletes, respectively, had clinically relevant depressive symptoms.

To assess the relevance of generic factors, sport-specific factors, and habitual negative thinking on depression total scores, a hierarchical linear regression was utilized. The results showed that habitual negative thinking was the only significant factor in affecting depression scores. In line with research on general and clinical populations (Verplanken et al., 2007), this finding suggests that habitual negative thinking significantly predicts depression scores in athletes.

Supporting earlier research and the study hypothesis, gender did affect depressive scores in the first regression model, with women reporting higher depression scores (Junge & Fedderman Demont, 2016; Wolanin et al., 2016). However, when accounting for habitual negative thinking, gender did not have a significant impact on depression scores. This finding suggests that these influences were better explained by differences in habitual negative thinking. Hence habitual negative thinking has a moderating effect on gender differences in depression scores, meaning that the relationship between gender and depression scores is explained by a different tendency to engage in habitual negative thinking. This finding supports the cognitive vulnerability-stress models of depression, which suggest that depression is a result of a cognitive vulnerability and negative experiences (Abramson et al., 2002). Furthermore, the current finding is in line with the results of Nixdorf et al. (2020)

results, where dysfunctional attitudes and negative coping strategies were a significant predicting factor for depressive symptoms over a sport season. Although earlier research has shown that age is a predicting factor in depression (Junge & Fedderman Demont, 2016; Beable's et al., 2017; Gerber et al., 2018), age did not significantly impact depression scores in this sample. This finding may imply that habitual negative thinking better explains differences in depression scores rather than age. However, the mean age for the athlete sample was very low (22,9 years), and thus the sample may not fully capture how age affects depression scores.

Interestingly, contrary to the study hypothesis as well as earlier findings (Junge & Fedderman Demont, 2016; Gerber et al., 2018), injury did not significantly predict depressive symptoms. However, the injury item in the questionnaire did not take into account whether the athlete had an injury that kept them away from competition. Instead, athletes merely reported whether they were dealing with an injury that negatively impacted their ability to perform. (Junge & Fedderman Demont, 2016; Gerber et al., 2018). The studies by Junge & Fedderman Demont (2016), which assessed professional athletes and Gerber et al. (2018), which assessed youth elite athletes, both showed that injured athletes were more vulnerable to depression than healthy athletes. Moreover, there is empirical evidence that playing with injury may expose athletes to an increased risk for more serious injury (McCall et al., 2015). Thus, given this particular limitation in this study, injury should be considered an important risk factor for depression in athletes.

The coach-athlete relationship showed to have a significant impact on depression scores in the first regression model, and although insignificant, it nearly leads to a significant difference in the second model. Those findings can be explained by the fact that the coach-athlete relationship on its own is a predicting factor in athletes' mental health. Overall, the second model of the regression, which accounted for habitual negative thinking, notably explained more of the variance, and explained considerably more of the variation of depression scores. This finding suggests that habitual negative thinking, to a greater extent than the other variables tested for, is a significant predicting factor in depression scores in athletes.

The current study found that habitual negative thinking significantly correlated with all of the individual depressive symptoms, except for psychomotor issues.

The symptoms which correlated the most with habitual negative thinking were the neurovegetative symptoms of depression, which are related to fatigue ( $r=.48$ ) and appetite

( $r=.53$ ). Recent research by Tahtinen et al. (2021) suggested that differences in depressive symptoms in male athletes were related to these neurovegetative symptoms, while differences in female athletes were rather in cognitive symptoms. The current finding, as well as this finding by Tahtinen et al. (2021) suggest gender differences in the representation of negative mental health outcomes in athletes. Thus, further research might address gender differences in depressive symptoms in athletes even further.

Other symptoms that had moderate correlation were “depressed mood“ ( $r=.44$ ) and „worthlessness“ ( $r=.47$ ). These symptoms correlate with each other, and it could be hypothesized that depressed mood predicts changes in feelings of worthlessness. That notion could be true particularly in athletes, as research has shown that elite athletes may be especially vulnerable to negative health outcomes as their performance may not only influence themselves, but others invested in their performance, such as family, coaches or agents (Gervis & Dunn, 2004).

It is important that sport psychology scholars investigate the underlying processes in athletes’ negative mental health outcomes, and these findings imply that habitual negative thinking should be considered as a key component in depressive symptoms in the population of athletes. Habitual negative thinking processes are formed over time as repetitive negative thoughts, and with time these thoughts become automatic, and the individual loses awareness of these negative thoughts (Verplanken et al., 2007). Therefore, it should be a priority of clinicians to help the individual gain awareness of their negative, repetitive and automatic thoughts. Furthermore, in light of the results proposed by Gerber et al. (2018), which showed that athletes with higher mental toughness scores reported fewer mental health issues, it should be considered to aim to prevent negative mental health outcomes in athletes by using clinical methods to improve mental toughness.

## Strengths and limitations

There were some notable limitations to the study that should be reported. First, the study was a cross-sectional survey, where participants gave information about themselves at one point in time. As mentioned before, future research should strongly consider also assessing changes



over time. Additionally, the majority of participants were females, which may have affected the results of the study. Hence, future research should strive to include an equal number of male and female participants, for the purpose of accuracy in results. Lastly, as the athletic participants were recruited using a non-probability (convenience) sampling method rather than a randomized method, and as they are all from the Northeast region of Iceland, the results of the study cannot be generalized to all athletes in Iceland or athletes in general.

On the other hand, the study had some strengths as well. A particular advantage of the current study is that it utilized the Habitual Index of Negative Thinking questionnaire, to specifically capture the habitual aspect of negative thoughts. Although it has shown correlation with the HINT, the brooding rumination questionnaire by Treynor et al. (2003) does not fully represent the automatic nature of habit, and sport psychology scholars have proposed for studies to utilize the HINT to assess this aspect in athletes (Tahtinen et al., 2021). Another strength of the current study is that the sample included a broad range of age groups, both in the athlete and panel samples, allowing researchers to assess younger and older athletes as well as non-athletes.

## Conclusion

Athletes face an immense amount of pressure each day, which can make them more vulnerable to negative mental health outcomes. Hence, it is vital to identify the factors involved in causing the negative outcomes in athletes. Therefore, sport psychology scholars should further investigate the underlying processes that aid negative mental health outcomes. Depressive symptoms in athletes have been linked with decrease in performance, and untreated mental illness has been linked to addiction, self-harm, and in the worst cases, suicide. Still, if sport psychology scholars can help identify the factors that underlie negative health outcomes in athletes and construct therapy on theoretical background to help athletes to manage their symptoms or disorders, sports could once again become a factor in improving mental health.

# References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association.
- Beable S, Fulcher M, Lee AC, Hamilton B. (2017). SHARPSports mental Health Awareness Research Project: Prevalence and risk factors of depressive symptoms and life stress in elite athletes. *J Sci Med Sport*. *12*, 1047-1052.  
<https://doi.org/10.1016/j.jsams.2017.04.018>
- Bennett, J, Rotheram, M, Hays, K, Olusoga, P, Maynard, I. (2016). Yips and Lost Move Syndrome : assessing impact and exploring levels of perfectionism, rumination, and reinvestment. *Sport and exercise psychology review*.
- Da Silva, A, Fortes, L, Carvalho, L, de Moraes, J, Carvalho, R, Nascimento Júnior, J. (2022). Quality of coach-athlete relationship and coping as associated factors of stress, anxiety, burnout, and depression symptoms of soccer players in transition to professional: a prospective study. *Motriz*, *18*. <https://doi.org/10.1590/S1980-657420220008421>
- Dancey, C. P., Reidy, J. (2007). *Statistics without maths for psychology*. Pearson education.
- Gerber, M, Best, S, Meerstetter, F, Walter, M, Ludyga, S, Brand, S, Bianchi, R, Daniel, M, Isoard-Gauthier, S, Gustafsson, H. (2018). Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes. *Journal of Science and Medicine in Sport*, *21*(12), 1200-1205.  
<https://doi.org/10.1016/j.jsams.2018.05.018>
- Gervis, M, Dunn, N. (2004), The emotional abuse of elite child athletes by their coaches. *Child Abuse Rev*, *13*, 215-223. <https://doi.org/10.1002/car.843>
- Junge, A, Feddermann-Demont, M. (2015). Prevalence of depression and anxiety in top-level male and female football players. *BMJ Open Sport & Exercise Medicine*, *2*.  
<http://dx.doi.org/10.1136/bmjsem-2015-000087>
- Hankin, BL, Abramson, LY, Miller, N, Haefffel G. (2004). Cognitive Vulnerability-Stress Theories of Depression: Examining Affective Specificity in the Prediction of Depression Versus Anxiety in Three Prospective Studies. *Cognitive Therapy and Research* *28*, 309–345. <https://doi.org/10.1023/B:COTR.0000031805.60529.0d>
- Herbert C, Meixner F, Wiebking C, Gilg V. Regular Physical Activity, Short-Term Exercise, Mental Health, and Well-Being Among University Students: The Results of an Online

- and a Laboratory Study. (2020). *Front Psychol*, *11*(509).  
<https://doi.org/10.3389/fpsyg.2020.00509>
- Hjartarson, K, Snorrason, Í, Bringmann, L, Ögmundsson, B, Ólafsson, R. (2021). Do daily mood fluctuations activate ruminative thoughts as a mental habit? Results from an ecological momentary assessment study. *Behaviour Research and Therapy*, *140*.  
<https://doi.org/10.1016/j.brat.2021.103832>
- Kadariya S, Gautam R, Aro AR. (2019). Physical Activity, Mental Health, and Wellbeing among Older Adults in South and Southeast Asia: A Scoping Review. *Biomed Res Int*. <https://doi.org/10.1155/2019/6752182>
- Manea, L, Gilbody, S, McMillan, D. (2012). Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. *CMAJ*. *184* (3).  
<https://doi.org/10.1503/cmaj.110829>
- McCall A, Carling C, Davison M, Nedelec M, Le Gall F, Berthoin S, Dupont G. (2015). Injury risk factors, screening tests and preventative strategies: a systematic review of the evidence that underpins the perceptions and practices of 44 football (soccer) teams from various premier leagues. *Br J Sports Med*. *49*(9), 583-589.  
<https://doi.org/10.1136/bjports-2014-094104>
- Mikkelsen K, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V. (2017). Exercise and mental health. *Maturitas*, *106*, 48-56.  
<https://doi.org/10.1016/j.maturitas.2017.09.003>
- Moeijes J, Busschbach JT, Bosscher RJ, Twisk J. (2018). Sports participation and psychosocial health: a longitudinal observational study in children. *BMC Public Health*, *18*. <https://doi.org/10.1186/s12889-018-5624-1>
- Nixdorf I, Beckmann J, Nixdorf R. (2020). Psychological Predictors for Depression and Burnout Among German Junior Elite Athletes. *Front Psychol*. *11*(601).  
<https://doi.org/10.3389/fpsyg.2020.00601>
- Nolen-Hoeksema S. (1991). Responses to depression and their effects on the duration of depressive episodes. *J Abnorm Psychol*. *100*(4), 569-82.  
<https://doi.org/10.1037//0021-843x.100.4.569>
- Nolen-Hoeksema S, Wisco BE, Lyubomirsky S. (2008). Rethinking Rumination. *Perspect Psychol Sci*. *5*, 400-24. <https://doi.org/10.1111/j.1745-6924.2008.00088.x>

- Ólafsson, R, Guðmundsdóttir, S, Björnsdóttir, T, Snorrason, Í. (2020). A Test of the Habit-Goal Framework of Depressive Rumination and Its Relevance to Cognitive Reactivity. *Behavior therapy*. 51(3), 474-487. <http://dx.doi.org/10.1016/j.beth.2019.08.005>
- Powers, M, Fogaca, J, Gurung, R, Jackman, C. (2020). Predicting Student-Athlete Mental Health: Coach–Athlete Relationship. *Psi Chi Journal of Psychological Research*, 25. <http://dx.doi.org/10.24839/2325-7342.JN25.2.172>
- Sigmon, ST, Pells, JJ, Boulard, NE et al. (2005). Gender Differences in Self-Reports of Depression: The Response Bias Hypothesis Revisited. *Sex Roles*. 53, 401–411. <https://doi.org/10.1007/s11199-005-6762-3>
- Simons, E, Bird, M. (2022). Coach-athlete relationship, social support, and sport-related psychological well-being in National Collegiate Athletic Association Division I student-athletes. *Journal for the Study of Sports and Athletes in Education*. <https://doi.org/10.1080/19357397.2022.2060703>
- Tahtinen, RE, Kristjánisdóttir, H, Þorgeirsson, S, Oddson, HR, Saavedra JM, Morris, R. (2021). Depressive symptoms in Icelandic elite athletes: A prospective examination through the lens of the response styles theory. *Psychology of Sport and Exercise*. 56. <https://doi.org/10.1016/j.psychsport.2021.101964>
- Tahtinen, RE, Kristjánisdóttir, H, Olason, D, Morris, R. (2021). What Lies Beneath: Exploring Specific Depressive Symptoms across Selected Risk Factors in Icelandic Team Sport Athletes. *Journal of clinical sport psychology*. <http://dx.doi.org/10.1123/jcsp.2020-0040>
- Tahtinen, RE, Shelley, J, Morris, R. (2021). Gaining perspectives: A scoping review of research assessing depressive symptoms in athletes. 54. <https://doi.org/10.1016/j.psychsport.2021.101905>
- Treynor, W, Gonzalez, R, Nolen-Hoeksema, S. (2003). Rumination Reconsidered: A Psychometric Analysis. 27(3). <http://dx.doi.org/10.1023/A:1023910315561>
- Watkins ER, Nolen-Hoeksema S. (2014). A habit-goal framework of depressive rumination. *J Abnorm Psychol*. 23(1): 24-34. <https://doi.org/10.1037/a0035540>
- Wegner M, Amatriain-Fernández S, Kaulitzky A, Murillo-Rodríguez E, Machado S, Budde H. (2020). Systematic Review of Meta-Analyses: Exercise Effects on Depression in Children and Adolescents. *Front Psychiatry*. 11(81). <https://doi.org/10.3389%2Ffpsyt.2020.00081>

- Verplanken, B, Aarts, H. (1999) Habit, Attitude, and Planned Behaviour: Is Habit an Empty Construct or an Interesting Case of Goal-directed Automaticity?, *European Review of Social Psychology*, 10(1), 101-134. <http://dx.doi.org/10.1080/14792779943000035>
- Verplanken, B, Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology*, 33(6), 1313–1330. <https://doi.org/10.1111/j.1559-1816.2003.tb01951.x>
- Verplanken, B, Wang, C, Friborg, O, Trafimow, D. (2007). Mental Habits: Metacognitive Reflection on Negative Self-Thinking. *Journal of Personality and Social Psychology*, 92(3), 526-41. <https://doi.org/10.1037/0022-3514.92.3.526>
- National Institute of Mental Health. (April, 2023). *Depression*. National Institute of Mental Health. [https://www.nimh.nih.gov/health/topics/depression#part\\_2256](https://www.nimh.nih.gov/health/topics/depression#part_2256)
- Wolanin A, Hong E, Marks D, et al. (2016). Prevalence of clinically elevated depressive symptoms in college athletes and differences by gender and sport. *British Journal of Sports Medicine*, 50, 167-171. <http://dx.doi.org/10.1136/bjsports-2015-095756>
- World Health Organization. (2017). Depression and Other Common Mental Disorders: Global Health Estimates. *World Health Organization*. <https://apps.who.int/iris/bitstream/handle/10665/254610/WHOMSD?sequence=1>



