Me, Myself, and My Thoughts: The Influence of Brooding and Reflective Rumination on Depressive Symptoms in Athletes in the United Kingdom

Abstract

Individual differences in vulnerability to depression are still underexplored in athletes. We tested the influence of different brooding and reflective rumination profiles (i.e. repetitive thought processes in response to low/depressed mood) on the odds of experiencing clinically relevant depressive symptoms in competitive athletes (N=286). The Patient Health Questionnaire 9 (PHQ – 9) and the Ruminative Responses Scale (RRS-short form) were utilized to measure depression and rumination, respectively. Compared to athletes with a low brooding/reflection profile, athletes with a high brooding/reflection profile had significantly higher odds of experiencing clinical levels of depressive symptoms (OR=13.40, 95% CI=3.81– 47.11). A high reflection/low brooding profile was not, however, related to increased odds of depressive symptoms. Future research could extend our findings by exploring determinants of ruminative tendencies, especially brooding, in athletes. Furthermore, psychological interventions targeting rumination could be examined as a potential prevention and treatment approach to tackling depressive symptoms in athletes.

Keywords: Depression, cognitive vulnerability, rumination, brooding, athletes

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Awareness of athlete mental health issues and corresponding recognition of the importance of athlete welfare and duty of care needs has occupied an increasingly important space in sport psychology literature and discourse (Moesch et al., 2018; Schinke, Stambulova, Si, & Moore, 2018). Although some research on mental health issues in athletes date back as far as the late 80s (Nudelman, Rosen, & Leitenberg, 1988), it is not until recently that literature reviews on the topic have emerged (Armstrong, Burcin, Bjerke, & Early, 2015; Frank, Nixdorf, & Beckmann, 2015; Gorczynski, Coyle, & Gibson, 2017; Gouttebarge et al., 2019; Rice et al., 2016; Wolanin, Gross, & Hong, 2015). Also, most of the primary research on athlete mental health issues are fairly recent, for example, in a review by Gouttebarge et al. (2019) 32 of the 34 included studies were published after the year 2010.

The current knowledge indicates that psychological distress and disturbance in athletes is common but often underreported due to stigma and a lack of awareness (Roberts, Faull, & Tod, 2016). Furthermore, while athletes experience similar mental health risk factors to non-athletes, athletes are also at risk from mental health decline due to sport-specific factors (Moesch et al., 2018; Schinke et al., 2018). These include, for example: public evaluation of performance (Doherty, Hannigan, & Campbell, 2016); post-Olympic blues (Howells & Lucassen, 2018); career transitions (Stambulova, 2017); stressors that relate to acculturation, cultural and athletic identity (Schinke, Blodgett, Ryba, & Middleton, 2018); difficulties adjusting to the off-season and dealing with a post-competition void (Doherty et al., 2016); injury and concussion (Rice et al., 2018); overtraining syndrome (Peluso & Andrade, 2005) and burnout (Gerber et al., 2018). Whether athletes are more likely than non-athletes to experience mental health issues is still, however, under debate. For example, while some scholars suggest that athletes experience comparable levels of mental health issues as non-

athletes (Gorczynski et al., 2017; Rice et al., 2016), there is also support for lower levels (Armstrong et al., 2015) and higher levels (Gouttebarge et al., 2019) in athletes than in non-athletes.

In terms of specific mental health illnesses, depression has been one of the main topics in the recent athlete mental health discourse (MacIntyre et al., 2017). Similar to broader mental health research, most studies on self-reported depression in athletes have been conducted with college-level athletes (Wolanin et al., 2015). The prevalence rates in this population have been shown to vary from 15.6% (Proctor & Boan-Lenzo, 2010) to considerably higher - for instance, Wolanin, Hong, Marks, Panchoo, and Gross (2016) reported that 21% of male and 28% of female collegiate athletes experienced clinically relevant depressive symptoms. Corresponding rates in college athletes were also reported for males (19.2%) and females (25.6%) by Yang et al. (2007). In the contexts of non-collegiate sport, Beable, Fulcher, Lee, and Hamilton (2017) reported a 21% prevalence rate in elite athletes in New Zealand, while Gulliver, Griffiths, Mackinnon, Batterham, and Stanimirovic (2015) found that 23.6% of male and 30.5% of female elite athletes in Australia reported clinically significant depressive symptoms. In Germany, Nixdorf, Frank, Hautzinger, and Beckmann (2013) reported a 15% prevalence for professional athletes, 19% for junior professionals, and 29% for amateur athletes. In another study in Germany, Junge and Prinz (2018) found a 12.8 % prevalence rate of mild-moderate symptoms and 11.7% prevalence of severe depressive symptoms in female first league football players. For second league players, the corresponding prevalence rates were 25.4% for mild-moderate and 20.6% for severe symptoms of depression. In a study by Jensen, Ivarsson, Fallby, Dankers, and Elbe (2018) a 16.7% prevalence rate was found in Nordic male football players, with elite junior sample reporting a 28% and professional sample a 10% prevalence. These findings – from college and non-college sport contexts in various parts of the world – suggest that experiencing

clinically relevant levels of depressive symptoms is not uncommon in athletes. Furthermore, the growing literature base has identified a range of risk groups/factors for elevated depressive symptoms in athletes, including, but not limited to; female gender (Beable et al., 2017), individual sport (vs. team sport) (Beable et al., 2017; Nixdorf, Frank, & Beckmann, 2016), athletic injury (Appaneal, Levine, Perna, & Roh, 2009), athletic failure (Hammond, Gialloreto, Kubas, & Davis, 2013), involuntary career termination (Wippert & Wippert, 2008), younger age (e.g. 18-24 years vs. older) and daily life-stress (Beable et al., 2017). As the reviewed literature suggests, many of the factors that have been linked to elevated depressive symptoms in athletes are largely unmodifiable, such as age, gender or type of sport, or factors that are inherent in the context of sports such as performance failure, career transitions, or injury. From an applied perspective, an understanding of these risk factors is essential as it allows stakeholders to determine potential target groups for prevention. However, to identify *what* exactly should be targeted, it is also important to explore individual differences in susceptibility to depression. That is, why do risk factors contribute to elevated depressive symptoms in some athletes but not in others?

Cognitive Vulnerability to Depression

One way to understand individual differences in susceptibility to depression is through the lens of cognitive vulnerability-stress models of depression, which suggest that individuals' interpretation of events or situations influences their mood and the subsequent likelihood of becoming depressed (Abramson et al., 2002). Two major cognitive theories of depression, the cognitive theory (Beck, 1967) and the hopelessness model (Abramson, Metalsky, & Alloy, 1989) are based on the vulnerability-stress accounts of depression. Although these theories are conceptually similar, each theory identifies distinct vulnerabilities that are considered central in the development and maintenance of depression (Hankin, 2008; Joormann & Arditte, 2015). For example, as described by Abramson et al. (2002), Beck's cognitive theory

identifies highly dysfunctional attitudes (e.g. maladaptive perfectionism) as the key cognitive vulnerability to depression. According to this theory, dysfunctional attitudes interact with a salient stressor to trigger negative automatic thoughts about oneself, the world and the future, which in turn give rise to depressive symptoms. In the hopelessness model, attributional or cognitive style is framed as the key vulnerability to depression. Here, a vulnerable individual is more likely than the non-vulnerable individual to make internal (self-focused), stable (an enduring characteristic), and global (generalizable across contexts) interferences of a negative event, subsequently leading to hopelessness (depression).

In spite of these differences, a common thread across the vulnerability models is the shared understanding that vulnerable individuals have a relatively stable tendency to respond to stressors in a negatively biased, and self-focused manner (Ingram, Miranda, & Segal, 2006). Cognitively vulnerable individuals may also be more likely than the non-vulnerables to engage in maladaptive cognitive processing or rumination when distressed, which may play a substantial role in the development and maintenance of depression (Abramson et al., 2002). To date, several different definitions or conceptualizations of rumination exists. For example, as described by Matthews and Wells (2004) rumination has been defined broadly as repetitive thoughts focused on discrepancies between current and desired goals, or as focus on past failures. Rumination can also be understood as controlled and automatic processes in relation to self-discrepant information (e.g., goal discrepancies and past failures), which are maintained by meta-cognitive (positive) beliefs about rumination as a coping mechanism (Matthews and Wells, 2004; Wells & Matthews, 1996). Rumination has also been conceptualized more specifically in relation to depression. In the Response Styles Theory (Nolen-Hoeksema, 1991) and in its subsequent revisions (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), depressive rumination is defined as a relatively stable, cognitive processing style in response to sad or depressed mood involving repetitive thoughts about the

causes and implications of ones‘ negative feelings and problems. Consequently, engaging in repetitive, abstract, and evaluative thought cycles in response to depressed mood is likely to exacerbate this state and to disrupt effective problem-solving. Depressive rumination can, therefore, be understood from a process perspective (e.g., attention or memory), rather than by the specific contents of thoughts such as negative attributions or negative automatic thoughts (Joormann & Arditte, 2015; Nolen-Hoeksema, 2004).

Several empirical studies have provided evidence on the potential importance of depressive rumination, indicating that it has a central role in the onset (Just & Alloy, 1997; Nolen-Hoeksema, 2000) maintenance (Nolen-Hoeksema, 1991; Nolen-Hoeksema, McBride, & Larson, 1997; Spasojević & Alloy, 2001) and recurrence of depression and depression symptomology (Michalak, Hölz, & Teismann, 2011). It has been suggested that depressive rumination may in fact function as a proximal mechanism through which other cognitive vulnerabilities (e.g., negative cognitive styles or dysfunctional attitudes) may operate on depression (Abramson et al., 2002; Pössel & Winkeljohn Black, 2017; Spasojević & Alloy, 2001). Although depressive rumination is considered a trait (i.e., it remains relatively stable over time), like other cognitive vulnerabilities, it is still amenable to change by means of therapy or intervention (Ingram et al., 2006). Indeed, sport psychology scholars have recently voiced the need for more research on cognitive vulnerability in athletes to better target prevention or intervention efforts within this population (Elbe & Jensen, 2016; Nixdorf et al., 2016).

Brooding and Reflection

Although ruminative responses to depressed mood are generally understood as maladaptive processes, they may also serve an adaptive function (Joormann, Dkane, & Gotlib, 2006). Indeed, focusing ones‘ thoughts on issues at hand may be adaptive in problem-solving, and self-reflection may contribute to the understanding of the self and the world (Watkins,

2016). This two-dimensional view of rumination as an adaptive and maladaptive process has been acknowledged in the continued refinement of the 22-item Ruminative Responses Scale (RRS), which was developed to measure depressive rumination. The original scale was criticized for including items highly similar in content to items in measures of depression (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Subsequently, Treynor et al. (2003) removed items with depression-related content and conducted a principal component analysis on the 10 remaining items on the refined RRS. In these analyses, Treynor and colleagues identified two separate factors of depressive rumination: brooding and reflective pondering (reflection). In testing the relationship between these factors, they found that brooding was related to higher levels of depression concurrently and longitudinally. Although reflection was also related to more depression concurrently, it was associated with less depression over time. This finding led the authors to conclude that a tendency to engage in brooding may be more maladaptive than engaging in reflection. This assumption was supported by Lo, Ho, and Hollon (2008) who demonstrated that brooding, but not reflection, mediated the effects of negative attributional/cognitive style on depression. Despite these findings, the role of reflection as an adaptive trait is still uncertain and is likely to be dependent on individuals' tendency to brood as well as on their current levels of depression (Joormann et al., 2006).

Ruminative Response Style in Athletes

It has been suggested that a ruminative response style can develop as a coping mechanism to highly controlling and critical parenting style, or when individuals are socialized through environments where expression of thoughts and opinions may be restricted (Watkins, 2016). Considering that some sport contexts may expose athletes to similar environments where coach mediated control behaviours may involve manipulation or verbal abuse, excessive personal control or dismissal of athlete individuality and autonomy (Bartholomew, Ntoumanis, & Thogersen-Ntoumani, 2009), examining the link between

rumination and depression in athletes may be highly relevant. In addition, maladaptive rumination may also involve a repetitive and evaluative approach to thinking about oneself in relation to others and the discrepancy between current and desired state (Watkins, 2016). Considering that performance outcomes are central in competitive sports and that athletes are likely to set high standards for achievement, often in comparison to others, rumination may indeed be a highly relevant characteristic to be explored. Although we are not aware of studies that have examined the relationship between depressive rumination and depression symptomology in athletes, there is evidence that rumination may be linked to performance blocks (Bennett & Maynard, 2017) or Yips and Lost movement syndrome (Bennett, Rotherham, Hays, Olusoga, & Maynard, 2016). Furthermore, in two studies by Roy et al. (2016) brooding and reflective rumination tendencies were explored first in male football players and then female field hockey players including non-athlete comparison groups. Their results showed that reflective rumination decreased as skill level increased, suggesting that low reflective rumination may be advantageous in the context of sports. No significant differences were found in brooding rumination between the male football players and non-athletes. Low ruminative brooding was however related to a longer athletic career in professional players. In the female sample, field hockey players had significantly lower brooding and reflective rumination than female non-athletes. In conclusion, although limited in scope, previous studies in athletes suggest that having a tendency to engage in reflective and/or brooding rumination may be detrimental for athletic performance.

The Current Study

Our study aims to extend mental health research in athletes by seeking to clarify the relationship between depressive rumination and depressive symptoms, therefore responding to Frank et al. (2015) call to validate knowledge acquired from general populations in athletes. Specifically, the aims were to; (1) report prevalence and severity rates of clinically relevant

depressive symptoms in the current athlete sample, (2) explore potential differences in depressive symptom and depressive rumination scores (brooding and reflection) across athlete characteristics, and (3) test whether athletes with different types of brooding and reflection (vulnerability) profiles would differ in rates of clinically relevant depressive symptoms. Based on previous studies, we hypothesized that female gender, lower level of competition, engaging in individual sports, and being currently injured would relate to higher depressive symptom scores (aim 2). In terms of brooding and reflection, we did not set any specific hypotheses regarding differences across sport-related variables, however, we did expect to see that brooding and reflective rumination scores would be higher in female athletes than in male athletes (aim 2). Finally, we hypothesized that athletes with a high brooding/reflection profile would have higher odds of experiencing clinically relevant depressive symptoms when compared to athletes with a low brooding/reflection profile (aim 3). Considering that the role of reflective rumination as an adaptive trait is still unclear, we did not set any specific hypothesis on the relationship between a high reflection/low brooding profile and the odds of experiencing depressive symptoms.

Methods

Participants

The participants of the present study were 286 competitive athletes (62.0 % male, age M= 30.43, SD=10.86, range 18-69 years) in the UK. For the purpose of this study, we defined 'competitive athletes' as athletes at any competitive level who reported the main sport in which they were currently competing. The majority of athletes were UK citizens (87.4 %) and 89.9% reported being of white/Caucasian ethnic background. Other ethnic backgrounds included mixed/multiple (3.5%), Black/African/Caribbean/Black British (3.1%), Asian/Asian British (2.4%), and Arab (.3%). Two participants did not report ethnic background. More than half of the athletes (53.5 %) had been selected to represent their country at some point

during their athletic careers, and 30.5 % were currently competing at international/top tier professional level. The most frequently reported male sports (or clusters of sports) were rugby (n=25), ultra-marathon/marathon/running (cluster) (n=21), ironman/triathlon/duathlon (cluster) (n=16), martial arts (cluster) (n=13), golf (n=14), football (soccer) (n=13), ice hockey (n=11) and swimming (n=9). The most frequently reported female sports were rowing (n=12), ironman/triathlon/duathlon (cluster) (n=11), volleyball (n=6), water polo (n=6), and martial arts (cluster) (n=5). In total, athletes represented 54 different types of sports.

Measures

Patient Health Questionnaire 9 (PHQ – 9) assesses depressive symptoms (present more than half the days) during the past two weeks (Kroenke & Spitzer, 2002). Each item is scored from '0' to '3' ranging from "not at all" to "nearly every day", thus total scores range from 0 to 27. The psychometric properties of PHQ-9 have shown to be good among the clinical (Kroenke & Spitzer, 2002) and the general population (Martin, Rief, Klaiberg, & Braehler, 2006). The internal consistency of the scale in the current sample was α=.88.

Ruminative Responses Scale - short form (RRS-short form) is a 10-item scale adapted from the original 22-item RRS to measure rumination in response to depressed or negative mood, without including items confounded by depression content (Treynor et al., 2003). The 10-items in the RRS-short form consist of five reflective pondering (reflection) items, such as "Analyse recent events to try to understand why you are depressed", and five brooding items, such as "Think why do I have problems other people don't have?". Respondents rate each of the 10 items in the questionnaire from 1 (almost never) to 4 (almost always) with higher scores representing higher tendency to engage in reflective and brooding rumination when feeling low, sad or depressed. The internal consistency of the scales in the current sample was α= .82 for brooding and α= .79 for reflection.

Ethical Considerations

The relevant University ethics committee granted ethical approval for this study. The online survey consisted of an information page that briefly described the study objectives. A link to a detailed information letter was included on the information page, which the participants were encouraged to read before consenting to participation. In addition to study details, the information letter also included contact details for various mental health organizations to encourage participants to seek support if they were experiencing any mental health issues or concerns. Participation in the study was voluntary, and answers to the survey were anonymous.

Procedures

Online survey data was collected between November 9th, 2018 and February 20th, 2019. We utilized a convenience sampling method to recruit athletes from various sport organizations and clubs in the UK. We contacted potential gatekeepers, such as performance directors, coaches and established members of sport clubs/organizations to assist in the recruitment of athletes. Finally, we also recruited participants through social media channels such as Twitter and LinkedIn. Potential participants received a link to the anonymous online survey including an information page with all relevant information concerning the study.

Statistical Analyses

To define clinically relevant symptoms of depression, we used a cut-off score ≥ 10 (Kroenke & Spitzer, 2002; Manea, Gilbody, & McMillan, 2015). We utilized logistic regression models with adjusted odds ratios and 95% confidence intervals to test different brooding and reflection profiles, as predictors of clinically relevant symptoms of depression. First, we conducted a median split to categorize athletes based on their responses to RRS-scale: high/low brooding and high/low reflection categories (coded as low=0, high=1, respectively). After this, we computed a "vulnerability to depressive symptoms" variable with

four categories: “low = low brooding/low reflection”, “moderate = low brooding/high reflection”, high = high brooding/low reflection, and “very high = high brooding/high reflection”. Although there are limitations with the median split method, in some situations it may allow for a more parsimonious interpretation of analyses (DeCoster, Gallucci, & Iselin, 2011). As our outcome variable was binary (i.e. clinical symptoms or not), a multiple regression analysis was not possible. Also, acknowledging that athletes may have different subsets of brooding and reflection tendencies, categorising athletes into rumination profiles (rather than using a continuous measure), allowed us to explore the relationship between different profiles and clinically relevant depressive symptoms. Hence, for the purpose of our logistic regression analyses we coded three dummy variables in which athletes with a “low brooding/low reflection” profile served as the reference category (“0”) to the three remaining combinations (“1”). Hence, the first model included low vs moderate vulnerability, the second model low vs high vulnerability, and the third model low vs very high vulnerability groups. We controlled all models for gender, age, and injury status and conducted analyses in IBM SPSS version 25.0.

Results

Prevalence and Severity of Depressive Symptoms

The collective prevalence rate for clinically relevant depressive symptoms in the sample was 19.9%. Of the female athletes reporting clinically relevant symptoms (30.6%), 15.7% reported moderate, 10.2% moderately severe, and 4.6% severe symptoms. In male athletes reporting clinically relevant symptoms (13.1%), 8.0% reported moderate, 3.4% moderately severe and 1.7% severe symptoms of depression. Finally, of the injured athletes reporting clinically relevant symptoms (31.1%), 14.8% reported moderate, 14.8% moderately severe and 1.6% severe symptoms.

Mean Depressive Symptom Scores

Table 1 presents athletes' gender and age distribution and sport-related characteristics along with mean scores for depressive symptoms. There was a significant difference in mean depressive symptom scores between male (M=5.11, SD=4.49) and female (M=7.48, SD=5.93) athletes [t(181.74) = -3.56, p< .001]. A significant difference was also found across age groups [F(2, 267) = 3.66, p=.027]. Based on Tukey´s post hoc test, athletes 35 and older had significantly lower scores (M=4.53, SD=4.82) than athletes in the age range 25-34 (M=6.43, SD=5.34) and 18-24 (M=6.50, SD=5.22). Across sport-related factors, the only differences in mean depressive symptom scores were between injured and non-injured athletes [t(284) = 2.49, p= .013]. Within the injured group, we also found a significant difference in mean symptom scores between athletes with 20 days or less to recovery (M=5.43, SD=3.80) and those with more than 20 days to recovery (M=8.80, SD=5.78) [t(50.92)= -2.67, p= .010].

[Insert Table 1 here]

Mean Brooding and Reflection Scores

Brooding rumination was significantly higher in female (M=10.25, SD=3.80) than male (M=8.91, SD=3.20) athletes, t(191.45) = -3.01, p=.003. Brooding was also significantly higher in athletes who were currently in their off-season (M=10.43, SD= 3.90) compared to athletes who were currently in-season (M=9.03, SD=3.27), t(107.86) = -2.72, p=.008. No other significant differences were found in brooding across participant characteristics. Reflective rumination was also significantly higher in female (M=10.43, SD=3.57) than male (M=9.14, SD=3.05) athletes, t(270) = -3.17, p=.002. In addition, reflection scores were significantly higher in injured (M=10.41, SD=3.66) than non-injured athletes (M=9.42, SD=3.18), t(272) = 2.04, p=.04.

316 **Brooding and Reflection Profiles and the Odds of Experiencing Clinically Relevant**
317 **Depressive symptoms**

318 As shown in table 2, when compared to athletes with a low brooding and reflection
319 profile, significantly higher odds of experiencing clinically relevant depressive symptoms
320 were observed for athletes with a high brooding/low reflection profile (OR=7.33,
321 95%CI=1.93- 27.84) and high brooding/reflection (OR=13.40, 95%CI=3.81– 47.11) profile.
322 Athletes with a low brooding/high reflection profile did not have significantly higher odds of
323 experiencing clinically relevant symptoms than the reference category.
324
325 [Insert Table 2 here]

326 **Discussion**

327 In the current study, we explored the prevalence of depressive symptoms and
328 depressive rumination (i.e. brooding and reflection) in a sample of competitive athletes in the
329 UK. We were specifically interested in testing the relationship between different brooding and
330 reflective rumination profiles and the odds of experiencing clinically relevant depressive
331 symptoms. Approximately one in five athletes reported clinically relevant symptoms of
332 depression, with female athletes reporting a 30.6 % and male athletes a 13.1% prevalence.
333 Our study adds to the rapidly growing evidence-base that demonstrates clinically relevant
334 depressive symptoms in athletes and reports overall prevalence rates that are comparable with
335 those found in other studies (e.g., Beable et al., 2017; Wolanin 2016). Our findings also
336 support previously reported gender difference in athlete depression and reaffirm that female
337 athletes show higher levels of depressive symptoms than their male counterparts (Gulliver et
338 al., 2015; Yang et al., 2007; Wolanin 2016). We also found that athletes between the ages of
339 18-34 had higher depressive symptom scores than athletes 35 years and older and that injured
340 athletes had significantly higher levels of depression than uninjured athletes. Although

previous studies have reported several other risk factors in athletes, we did not find any significant differences across the other measured characteristics. For example, and contrary to some other studies (Nixdorf et al., 2016; Nixdorf, Hautzinger, & Beckmann, 2013; Schaal et al., 2011; Wolanin et al., 2016), we did not find a difference between team and individual sport athletes. This finding could be due to the specific type of sports that were included (or not) in this study. For instance, in our sample, there were few athletes competing in aesthetic sports which are sport contexts shown to increase the risk of mental health issues (Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004). Future studies could, therefore, explore whether differences between team and individual sports may be more accurately explained by specific sports (e.g., rugby vs figure skating) or types of sport (e.g., team ball sports vs aesthetic) rather than by the broad distinction alone.

In terms of brooding and reflection, we found that brooding and reflection was significantly higher in female than in male athletes. This is in line with previous studies in non-athlete samples that have suggested that gender differences in depression may be partly explained by females' higher tendency to engage in rumination (Johnson & Whisman, 2013). It is also likely that wider societal forces contribute to the development of gender differences in depression that emerge during middle to late adolescence (Nolen-Hoeksema, 2001). For example, females may be more likely than males to experience victimization such as sexual abuse and harassment, and chronic strains due to their societal status and roles (Nolen-Hoeksema, 2001). For female athletes, additional stressors may emerge from the context of sports where male sports are often portrayed as the norm, and female sports merely as secondary (Fink, 2015). It is therefore important for future research to explore how potential contextual stressors interact with rumination in terms of gender differences in athlete depression.

We also found that brooding was higher in off-season athletes when compared to in-season athletes. We are unable to infer any causal directions due to our cross-sectional design, however, it is possible that levels of brooding vary across the athletic season. Although brooding rumination is considered a stable trait, there is evidence suggesting that this stability is relative rather than absolute (Bagby, Rector, Bacchiochi, & McBride, 2004). That is, while levels of brooding may fluctuate due to contextual influences (e.g., change in stressors), they do so in a predictable pattern over time. Future studies could hence explore whether athletes with a high brooding tendency may be especially vulnerable to experiencing depression during off-season periods (Doherty et al., 2016).

Exploring reflective rumination across sample characteristics, the only difference was found between injured and uninjured athletes. Specifically, injured athletes showed significantly higher tendency to engage in reflective rumination than uninjured athletes. Similar to findings on higher brooding in off-season than in-season athletes, it is possible that higher reflection scores in injured than uninjured athletes reflected increased coping efforts in response to stressors associated with athletic injury. As discussed by Roy et al. (2016), higher reflective rumination has also been linked to a lower ability to shift attention between tasks. Perhaps athletes with a higher tendency to engage in reflective rumination in our sample were more likely to be injured due to a decreased ability to switch focus, and consequently being less likely to react to or avoid situations that may lead to injury.

A particular focus of the current study was to deepen understandings of cognitive vulnerability in relation to depressive symptoms in athletes. Specifically, we wanted to test whether the odds of experiencing clinically relevant symptoms of depression differed depending on the athletes' tendency to engage in brooding and reflective rumination. Based on the response style theory and recent accounts of the role of reflection and brooding rumination in depression, we expected that athletes with a high brooding and reflection profile

would have higher odds of experiencing clinically relevant depressive symptoms when compared to athletes with low brooding and low reflection profile. We found support for this expectation as athletes with a tendency to engage in high levels of brooding and reflection had the highest odds for experiencing clinically relevant depressive symptoms. More specifically, in comparison to athletes with a low brooding/reflection profile, the odds of clinically relevant symptoms were seven-fold in athletes with high brooding but low reflection. For athletes with a high brooding and high reflection profile, however, the odds of clinically relevant symptoms were 13-fold. Our findings are in line with studies conducted in non-athlete samples (Joormann et al., 2006; Treynor et al., 2003), suggesting that brooding represents a maladaptive process that has a significant impact on individuals' likelihood of experiencing clinically relevant depressive symptoms.

We did not set any specific hypotheses to how reflection would relate to depressive symptoms. Our results suggested that having a high tendency to engage in reflective rumination did not increase the odds of clinically relevant depressive symptoms when combined with a low tendency to brood. On the other hand, when combined with a *high* tendency to brood, reflection was linked to increased odds of depressive symptoms. These findings support the general consensus among clinically oriented psychology researchers that the adaptiveness of reflection may be largely dependent on individuals' tendency to brood, in the way that high levels of brooding may override the adaptive effects of reflection (Joormann et al., 2006). In line with this, engaging in reflective rumination may be adaptive in non-depressed individuals, but a maladaptive in depressed individuals (Treynor et al., 2003; Whitmer & Gotlib, 2011). Considering that we found that reflective rumination was higher in injured than uninjured athletes, it is possible that reflection is, in fact, a maladaptive trait in the context of sports. Future research could further investigate whether reflection could have

414 an adaptive function over time and/or through other outcomes, such as increased meaning in
415 life and/or sport.

416 It is likely that the stressors that trigger depression in athletes may often be linked to
417 sport-related issues such as athletic failure, injury, or career termination (Appaneal et al.,
418 2009; Hammond et al., 2013; Wippert & Wippert, 2008; Wolanin et al., 2015). Although the
419 stressors may indeed revolve around sport-related issues, the mechanism by which these
420 stressors elicit depression would be expected to be similar to the general population. For
421 example, Nixdorf and colleagues (2016) found that a higher tendency to make internal, stable,
422 and global attributions after athletic failure explained differences in depressive symptoms
423 between individual sport athletes and team sport athletes. Nixdorf and colleagues' study is
424 one of the few studies on cognitive vulnerability to depressive symptoms in athletes and
425 provides some evidence for the potential importance of the sport context (e.g., type of sport)
426 in the development of these vulnerabilities. However, as they tested attributional style in
427 relation to athletic failure, the results from their study are limited to this specific context. As
428 athletes may be challenged by a multitude of stressors (Howells & Fletcher, 2015; Moesch et
429 al., 2018; Sarkar & Fletcher, 2014; Schinke, Stambulova, et al., 2018), even at times when
430 athletes are not engaged in their sporting endeavours (Doherty et al., 2016; Nesti & Sewell,
431 1999), our study deliberately focused on the maladaptive processes that may take place in
432 response to negative/depressed mood, be it due to athletic failure, injury, or any other
433 significant event or situation in the athletes' life.

434 Depressive rumination is defined as maladaptive abstractive thought patterns in
435 response to distress that can be characterized as asking oneself unanswerable questions
436 (Nolen-Hoeksema et al., 2008; Watkins, 2016). This type of processing of negative
437 information is seen as one of the active ingredients in maintaining attentional resources on the
438 causes and implications of one's depressive symptoms. This negative processing of

information then subsequently increases and maintains depressed mood, as well as impairs effective problem solving (Nolen-Hoeksema et al., 2008; Watkins, 2009). While targeting ruminative processes in treatment have shown to be effective in decreasing levels of depression (Manicavasagar, Perich, & Parker, 2012), rumination could also be a potential target in prevention approaches as "…it is observed to be elevated as a risk factor prior to the onset of depression, during episodes of major depression, in partial remission, and in full remission from depression." (Watson, 2016, p.20). Based on our findings, a ruminative tendency, especially brooding, may also be an important cognitive process to be considered in treatment and prevention within athlete populations. However, future studies should utilize longitudinal and intervention designs across different in-risk athlete populations to test the temporal patterns between rumination and depressive symptoms.

Targeting rumination may also be effective, not only in treating levels of depression, but also co-morbid issues (e.g., anxiety) and residual symptoms of depression (e.g., sleep) that may significantly impair daily functioning (Watkins et al., 2007). From this perspective, theoretical approaches that have a more generic conceptualization of rumination (e.g., the S-REF model, Wells & Matthews, 1996) in relation to emotional disorders, could provide a promising avenue for future applied and empirical investigations across different clinical and subclinical issues in athletes. As already partly voiced by Uphill and Dray (2009), another interesting avenue for future research in athletes would be to collectively examine cognitive vulnerability factors (e.g., negative attributions, dysfunctional attitudes, and rumination) in relation to depression in athletes. Furthermore, linking these vulnerabilities to other concepts that may be relevant in the context of sports, such as mental toughness or flow, would allow for improved understanding of the interaction between depression (or mental health) and athletic performance. Also, considering that ruminative response style may develop early in individuals' life (Spasojevic & Alloy, 2002), important insights into the influence of the sport

context on the development of ruminative tendencies could be gained by exploring different youth sport environments (e.g. outcome-oriented, early initiation or specialization) and/or youth coaching environments (e.g. criticism, excess control). If some contexts are more likely to contribute to an increased tendency to ruminate, early prevention strategies could be designed to attenuate these trends.

Our study findings should be interpreted with an understanding of its' main limitations. Firstly, due to the cross-sectional study design, causal or temporal inferences cannot be concluded. Also, due to the convenience sampling methodology, self-selection bias may have influenced our findings. We also had a broad inclusion of athletes in terms of the type and the level of sports. As we did not have sufficiently large sample sizes across different sports, we were not able to conduct specific analyses to disentangle potential sport-specific effects. It is also important to note, that our findings were limited to athletes from the United Kingdom and hence, interpretations should be made with an understanding of this cultural specificity.

In spite of these limitations, we believe that our study is an important addition to the mental health literature in sport psychology. It provides a theory-driven glance into the relationship between depressive rumination and depression symptomology in an athlete sample, which to our knowledge is first of its kind in the field. Furthermore, the study responds to a call voiced by other scholars to explore and validate cognitive vulnerability research in the athlete population. By doing this, we hoped to open new avenues to further understand depressive symptoms in the sport context, especially in terms of potentially modifiable risk factors. Finally, many of the previous studies have merely assessed differences in depressive symptoms across hypothesized predictors by comparing mean differences. Although informative of differences, these types of analyses are not sensitive to the clinical relevance of the observed differences. Therefore, in addition to mean differences,

we also wanted to explore ratios of non-cases to cases across the different levels of our predictor variable.

Clinical Implications

Considering our findings that brooding was a significant predictor of current clinically relevant symptoms of depression, and that a ruminative response style may develop early in life, psychologists working in youth sport could potentially screen for ruminative tendencies to promote more adaptive cognitive skills early in athletes' careers. Practitioners working with athletes could benefit from a detailed assessment and conceptualization of ruminative tendencies to identify the potential functions of rumination in the athlete's presenting issues such as depressed mood. This could allow the practitioner and the athlete to tackle ruminative tendencies and potential barriers (e.g., positive beliefs about rumination as an effective coping mechanism) to optimal outcomes. Considering that several different potential approaches to targeting ruminative tendencies exist (Fisher & Wells, 2009; Gardner & Moore, 2007; Segal & Teasdale, 2018; Watkins, 2016), and that rumination may be a relevant cognitive process, not only in terms of clinical disorders, but also in terms of sport-specific functioning of athletes (Bennett et al., 2016; Uphill & Dray, 2009); introducing and applying rumination-focused approaches in the context of sports could provide exciting opportunities for future prevention, treatment, and research efforts in athlete populations.

Conclusion

Depressive rumination might be an important vulnerability factor to be considered in future research, prevention, and treatment in athlete depression. Our findings indicated that a tendency to engage in brooding rumination significantly increased the odds of experiencing clinically relevant symptoms of depression, independent of athletes' reflection profile. Prospective studies are needed to disentangle temporal patterns in the relationship between

rumination and depressive symptoms, and to identify potential sport-specific factors that may contribute to the development of ruminative tendencies in athletes.

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Table 1 Mean Depression Symptom Scores on the Patient Health Questionnaire (PHQ-9) Across Selected Sample Characteristics

Factor	n	%	PHQ-9 M (SD)
Gender			
Male	176	61.5	5.11 (4.49)*
Female	108	37.8	7.48 (5.93)
Age			
18-24	102	35.7	6.50 (5.22)
25-34	98	34.3	6.43 (5.34)
35+	70	24.5	4.53 (4.82)*
Type of sport			
Team	124	43.4	6.68 (5.53)
Individual	162	56.6	5.53 (4.96)
Current competitive level			
International/Top tier professional	87	30.4	6.45 (5.37)
Local/Regional/National	179	61.3	6.02 (5.27)
Currently injured			
Yes	61	21.3	7.49 (5.47)
No	225	78.7	5.63 (5.11)*
Estimated time to full recovery (injured)			
≤ 20 days	19	32.4	5.43 (3.78)*
> 20 days	40	67.8	8.80 (5.78)
Competitive season			
In-season	213	74.5	5.86 (5.13)
Off-season	73	25.5	6.53 (5.55)

Note. % refers to the percentage of the total sample within each factor, * $p<.05$

729 *Table 2 Prevalence Odds Ratios for Clinically Relevant Depression Symptoms (PHQ-9 ≥ 10)*
730 *Relative to Athletes' Rumination Profiles*

Factor	%	n/N	OR (95% CI)
Rumination profiles (vulnerability)			
Low brooding/Low reflection (low)	3.5	3/86	1.0
Low brooding/High reflection (moderate)	9.1	4/44	4.25 (0.65 – 27.70)
High brooding/low reflection (high)	19.7	12/61	7.33 (1.93- 27.84)*
High brooding/High reflection (very high)	39.5	32/81	13.40 (3.81– 47.11)**

Note. % = within group prevalence of clinically relevant depression symptoms, n= frequency of cases, N=total sample size within (vulnerability) category. OR= Odds ratio, 95%CI= 95% confidence intervals. All analyses were adjusted for gender, age and injury status. *p<.005, **p<.001.

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