

1 **Mental health symptoms of amateur association football referees: A cross-sectional**
2 **study**

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14 **Conflicts of interest**

15 The authors certify that there is no conflict of interest with any financial organization regarding the material
16 discussed in the manuscript.

17 **Funding**

18 No funding has been received for this study.

19 **Acknowledgments**

20 The authors would like to thank all referees who officiate in Turkish amateur football leagues. The authors also
21 would like to thank Mr. Burcin Keskin for his assistance with the data collection, and Nazli Deniz Oz for her
22 assistance with the data analysis.

23 **Ethical approval**

24 The study was approved by the ethics committee of Istanbul University Faculty of Medicine (2021/1889-742844).

25 **Mental Health Symptoms of Amateur Association Football Referees: A Cross-sectional Study**

26 **Abstract**

27 Although referees who officiate in the amateur football leagues are exposed to various stressors that can negatively
28 affect their mental health (MH), little is known about their MH symptoms. The purpose of the study was to evaluate
29 MH symptoms of referees who officiate in the Turkish amateur football leagues. An online survey was sent to all
30 referees in the Turkish amateur football leagues (n=4900) incorporating standardized scales assessing depression,
31 anxiety, and stress. A total of 1279 referees participated in the study. Female referees reported higher depression
32 (p<0.01) and anxiety (p=0.02) scores than males. Younger referees (23-27 years) reported higher depression
33 (p=0.01) and anxiety (p<0.01) scores than older (>38 years) referees. Results showed that symptoms of depression,
34 anxiety, and stress scores were associated with marital status (being single), lower-incomes, severe sports injury
35 history, and inadequate social support. In light of these results, MH assessments should be undertaken to detect
36 which referees are at greater risk of MH problems, and facilitate appropriate and timely MH interventions. Further
37 study is needed to inform MH risk reduction strategies and/or programming.

38 **Keywords**

39 Sports officials, Depression, Anxiety, Stress, Soccer

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50 **Introduction**

51 Association football (soccer) refereeing is a complex job with inherent physical, professional, and
52 psychological demands (Arnold & Fletcher, 2012). Whilst referees run almost as much as the players throughout
53 a match (Weston et al., 2012), they also manage the game (Guillén & Feltz, 2011) and deal with unique stressors
54 such as abuse (e. g., microaggressions such as bad language or physical assault, verbal or physical threats) from
55 players, coaches, or spectators on field, in the corridor, or locker rooms. (Mountjoy et al., 2016; Webb, Rayner,
56 Cleland, & O’Gorman, 2020). While meeting the responsibilities of their role, referees must make accurate
57 decisions despite potential economic consequences for athletes, teams, and clubs (Webb, 2017). Referees work in
58 stressful environments, and referees have developed various coping strategies to deal with these issues (Cuskelly
59 & Hoye, 2013). Older age, greater refereeing experience, adequate social and organizational support all provide
60 advantages when coping with these issues (Cuskelly & Hoye, 2013; Hong, Jeong, & Downward, 2019). Those
61 who cannot create adequate coping strategies may be negatively affected psychologically, and be more vulnerable
62 to mental health (MH) problems such as depression, anxiety, and stress. Carson et al. and Lima et al. report that
63 negative emotional symptoms among referees are associated with younger age, being single, reduced officiating
64 experience, and performance concerns (Carson, Dynon, Santoro, & Kremer, 2020; Lima, Devran, Öz, Webb, &
65 Bayraktar, 2022). Likewise, research shows that referees who are less satisfied with social support and have a
66 severe injury history are more likely to report MH problems than their counterparts (Gouttebauge, Johnson,
67 Rochcongar, Rosier, & Kerkhoffs, 2017; Kilic, Johnson, Kerkhoffs, Rosier, & Gouttebauge, 2018). In addition,
68 female referees are at greater risk of MH problems because toxic, abusive, male-dominated environments that
69 include sexist and derogatory language, negatively affect their MH (Webb, Gorczynski, Oftadeh-Moghadam, &
70 Grubb, 2021).

71 In amateur football refereeing, it is noticeable that referees are exposed to diverse issues compared to
72 referees at higher levels, which can negatively impact their MH. For example, although verbal abuse is a significant
73 stressor that threatens the MH of referees at all levels (Webb, Dicks, Thelwell, van der Kamp, & Rix-Lievre, 2020),
74 amateur league referees suffer from this abuse more frequently given higher rates of negative behaviour towards
75 referees in amateur leagues (Webb, Rayner, Cleland, & O’Gorman, 2020). Moreover, increased fear of physical
76 harm due to the crowd’s proximity to the field, lack of physical barriers and security staff at amateur levels are
77 also significant sources of stress that may adversely affect the MH of referees who officiate in these amateur
78 leagues (Cuskelly & Hoye, 2013). Considering that these referees are often younger, less experienced, and have
79 lower levels of educations than referees who officiate in the professional leagues, they may also have difficulty

80 coping with the stressors mentioned above (Guillén & Feltz, 2011). Conversely, amateur referees are not provided
81 the technological tools used by professional referees such as audio communication systems, goal-line technology,
82 and access to video assistant referees (e Pina, Passos, Araújo, & Maynard, 2018). Furthermore, recent research
83 demonstrates that referees in lower leagues are more likely to suffer from MH problems than their counterparts in
84 higher leagues (Lima, Devran, Öz, Webb, & Bayraktar, 2022).

85 The COVID-19 pandemic created new stressors that may adversely affect the MH of referees (Webb,
86 2021). Since the 2020-2021 amateur football season was cancelled in many countries, the income of referees who
87 officiate in these amateur leagues decreased. However, referees who had a second job during the pandemic might
88 have been protected from some of the more harmful financial consequences during that period. Given that the vast
89 majority of amateur referees already had second jobs, prior to the start of the pandemic, they may have prioritised
90 their other employment due to economic concerns (Wilson et al., 2020). Moreover, these economic conditions
91 may have been even more concerning for student-referees who tend to be younger, often do not have second jobs,
92 and have additional academic pressures (Sallen, Hemming, & Richartz, 2018). When all of these factors are
93 combined with inadequate social and/or organizational support and potentially being infected with SARS COV-2,
94 all known to negatively impact MH (Hong, Jeong, & Downward, 2019; Lima, Denerel, Yilmaz, & Senisik, 2021;
95 Lima, Denerel, Yilmaz, & Senisik, 2021; Lima, Denerel, Devran, Rice, & Bayraktar, 2022), MH risks may be
96 intensified.

97 Although referees who officiate in the amateur football leagues are exposed to unique stressors that can
98 negatively affect their MH, there is a paucity of research examining the MH problems of referees who officiate in
99 lower leagues (Orviz-Martínez, Botey-Fullat, & Arce-García, 2021). To ensure the timely implementation of
100 protective measures, it is necessary to understand the MH problems of referees and determine which referees are
101 at increased risk of MH problems. Therefore, the primary objective of this study was to evaluate the prevalence of
102 MH problems (anxiety, depression, and stress) among referees who officiate in the Turkish amateur football
103 leagues. The secondary objective was to evaluate the association between MH problems and a range of variables,
104 including demographics, sport-specific aspects, and the COVID-19 pandemic-related factors. Given results of
105 previous research, it was hypothesized that gender (being female), younger age, less refereeing experience, lower-
106 income, being a student-referee, and being infected with SARS-CoV-2 would be associated with MH problems.

107 **Method**

108 **Study design and data collection**

109 This cross-sectional, anonymous, and online study was conducted in accordance with the Helsinki
110 declaration. The study was approved by the University Ethics Committee (XXX), and all participants provided
111 informed consent. The survey, questioning demographic information, sport-specific aspects, COVID-19
112 pandemic-related factors, and three standardized scales, was sent to the smartphones of referees who officiate in
113 the Turkish amateur football leagues via the Turkish Football Federation (TFF) Medical Board. Data were
114 collected between 2.10.2021 and 15.10.2021, and confidentiality of all data was ensured.

115 **Participants**

116 Turkish referees who officiate in the amateur football leagues were included in this study. To be included
117 in the study referees had to be 18 years or older and refereeing in the amateur football leagues throughout the
118 2021–2022 season. We invited all referees (n=4900) registered in the TFF Referee Board for the 2021-2022 season
119 amateur leagues via online chat groups. 1279 referees completed the survey, a response rate of 26.1%. No referees
120 were excluded from the study because all referees met the inclusion criteria.

121 **Measures**

122 **Patient Health Questionnaire-9 (PHQ-9)**

123 The PHQ-9 consisted of 9 items to measure depression according to the Diagnostic and Statistical Manual
124 of Mental Disorders-IV (DSM-IV) criteria (Kroenke, Spitzer, & Williams, 2001). Each item was scored on a 4-
125 point Likert-type (ranging from 0=not at all to 3=nearly every day). Higher scores indicated higher depression
126 levels. Cut-off values of the PHQ-9 were reported for mild \geq 5, moderate \geq 10, moderately severe \geq 15, and severe \geq 20
127 (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 previously demonstrated sufficient psychometrics and fit
128 indexes in a Turkish sample (Güleç, Güleç, Şimşek, Turhan, & Sünbül, 2012). Cronbach's alpha internal reliability
129 coefficient was 0.84, and the reliability coefficient for this study was 0.85.

130 **General Anxiety Disorder-7 (GAD-7)**

131 The GAD-7 consisted of 7 items to measure generalized anxiety disorder according to the DSM-IV
132 criteria (Spitzer, Kroenke, Williams, & Löwe, 2006). Each item was scored on a 4-point Likert-type (ranging from
133 0=none to 3=almost every day). Higher scores indicated a higher anxiety level. Cut-off values of the GAD-7 were
134 reported for mild \geq 5, moderate \geq 10, severe \geq 15 (Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7
135 previously demonstrated high validity, reliability, and good psychometric properties in a Turkish sample (Konkan,

136 Senormanci, Guclu, Aydin, & Sungur, 2013). Cronbach's alpha internal reliability coefficient was 0.85, and the
137 reliability coefficient for this study was 0.87.

138 **Perceived Stress Scale-10 (PSS-10)**

139 The PSS-10 consisted of 10 items to measure perceived stress (Cohen, Kamarck, & Mermelstein, 1994).
140 Each item was scored on a 5-point Likert-type (ranging from 0=never to 4=very often). Higher scores indicated a
141 higher stress level. Cut-off values of the PSS-10 were reported for moderate ≥ 13 and severe ≥ 26 (Das.nh.gov, 2022).
142 The PSS-10 previously demonstrated good psychometric properties in a Turkish sample (Eskin, Harlak,
143 Demirkıran, & Dereboy, 2013). Cronbach's alpha internal reliability coefficient was 0.82, and the reliability
144 coefficient for this study was 0.78.

145 **Demographic and COVID-19 pandemic-related questions**

146 Demographics included gender, age, marital status, highest-education level, second job, years in
147 refereeing, annual income, severe sports injury history (leading to time-loss of more than 28 days in the last year),
148 and psychiatric illness. The following variables were collected to evaluate the effect of the COVID-19 pandemic:
149 being infected with SARS CoV-2, adequate social support (thoughts about the provision of adequate support from
150 family and close friends), and performance concerns (e.g., feeling useless as a referee and feeling a need to train
151 harder for future matches/contests).

152 **Data analysis**

153 The data were analyzed using SPSS 24 package software. Descriptive statistical methods were utilized,
154 with analysis incorporating frequency (n) and percentage (%). The normality distribution was tested with the
155 Kolmogorov-Smirnov test. As the data did not show normal distribution (it exceeded the reference skewness-
156 kurtosis values of $-1.95/+1.95$), the Mann Whitney-u test was used for two-group comparisons, and the Kruskal
157 Wallis-h test was used for comparisons of three or more groups. The Spearman correlation test was applied to
158 determine the direction and level of correlation between scales. The level of significance in the study was
159 established as 0.05 and 0.01.

160 **Results**

161 A total of 1279 amateur football league referees participated in the study. The majority of the respondents
162 were male (95.5%, n=1221), 67.9% of referees (n=869) were single, 70.8% (n=905) graduated from university,
163 69.2% (n=885) of referees had another job, and 22.9% (n=293) of referees were also a student. A total of 66.4%

164 (n=849) of referees had performance concerns. The demographics and distribution of answers about the COVID-
165 19 pandemic-related questions are presented in Table 1.

166 [please insert Table 1 here]

167 Considering PHQ-9, GAD-7, and PSS-10 results according to cut-off values, the proportions of at least
168 mild severity were 36.1% (n=462), 26.2% (n=335), and 45.2% (n=577), respectively. The distribution of the scale
169 scores is presented in Table 2.

170 [please insert Table 2 here]

171 When the relationship between scale scores and variables was examined, female referees reported higher
172 depression ($p<0.01$) and anxiety ($p=0.02$) scores than males. Depression ($p=0.01$) and anxiety ($p=0.01$) scores of
173 younger referees (23-27) were higher compared to older referees (>38). Single referees reported higher depression,
174 anxiety, and stress scores (all $p<0.01$), whilst lower-income was associated with higher depression ($p<0.01$),
175 anxiety ($p=0.02$), and stress ($p=0.04$) scores. Student-referees reported higher depression ($p=0.02$) and anxiety
176 ($p<0.01$) scores than those with another job. Referees with less refereeing experience (4-7 years) reported higher
177 anxiety ($p=0.03$) scores than those with more experience (12-15 years). Referees with a severe sports injury history,
178 performance concerns, and who thought that the social support was inadequate reported higher depression, anxiety,
179 and stress scores than their counterparts (all $p<0.01$) (Table 3).

180 [please insert Table 3 here]

181 Elevated scores for depression, anxiety, and stress were highly correlated with each other (all $p<0.01$)
182 (Table 4).

183 [please insert Table 4 here]

184 **Discussion**

185 This is the first study presenting the MH problems of referees who officiate in amateur football leagues.
186 The principal findings of the study were that 36.1% of referees suffered from depression, 26.2% from anxiety, and
187 45.2% from stress; the MH problems of referees were associated with being female, younger, single, a student-
188 referee, having inadequate social support, and performance concerns.

189 We hypothesized that the main reasons why almost one in two referees had any MH problems were the
190 pandemic, economic concerns, and abuse. The pandemic and changes in football negatively affected referees as

191 well as all other football stakeholders (Webb, 2021). Moreover, the income of referees who officiate in the amateur
192 leagues, who were paid per match, decreased significantly due to the cancellation of the 2020-2021 amateur season.
193 In accordance with our hypothesis, while referees with another job may have focused on their second job to make
194 money, student-referees and referees without another job may have faced economic difficulties, leading to negative
195 impacts on their MH (Wilson et al., 2020). In addition, academic pressure may have made student referees even
196 more vulnerable to MH problems (Sallen, Hemming, & Richartz, 2018). Furthermore, physical (bullying,
197 scuffling, etc.) or verbal (swearing, harassment, etc.) abuse from athletes, coaches, or spectators are one of the
198 primary stressors for referees (Mountjoy et al., 2016; Webb, Dicks, Thelwell, van der Kamp, & Rix-Lievre, 2020),
199 with referees who officiate in the amateur leagues suffering this abuse more frequently (Webb, Rayner, Cleland,
200 & O’Gorman, 2020). Nevertheless, the high prevalence of MH problems among referees who officiate in the
201 amateur leagues is a worrying consequence. Therefore, underlying factors associated with the poor MH outcomes
202 of referees should be identified, whilst appropriate and timely interventions should be provided.

203 Although the use of different scales makes comparisons difficult, our results showed that the prevalence
204 of MH symptoms of amateur referees were higher compared to professional referees, elite athletes, and football
205 players (Lima, Devran, Öz, Webb, & Bayraktar, 2022; Denerel & Lima, 2022; Lima, Denerel, Yilmaz, & Senisik,
206 2021). Whilst Lima et al. reported that 34.6% of the professional league referees suffer from depression, 24% from
207 anxiety, and 40.6% from stress, these measures are 15%, 8.6%, 22.4% for elite athletes and 26.5%, 16.4%, and
208 19.3% for football players respectively (Lima, Devran, Öz, Webb, & Bayraktar, 2022; Nixdorf, Frank, Hautzinger,
209 & Beckmann, 2013; Rice et al., 2019; Denerel and Lima, 2022; Lima, Denerel, Yilmaz, & Senisik, 2021).
210 Although different stakeholders are exposed to both similar and diverse stressors in sport, the fact that the
211 prevalence of MH symptoms in amateur referees is similar or higher than other groups demonstrates that further
212 detailed research is required.

213 Recent adverse life events may affect the MH of athletes, and may cause various MH problems (Rice et
214 al., 2016), and female athletes are more likely to experience MH problems than males (Schaal et al., 2011). In a
215 recent study conducted on the same stakeholders, Lima et al. reported that female football players suffered from
216 depression and stress almost five-times more often than their male counterparts (Lima et al., 2022). Otherwise,
217 consistent with our results, Webb et al. reported that toxic, abusive, male-dominated environments negatively
218 affects the MH of female referees, and female match officials often experience poor MH during and after matches
219 (Webb, Gorczynski, Oftadeh-Moghadam, & Grubb, 2021). Although the number of female referees in our study

220 is small, further consideration of why female referees are more likely to suffer from depression and anxiety is
221 required. The risk factors that threaten their MH should be identified and timely interventions should be delivered.

222 One of the most important elements that helps to deal with any stressors is social support (Guillén &
223 Feltz, 2011), with close family the most influential supporter (Lin, Mutz, Clough, & Papageorgiou, 2017).
224 Effective support assists referees in dealing with MH issues by developing various coping strategies (Hong, Jeong,
225 & Downward, 2019). In a recent study conducted with Turkish professional football league referees, Lima et al.
226 revealed the importance of social support on MH (Lima, Devran, Öz, Webb, & Bayraktar, 2022). Our results also
227 support previous studies showing that social and family support is essential for referees' MH (Carson, Dynon,
228 Santoro, & Kremer, 2020; Kilic, Johnson, Kerkhoffs, Rosier, & Goutteborge, 2018). Given that inadequate support
229 may even cause discontinuation from employment (Riggle, Edmondson, & Hansen, 2009), closely monitoring the
230 referees who thought that they had received insufficient support and taking the necessary interventions will not
231 only improve the MH status of amateur referees, but may also remove an important barrier to being an excellent
232 referee (Aragão e Pina, Passos, Carvalho, & Travis Maynard, 2019).

233 Older age and more refereeing experience contribute to the maintenance of MH by providing autonomous
234 behaviours and adaptive coping strategies (Cuskelly & Hoye, 2013; Guillén & Feltz, 2011; Hong, Jeong, &
235 Downward, 2019). Older referees can more easily deal with stressors, which younger and less experienced referees
236 face for the first time, by drawing upon their past experiences. Also, mental toughness and self-efficiency are
237 known to improve with age (Guillén & Feltz, 2011) and provide some form of protection against MH problems
238 (Slack, Maynard, Butt, & Olusoga, 2013). Moreover, a recent study showed that younger and less experienced
239 referees had an increased risk of MH problems compared to their older and more experienced counterparts (Lima,
240 Devran, Öz, Webb, & Bayraktar, 2022). Considering that younger referees in the present study are usually students,
241 whereas the vast majority of older referees have another job, the distribution of having a second job according to
242 age may also have impacted on MH due to some of the possible reasons mentioned above (Wilson et al., 2020).
243 Since it is known that having more knowledge about stress makes it easier to cope with stress, younger and less
244 experienced referees, in particular, should be informed about how to deal with stress through mental skills training
245 (Mathers & Brodie, 2011) and MH awareness programs (Breslin, Shannon, Haughey, Donnelly, & Leavey, 2017).

246 Recent research on the same stakeholders has shown that being infected with SARS CoV-2 adversely
247 affects athletes' MH (Lima, Denerel, Yilmaz, & Senisik, 2021; Lima, Denerel, Devran, Rice, & Bayraktar, 2022).
248 Moreover, the MH problems of professional football players infected with SARS COV-2 were associated with

249 participation in football at lower levels and performance concerns (Lima et al., 2022). However, our result, which
250 does not support our hypothesis, can be explained by several reasons. Since it is known that higher levels of
251 education may afford greater levels of self-awareness and self-regulation (Loghmani, Cuskelly, & Webb, 2021)
252 referees could have developed coping strategies more easily; whilst more than 80% of the football players in the
253 study mentioned above were high school graduates (Lima, Denerel, Yilmaz, & Senisik, 2021) this rate was only
254 22.5% in the present study. Furthermore, the fact that the study was conducted close to the third year of the
255 pandemic may have caused us to achieve different results compared to studies conducted in the early period of the
256 pandemic. The reduction of the restrictions, adaptation of the community to living with the pandemic, having a
257 greater knowledge of the SARS CoV-2 infection, and reduction in mortality and morbidity due to SARS CoV-2
258 may have tapered the negative effects of being infected on MH (Wessels et al., 2022; Our world in data, 2022).

259 The capacity of referees for endurance and sprinting during matches is essential to enable them to be in
260 optimum positions on the field of play, in order to obtain sufficient information to make accurate decisions (Giske,
261 Haugen, & Johansen, 2016). This whole process is followed and reported by the referee observers (assessors) on
262 a match by match basis, and these reports and observations can affect the future promotion opportunities of referees
263 (Samuel, 2015). This unique stressor may put referees under pressure, and contribute to performance concerns.
264 Performance concerns not only negatively affect MH directly (Gouttebauge, Johnson, Rochcongar, Rosier, &
265 Kerkhoffs, 2017; Lima, Denerel, Yilmaz, & Senisik, 2021) but may also cause sports injuries by leading to
266 overloading, and negatively affecting MH indirectly (Kilic, Johnson, Kerkhoffs, Rosier, & Gouttebauge, 2018).
267 Given that referees with performance concerns and severe injury history were at increased risk of MH problems
268 in the present study, it would be beneficial to monitor the training workload and the psychological states of referees
269 with performance concerns. Also, the MH of referees who have suffered from severe injuries should be monitored
270 as well as their physical health and adequate support should be provided when they get injured and are recovering
271 from injury.

272 Several limitations should be considered for this study. First, there was no clinical assessment for MH
273 symptoms, and all outcome data were collected via online self-reporting. Second, since the data were cross-
274 sectional, results only provide information about relationships and causality cannot be inferred, limiting
275 interpretations. Third, although a large sample size was achieved, the number of female referees was far fewer
276 than male referees, and therefore inadequate for definitive determinations of gender effects. Fourth, the present
277 study was limited to referees who officiate in the Turkish amateur football leagues. Since the coping strategies of
278 referees living in various cultures and societies may differ (Arnold & Fletcher, 2012), it may not be possible to

279 generalize our results to all referees. Fifth, questioning diagnosed psychiatric illness instead of subclinical
280 conditions is also a limitation. Sixth, the format of the responses to some questions as yes or no, closed questions,
281 limited the interpretation of the results. Lastly, some referees may have worried about being stigmatized or
282 identified, despite anonymity reassurance, and therefore may not have completed the surveys accurately.

283 **Practical Implications**

284 The present study provides practical insights beyond the theoretical implications that have been presented.
285 Findings have particular relevance to referee administrators, trainers and managers at governing bodies both in
286 Turkey and in other countries. Moreover, given, the present concerns around the discontinuation and attrition of
287 football referees and sports officials more widely (Downward, Webb, & Dawson, 2022), the present findings
288 provide essential information for governing bodies that can be used to improve referee mental health and their
289 structures around referees, particularly at a national level.

290 First, the results identify that amateur referees have an increased prevalence of MH when compared to
291 professional referees, elite athletes, and football players. This presents challenges for administrators, with the
292 recruitment and retention of referees ever more important, given their discontinuation. As such, governing bodies
293 should focus on the support networks provided for newly qualified and inexperienced referees to minimise drop
294 out and improve MH.

295 Second, the present study identified that female officials were more likely to suffer from depression and
296 anxiety. Given the national and international drive to recruit female referees and provide a more inclusive and
297 supportive environment for these referees when they do qualify, governing bodies and referee administrators
298 should reflect on the current training, development and support provided for female referees and whether this
299 support provides the most effective framework for good MH.

300 Third, support for all referees should be as effective as possible. The present study identified that effective
301 social and family support is essential for positive MH. Alongside a focus on this provision, governing bodies
302 should also identify the use of mentoring as a proactive method of supporting young and new referees. By utilising
303 older, more experienced referees who are better prepared to deal with stressors by reflecting on previous
304 experiences, younger and less experienced referees can utilise this experience through effective mentoring
305 programmes.

306 Fourth, the organisation of assessment for referees should be further considered by governing bodies. The
307 findings identified that referees can feel pressurised and stressed by assessments and that performance concerns
308 and severe injury history provided an increased risk of MH problems. As such monitoring training workload and
309 the psychological states of referees would be beneficial for governing bodies. The approach to assessment and
310 training preparation requires further consideration, given the MH implications and the potential impact on referee
311 discontinuation and attrition rates.

312 **Conclusion**

313 The present study contributes to an improved understanding of an under-researched population and adds
314 a valuable contribution to the extant literature by showing the prevalence of depression, anxiety, stress symptoms
315 and correlating variables among referees who officiate in the Turkish amateur football leagues. Findings
316 demonstrate that 36.1% of referees suffered from depression, 26.2% from anxiety, and 45.2% from stress. Female,
317 younger (23-27 years), and student referees are especially prone to exhibit depression and anxiety symptoms. Our
318 study also shows that being single, having less income (<5k \$), inadequate social support, performance concerns,
319 and experiencing a sports injury are associated with depression, anxiety and stress symptoms. In light of these
320 results, the MH of referees, in particular those who are more vulnerable to MH problems, should be monitored
321 closely. Early and timely intervention should be provided. Further study is needed to inform MH risk reduction
322 strategies and/or programming within national governing bodies of sport.

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489 **Table 1. Descriptive variables of amateur referees (n=1279)**

<i>Variables</i>		<i>Frequency (%)</i>
Gender	Male	1221 (95.5)
	Female	58 (4.5)
Age (years)	18-22	265 (20.7)
	23-27	488 (38.2)
	28-32	264 (20.6)
	33-38	178 (13.9)
	>38	84 (6.6)
Marital status	Single	869 (67.9)
	Married	410 (32.1)
Highest education	High school	288 (22.5)
	University	905 (70.8)
	Doctorate	86 (6.7)
History of refereeing (years)	0-3	344 (26.9)
	4-7	524 (41)
	8-11	215 (16.8)
	12-15	98 (7.7)
	>15	98 (7.7)
Second job	No	101 (7.9)
	Yes, student	293 (22.9)
	Yes, another job	885 (69.2)
Annual income (\$)	<5k	774 (60.5)
	5-10k	340 (26.6)
	10-20k	137 (10.7)
	>20	28 (2.2)
SARS CoV-2 Status	Yes	320 (25)
	No	959 (75)
Adequate social support	Yes	704 (55)
	No	575 (45)
Performance concerns	Yes	849 (66.4)
	No	430 (33.6)
Psychiatric illness*	Yes	18 (1.4)
	No	1261 (98.6)
Chronic illness*	Yes	13 (1)
	No	1266 (99)
Experience a sport injury	Yes	100 (7.8)
	No	1179 (92.2)

*Previously diagnosed by a specialist

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Table 2: Prevalence of depression, anxiety, and stress symptoms for amateur referees (n=1279)

	<i>Depression n (%)</i>	<i>Anxiety n (%)</i>	<i>Stress n (%)</i>
Normal	817 (63.9)	944 (73.8)	702 (54.8)
Mild	323 (25.2)	259 (20.3)	-
Moderate	91 (7.1)	62 (4.8)	547 (42.8)
Severe	48 (3.8)	14 (1.1)	30 (2.4)

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Table 3. Comparison of depression, anxiety, and stress symptoms according to descriptive variables (n=1279)

<i>Variables</i>		<i>Depression (mean rank)</i>	<i>Anxiety (mean rank)</i>	<i>Stress (mean rank)</i>
<i>Gender</i>	Male	618.43	635.18	636.02
	Female	782.16	741.39	723.79
<i>Z</i>		-3.28	-2.19	-1.77
<i>p/ES</i>		<0.01**/0.09	0.02*/0.06	0.07
<i>Age (years)</i>	18-22	615.14	660.45	630.85
	23-27	666.76 ^a	672.98 ^a	671.15
	28-32	615.42	610.35	624.73
	33-38	580.93 ^b	589.97	625.97
	>38	547.83 ^b	583.08 ^b	565.64
<i>X²</i>		13.27	12.281	7.76
<i>p/ES</i>		0.01*/0.07	0.01*/0.05	0.10
<i>Marital status</i>	Single	655.75	667.51	660.91
	Married	561.69	581.69	595.69
<i>Z</i>		-4.33	-3.97	-2.95
<i>p/ES</i>		<0.01**/0.12	<0.01**/0.11	<0.01**/0.08
<i>Highest education level</i>	High school	655.31	660.66	663.55
	Collage	615.54	637.12	636.71
	Doctorate	629.17	601.08	595.81
<i>X²</i>		2.65	2.01	2.48
<i>p/ES</i>		0.26	0.36	0.28
<i>Annual income (\$)</i>	<5k	649.57 ^a	661.42 ^a	677.68 ^a
	5-10k	592.59	607.10 ^b	596.33
	10-20k	592.33 ^b	622.23	552.53 ^b
	>20k	519.98 ^b	534.34 ^b	556.57 ^b
<i>X²</i>		9.70	8.32	21.97
<i>p/ES</i>		0.02*/0.04	0.04*/0.06	<0.01**/0.10
<i>Second job</i>	No	678.53	706.71 ^a	689.19
	Yes, student	670.58 ^a	686.03 ^a	666.03
	Yes, another job	604.64 ^b	617.15 ^b	625.77
<i>X²</i>		11.82	9.58	4.57
<i>p/ES</i>		<0.01**/0.07	<0.01**/0.06	0.10
<i>History of refereeing (years)</i>	0-3	615.79	632.52	625.22
	4-7	645.06	673.42 ^a	659.69
	8-11	652.41	623.06	663.73
	12-15	551.46	571.74 ^b	571.86
	>15	570.47	592.98	602.69
<i>X²</i>		9.31	10.33	7.28
<i>p/ES</i>		0.054	0.03*/0.07	0.12
<i>Experience a sport injury</i>	Yes	807.90	749.80	755.70
	No	609.81	630.69	630.19
<i>Z</i>		-5.27	-3.17	-3.26
<i>p/ES</i>		<0.01**/0.14	<0.01**/0.08	<0.01**/0.09
<i>SARS CoV-2 status</i>	Yes	621.80	634.48	638.16
	No	626.73	641.84	640.61
<i>Z</i>		-0.21	-0.31	-0.10
<i>p/ES</i>		0.83	0.75	0.91
<i>Adequate social support</i>	Yes	589.07	611.39	597.22
	No	669.81	675.02	692.38
<i>Z</i>		-3.96	-3.14	-4.58
<i>p/ES</i>		<0.01**/0.11	<0.01**/0.08	<0.01**/0.12
<i>Performance concerns</i>	Yes	668.01	663.36	674.07
	No	540.28	593.88	572.74
<i>Z</i>		-5.93	-3.26	-4.64
<i>p/ES</i>		<0.01**/0.16	<0.01**/0.09	<0.01**/0.12

*p<0.05; **p<0.01; ^aHigher; ^bLower

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Table 4. Relationship between depression, anxiety, and stress symptoms (n=1279)

		<i>Depression</i>	<i>Anxiety</i>	<i>Stress</i>
<i>Depression</i>	r		0.70	0.52
	p	1,00	<0.01	<0.01
<i>Anxiety</i>	r	0.70		0.52
	p	<0.01	1,00	<0.01
<i>Stress</i>	r	0.52	0.52	
	p	<0.01	<0.01	1,00

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