Impact of COVID-19 Pandemic on the Mental Health of Sports Fans

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Research

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Running title

Impact of COVID-19 pandemic on the mental health of sports fans

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Abstract

Background: Information regarding COVID-19 mental health burden among medical workers and other vulnerable individuals has been hugely emphasized during the stressful campaign against COVID-19, however, the mental health problems among sports fans and athletes of Africa and globally have been neglected. The present studies investigated mental health burden and knowledge of sport associated with mental health issues among sports fans.
Methods: A cross-sectional descriptive study was undertaken amongst sports fans above the age of 18. A closed-ended questionnaire was used to collect data from respondents (N=196). Data was collected using google form for indications of anxiety and anger using a modified generalized anxiety disorder (GAD-7) and Spielberger's State-Trait Anger Expression Inventory-2 (STAXI-2) as appropriate.
Results: Few sports fans (47.4%) knewknew COVID-19 mental health care. Sports fans who had knowledge about mental health issues associated with sports had low levels of anxiety (R = 0.010; P = 0.894) and anger (R = -0.025; P= 0.724) with increasing age. However, anxiety and anger increase with age among female sports fans but reduce in males. Sports fans with partners have high levels of anxiety and anger during lower age levels (below the 20s) and these decrease with aging and this relationship is inverse in their single counterparts.
Conclusions: Most sports fans in Uganda are not knowledgeable about COVID-19 sports-associated mental health issues and surprisingly this seems to be associated with less COVID-19 sports-related mental health issues during the lockdown.

Keywords: Age, Sex, Marital status, Anger, Anxiety, Sports fans, COVID-19 mental health, Sports-associated mental health, Africa

1.0 BACKGROUND

The Coronavirus disease of 2019 (COVID-19) pandemic was declared a global health emergency [1], with a great impact on people's livelihood, including the sports industries [2]. Currently, only scanty data exists regarding COVID-19 sports-associated mental health issues among sports fans and athletes of Africa and globally because an emphasis on mental health during the COVID-19 campaign has been put on healthcare workers [1, 3, 4], and other vulnerable persons neglecting the sport's stakeholders [5]. The recommended quarantine restrictions and social distancing measure have greatly affected various categories of people in the African continent [6], including sports fans, through impacted athlete's chances to professionally compete, followed by a wide-spread concern on mental health issues among sports fans and athletes [7]. Previous research on psychological effects of pandemic-associated quarantine involving MERS (Middle East Respiratory Syndrome) and SARS (Severe acute respiratory syndrome) correlated obstructive social interaction, suspension of recreational activities with PTSD (posttraumatic stress disorder), anger, anxiety, and subtle bipolar behavioral orientation [8, 9]. Recent findings regarding COVID-19 sports-associated mental health burdens among the sports fans and athletes have shown that athletes and sports fans could be predisposed to sports-related mental burdens due to lack of poor

social support whenever they indulge in stressful thoughts that can lead to psyche concerns [10], and that focusing on COVID-19 sports-associated mental health and increased awareness of it using sports bodies and health ministries were vital strategies in curbing not only COVID-19 mental health challenges in general but specifically COVID-19 sports-associated mental health burdens as well in the face of the pandemic [11].

With the outbreak of COVID 19, the Ugandan government took some unprecedented measures, which included travel restriction, suspension of public and social gathering, and sporting activities [2, 6, 12]. The restriction of people from going to stadiums and viewing centers to watch their favorite team play, due to the need for social distance would be associated with psychological effects amongst sports [13]. The catastrophic effects associated with the sudden cancellation of most sporting events initiated a crisis that left sports enthusiasts, coaches, and athletes with personal emotional burdens, with some complaining of symptoms consistent with depression and anxiety-related mindset during the lockdown [14]. The ongoing partial international sports bans weigh heavily on the minds of sports fans, subscribers, and supporter clubs largely due to financial constraints affecting the sport's stakeholders including the fans [15]. Several international sporting events including but not only the 2020 Two Oceans Marathon of Cape Town, South Africa, [16], Tokyo 2020 Summer Olympic Games [17], and the UEFA Euro 2020 [18] were canceled or postponed to limit the impact of the COVID-contagion, therefore negatively impacting athletes, fans, brand-sponsors, and other companies.

Studies have found a meaningful association between age, knowledge, and mental health, where knowledge, and the associated up-to-date and specifically accurate mental health information, precautionary measures, and maturity (age) were shown to improve positive attitudes toward mental health and reduced the psychological impact of COVID-19-related stress, anxiety, and depression with an improved psychological resilience during the pandemic [19] However, it should be re-emphasized that elderly persons are more predisposed to epidemic-related medical conditions including mental health issues related to epidemics such as COVID-19 and SARS of 2003 [19–21]. Previous studies regarding mental health associated with the epidemics have indicated that there are sex differences regarding psychological responses with variable levels of stress, anxiety, and depression among the male and female sports fans [22, 23], the contributing factors for the gender differences of the epidemic sports-related mental health burdens could be biological, social, among others that invariably impact the physiological, cognitive and behavioral responses of the fans [24][25]. The variable role of marital status in sports-related mental health problems has been shown in single individuals and those with partners, where the two groups show different impact levels regarding epidemically-related mental health burdens [26]. While collaborative efforts and global partnerships are required to fight the COVID-19 pandemic and its associated mental health challenges [11], all the stakeholders such as the academicians, media, health professionals, government and non-government organizations are uniquely positioned in their communities and could be used in the battle against COVID-19 mental health challenges, including COVID-19 sports-associated mental health burdens [11].

In sports terms, the impact should be tackled from wide perspectives including and not limited to business, sociology, sustainability, psychology, finance, and economics [27], justing the need for the present study. The present study aimed to evaluate the knowledge of COVID-19 sports-associated mental health issues, COVID-19 sports-associated mental health burdens, and their relation with factors such as age, sex, and marital status among sports fans of Uganda

2.0 METHODS

2.1 STUDY SITE AND DESIGN

This was a cross-sectional study conducted among 196 sports fans in Bushenyi district of Western Uganda above the age of 18, in August and September 2020.

2.2 SAMPLE SIZE DETERMINATION

The sample population was small, but not static; thus, the study adopted the sample size necessary for estimating a population proportion of a small, finite population with (1-α) 100% confidence and error no larger than *e* [28];

$$n = \frac{m}{1 + \frac{m-1}{N}}$$

Where;

$$m = \frac{Z^2_{1/2\beta}\, p(1-p)}{e^2}$$

m = is the sample size necessary for estimating the proportion p for a small infinite population, and n = correction to represent a finite population.

Let α = 5, therefore e = 0.05

$Z_{1/2\beta}$ = 1.96

Where p = the assumed proportion of sports fan in Ishaka town

The youth population in Uganda is 78% of the total population [29], which was also assumed to be the proportion of youth (0.78) that makes up Ishaka population of 17,500 [30] = 13,475

There was no available record for fan base in Uganda, thus, the study assumed that the proportion of sports fan will be at least one-quarter of the proportion of youth = 0.78 / 4 = 0.195

Therefore,

$p = 0.195$

$$m = \frac{1.96^2 \times 0.195(1 - 0.195)}{0.05^2}$$

$$m = \frac{0.60303516}{0.0025} = 241.214$$

Correction for small population (n);

$$n = \frac{241.214}{1 + \frac{241.214 - 1}{13{,}475}}$$

$$n = \frac{241.214}{1.018} = 237$$

The sample Size for nursing students will be 237, and the researcher assumed an attrition rate of 10% (24); therefore, the workable sample size will be 261.

2.3 DATA COLLECTION AND MANAGEMENT

2.3.1 Data collection tool

A structured close-ended questionnaire was used for the data collection. The questionnaire captured the sociodemographic features of the respondents modified tools used to measure awareness of mental health care, generalized anxiety, anger, and depression. Awareness of mental health care was assessed using simple questions and each of the options provided were assigned scores. Anxiety was assessed using a modified generalized anxiety disorder (GAD-7) item tool [31]. Each of the responses attracted scores. Anger was assessed using a modified Spielberger's State-Trait Anger Expression Inventory-2 (STAXI-2) [32]. Responses for each question were assigned scores (Figure 1).

Figure 1: ***Insert here***

2.3.2 Data collection method

The initial draft of the questionnaire was sent to different experts (psychiatrists, sociologists, and statisticians) for face and content validity. The questionnaire was pretested among 10 respondents and remolded to a final tool and was made available online, using google form online resource (via docs.google.com/forms). In the end, 257 responses were retrieved, 41 responses were excluded because greater than 25% of the required pieces of information were missing, and about 10 were minors.

2.3.3 Data management

The data obtained from the survey were entered into Microsoft Excel (2016) and scores, grades were assigned to assessment variables. Since the questionnaire were self-administered. Data collected were assessed for completeness, and response failing to meet the 75% cut-off (on all valid questions) were excluded. No adjustment was made to any categorical variable.

The coding for the various sections were provided as follows: Sociodemographic characteristics (Q1-Q5) entered into excel included sex (male/female), marital status (single/married/divorced/separated) recoded to relationship status (married=partner, single/divorced/separated=no-partner). The response variables anxiety (score & level) and anger (score & level) were the mental health state of interest, while knowledge of mental health associated with sports (K-MHCSPORTS) was an intervening variable. Sex and relationship status were the categorical factor and age the continuous factor. Mental Health Care Knowledge was obtained as a binary attribute of YES (1) or NO (0). Modified GAD Assessment of Anxiety (Q11, Q12 & Q14): Numerical values – Multiple response [For each option selected = 1, indifferent = 0]., while Q13 was closed-ended [Yes =1, No=0]. Modified STAXI-2 Assessment for Anger (Q15 – Q17): Numerical values – Multiple response [For each option selected = 1, indifferent = 0]. The scores of the multiple options for the modified GAD, and STAXI-2 were obtained by assigning one (1) mark per response, and the averages were obtained by summing all scores (qt) and dividing by the weight (n). While BDI had four (4) options graded as 3, 2, 1, and 0 (for indifferent). This provided the score (score), which is then rated (_name of condition; knowledge, anxiety, or anger) using preestablished cut-offs; to determine the level of mental state (No/low, moderate, or severe). This scoring and grading system allows for both linear and uni/multivariate analysis (Figure 1).

2.3.4 Data Analysis

The data was transferred entered into STATGRAPHICS centurion XVI version 16.1.11 (StatPoint Tech., Inc.), which was used to build a relationship model for Knowledge, Anxiety & Anger using Multiple Correspondence Analysis (Burt option). Comparison of Regression Lines analysis was used to observe the relationship between age, awareness, anxiety, and anger stratified using the sociodemographic variables. All analyses were performed at a 95% confidence level and p-values less than 0.05 were taken to be significant. Burt option of the multiple Correspondence Analysis was used to model the relationship between the three (3 key) variables; knowledge, Anxiety, and Anger.

3.0 RESULTS

Knowledge of COVID-19 mental health associated with sports

Table 1 represents the Burt description of variable interaction, therefore showing how frequently pairs of categories for two variables occur together. Few sports fans (47.4%) knew of COVID-19 mental health associated with sports (Table 1).

Table 1: ***Insert here***

Dimensions of variability

The scree plot in Figure 2 shows the Eigen analysis of the correlation matrix for the Multiple Correspondence Analysis (MCA) of target variables entered into the models. From the graph, it was observed that only two dimensions (Dims) in the models explain the variance, therefore only Dim 1 and Dim 2 were considered in the analysis (Figure 2). The Inertia and Chi-Square Decomposition table was used to describe how many dimensions are needed to explain most of the differences amongst the categories. A tabular description of primary interest is the Cumulative Percentage column, which shows the percentage of total variability explained by Dim1, Dim1&2, Dim1, 2 &3, and so on. In this case, the first 2 dimensions explain 72.45% of the variability (Table 2).

Table 2: ***Insert here***

Relationships between variables in Dim 1 and Dim 2

The MCA Map is a 2D-graphically explanation of the correlation of variables in Dim1 & Dim2 and as observed, the various level of mental health (anxiety and anger) correlated in their dimensions; moderate levels of anxiety & anger and high levels of anxiety and anger were clustered within the same area, while no knowledge of MHC was clustered with results low anxiety and anger (Figure 2).

Figure 2: ***Insert here***

Relationship between mental health levels, age, and knowledge of mental health in sport

From the correlation result in Table 3, the linear relationship between age & anger was not significant but negative ($r=-0.025$, $P=0.724$), while anxiety was positively but not also significant anger ($r=0.01$, $P=0.894$). However, anxiety & anger were strongly (positively) correlated ($r=0.625$, $P<0.001$). Sports fans who had knowledge about sports-associated mental health issues had low levels of anxiety ($R = 0.010$; $P = 0.894$) and anger ($R = -0.025$; $P= 0.724$) with increasing age (Figure 3 & Table 3).

Figure 3: ***Insert here***

Table 3: ***Insert here***

Relationship between mental health levels, age, and sex

The influence of sex on COVID-19 sport mental health (anxiety and anger) with increasing age do not favor females when compared to males. As age increased, anxiety and anger were reduced in males but increased in females (Figure 4).

Figure 4: ***Insert here***

Relationship between mental health levels, age, and relationship statuses

At lower ages (below the 20s) individuals with partners had more levels of mental health burdens (anger and anxiety) than those without partners, but the individuals with partners had sharply

decreased anxiety levels with increasing age and the reverse was observed for those without partners (Figure 5)

Figure 5: ***Insert here***

4.0 DISCUSSION

This current work focuses specifically on the considerations for COVID-19 sports-associated mental health among sports fans as recommended recently [27]. The majority of sports fans (52.6%) had insufficient knowledge of COVID-19 mental health associated with sports because an emphasis on mental health during the current COVID-19 pandemic has been put on medical workers and other vulnerable population such as the stakeholders of sports are left out. This has contributed to the lack of information on COVID-19 sports mental health to advice policy especially on the African continent [3, 4][5]. Therefore, the general widespread concern on the mental health of fans and athletes remains to be investigated in several communities [7]. The two COVID-19 sports-related mental health challenges of anger and anxiety complement each other within this study population, and this is important since multiple mental health burdens usually appear together in pandemic related psychological effects associated with quarantines as was observed during the MERS and SARS epidemics and now, the COVID-19 pandemic which has been associated with anger, anxiety and subtle bipolar behavioral orientation [8, 9], depression occurring with anxiety, stress, and loss of sleep [5].

Our study suggests that a lack of knowledge on COVID-19 sport-associated with less COVID-19 sport-related mental health problems of anger and anxiety, in agreement with Henriksen *et al*, [10] who found that when a sports fan becomes knowledgeable about the challenges and predisposing factors of sports-related mental health, then they get feelings that predispose them to psyche concerns. For example, being an over-weight athlete increases feelings of addictions, anxiety, drug-addictions, and bipolar psyche health concerns [10]. This reasoning largely contradicts with most studies involving COVID-19 sports-related mental health among sports fans that indicate that focusing on sports-related mental health and increased awareness through sports bodies and health ministries were vital strategies in improving general and sports-associated mental health in the face of the pandemic [11], for them a lack of awareness is a predisposing factor to mental health burdens. This line of reasoning seems to be more applicable to our study because although knowledge has been suggested as less important in our fans, those with knowledge tend to have less COVID-19 sport-related anxiety and anger with aging indicating that level of awareness of COVID-19 sports-related mental health is vital in curbing the problem [11]. Further research is needed in this line. The study shows that the most important associations seen in our population that could be effective in improving COVID-19 sport mental health among sports fans in Ugandan are dimensions 1 (high anxiety/high anger), and dimension 2 (low anxiety/low anger/no knowledge of mental health of sports fans) that accounted for 72.45% of the variability amongst the categories. These findings emphasize that lack of awareness of the sport mental health during the pandemic seems to be protecting the fans from the mental challenges and although this finding looks weird but it agrees with previous work of [10], but this explanation does not apply to our study because

having knowledge on sports-related mental health did not increase the levels of anger and anxiety in the general population.

Furthermore, the study shows that having knowledge of mental health associated with sports is not dispensable because having the knowledge was associated with low levels of anxiety and anger with aging concurring with, that age and knowledge are important variables that come with maturity [19],. A well-informed older individual would prefer to calmly go through a mental situation when challenged than individuals who are getting old but do not understand the psychological negative effects associated with certain issues. There is a meaningful relationship between knowledge, maturity (age) and these improve positive attitudes toward mental health [19]. Additionally, specific up-to-date and accurate mental health information and precautionary measures were associated with a lower psychological impact of COVID-19 related stress, anxiety, and depression and improved mental health and psychological resilience during the pandemic [19]. This explanation is in disagreement with most findings that suggest that epidemic-related mental health burdens such as those of SARS of 2003 and the current COVID-19 occur more among older adults [20, 21], however those studies included persons aged 65 and over unlike the current study that obtained data on persons of 18-to-50 years, additionally, they did not elicit knowledge levels on mental health among the individuals. Further scientific justification is recommended to show the role of knowledge of mental health associated with sports or lack of knowledge, in improving COVID-19 sport mental health of sports fans.

The influence of sex on COVID-19 sport mental health (anxiety and anger) with increasing age does not favor females when compared to males. As age increased, anxiety and anger were reduced in males but increased in females. These could be explained by social and biological factors and how these affect the psychological response of the two sexes (sex differences in stress responses as a mechanism underlying gender differences in mental problems) [25]. Our findings concur with Wang et al. who associated the female gender with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression, however, we contradict with Wang et al. in that the present study shows an association between mental health, age, and marital status, unlike in Wang et al.'s study where there was no significant association between mental health, age and marital status [22]. Young male fans tend to be more anxious and angry than females due to the existence of numerous fears such as losing their male-dominated domain and insecurities concerning their adulation of sports stars [23]. In additional, biological factors especially testosterone changes during vicarious experiences of winning and losing among male sports fans play a major role in determining physiological, cognitive and behavioral responses of the fans [24].

The interaction between relationship status, age, and anxiety levels were important in our study; at lower ages (below the 20s) individuals with partners had more levels of mental health burdens (anger and anxiety) than those without partners, but the individuals with partners had sharply decreased anxiety levels with increasing age and the reverse was observed for those without

partners. These findings are in contradiction with a study by Wang et al [22] who found no association between age, marital status, and the psychological impact associated with the COVID-19 outbreak regarding the levels of stress, anxiety, and depression [22]. At lower ages, those with partners are more vulnerable to poor mental health because they are predisposed to stressful events associated with young couples during their transition to parenthood such as intimate partner violence including but not limited to sexual violence, physical violence, threats or emotional abuse, and substance abuse among the young sports fans/couples [33]. However, providing strategies for strengthening social support networks and relationships among young sports fans is an effective way of improving mental health among them [33] and this seems true to the young fans in the present study. The presence of a companion in stressful times has been observed as an effective tool in alleviating sport mental health challenges because a friend/ couple discus about their problems instead of indulging in risky behavior such as binge drinking, drug abuse that could predispose them to risky behaviors impacting on their mental health [26]. In general terms, single sports fans are more predisposed to risky behavior predisposing them to sports-associated mental health burdens [26] due to their poor social support network and lack of a companionship [26, 33]. However, these theories need more exploration and validation in the context of sport mental health before they can be used in policies to curb sports-related mental problems.

CONCLUSIONS

Most sports fans in Uganda are not knowledgeable about COVID-19 mental health care, and surprisingly this seems protective from COVID-19 mental health issues during the lockdown. However, knowledge of mental healthcare is not dispensable because it was associated with low levels of anxiety and anger with aging. The age, sex, and marital status of the sports fans variably influenced mental health state among sports fans during the pandemic, as such should be considered during policy formation aimed at formulating psychological interventions to improve sports-associated mental health and psychological resilience during the COVID-19 pandemic.

ABBREVIATIONS

COVID-19	Coronavirus disease of 2019
MERS	Middle East Respiratory syndrome
PTSD	Posttraumatic stress disorder
SARS	Severe acute respiratory syndrome

DECLARATIONS

Ethics approval and consent to participate

Expediated ethical approval was acquired from the Institutional Review Board of Kampala International University. Consent to participate was acquired through online acceptance to participate in the study.

Consent for publication

Not applicable

Availability of data and material

Data files used in the study can be accessed on https://figshare.com/s/9b773c81aa0a3acc875d

Completing interests

Authors declare no competing interests.

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Author contributions

JTA, EOA, IMU conceptualized the study; JTA, EOA, KIK, IMU, VA, SCW designed the study; FS, AMA, IJ, SDT, AML, AOA, JOA, OS, SNC, TP, SHE, CO, KM collected the data; , EOA, KIK, VA, RS, conducted statistical analysis, EOA, VA, IMU, KIK, FS, AMA, IJ, SDT, RS, AML, AOA, JOA, OS, SNC, TP, SHE, CO, KM, SCW conducted data interpretation. JTA, EOA, KIK, IMU drafted the initial manuscript while JTA, EOA, VA, IMU, KIK, FS, AMA, IJ, SDT, RS, AML, AOA, JOA, OS, SNC, TP, SHE, CO, KM, SCW reviewed it for intellectual content. All authors approved the final version for publication and remain in agreement to ensure that questions related to the integrity of any part of the work are resolved.

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References

1. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. N Engl J Med. 2020;382:1199–207. doi:10.1056/nejmoa2001316.

2. Usman IM, Ssempijja F, Ssebuufu R, Lemuel AM, Archibong VB, Ayikobua ET, et al. Community Drivers Affecting Adherence to WHO Guidelines Against COVID-19 Amongst Rural Ugandan Market Vendors. Front Public Heal. 2020;8:340. doi:10.3389/fpubh.2020.00340.

3. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. The Lancet Psychiatry. 2020;7:e14. doi:10.1016/S2215-0366(20)30047-X.

4. Bao Y, Sun Y, Meng S, Shi J, Lu L. 2019-nCoV epidemic: address mental health care to empower society. The Lancet. 2020;395:e37–8. doi:10.1016/S0140-6736(20)30309-3.

5. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian J

382 Psychiatr. 2020;52:102066. doi:10.1016/j.ajp.2020.102066.

383 6. Kasozi KI, MacLeod E, Ssempijja F, Mahero MW, Matama K, Musoke GH, et al.
384 Misconceptions on COVID-19 Risk Among Ugandan Men: Results From a Rapid Exploratory
385 Survey, April 2020. Front Public Heal. 2020;8:416. doi:10.3389/fpubh.2020.00416.

386 7. Coronavirus (COVID-19) events as they happen.
387 https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen.
388 Accessed 12 Nov 2020.

389 8. Reynolds DL, Garay JR, Deamond SL, Moran MK, Gold W, Styra R. Understanding,
390 compliance and psychological impact of the SARS quarantine experience. Epidemiol Infect.
391 2008;136:997–1007. doi:10.1017/S0950268807009156.

392 9. Kavanagh AM, Mason KE, Bentley RJ, Studdert DM, McVernon J, Fielding JE, et al. Leave
393 entitlements, time off work and the household financial impacts of quarantine compliance during
394 an H1N1 outbreak. BMC Infect Dis. 2012;12:311. doi:10.1186/1471-2334-12-311.

395 10. Henriksen K, Schinke R, Moesch K, McCann S, Parham WD, Larsen CH, et al. Consensus
396 statement on improving the mental health of high performance athletes. International Journal of
397 Sport and Exercise Psychology. 2020;18:553–60. doi:10.1080/1612197X.2019.1570473.

398 11. Yang J, Tong J, Meng F, Feng Q, Ma H, Shi C, et al. Characteristics and challenges of
399 psychological first aid in China during the COVID-19 outbreak. Brain, Behavior, and Immunity.
400 2020;87:113–4. doi:10.1016/j.bbi.2020.04.075.

401 12. Echoru I, Kasozi KI, Usman IM, Mutuku IM, Ssebuufu R, Ajambo PD, et al. University
402 Lecturers and Students Could Help in Community Education About SARS-CoV-2 Infection in
403 Uganda. Heal Serv Insights. 2020;13:117863292094416. doi:10.1177/1178632920944167.

404 13. Tremblay MS, Warburton DER, Janssen I, Paterson DH, Latimer AE, Rhodes RE, et al. New
405 Canadian physical activity guidelines. Applied Physiology, Nutrition and Metabolism.
406 2011;36:36–46.

407 14. Coronavirus shutdown: sharp rise in players reporting depression symptoms - FIFPRO World
408 Players' Union. https://www.fifpro.org/en/health/coronavirus-covid-19-page/coronavirus-
409 shutdown-sharp-rise-in-players-reporting-depression-symptoms. Accessed 12 Nov 2020.

410 15. Toresdahl BG, Asif IM. Coronavirus Disease 2019 (COVID-19): Considerations for the
411 Competitive Athlete. Sports Health. 2020;12:221–4. doi:10.1177/1941738120918876.

412 16. Swart K, Maralack D. COVID-19 and the cancellation of the 2020 Two Oceans Marathon,
413 Cape Town, South Africa. Sport Soc. 2020;23:1736–52. doi:10.1080/17430437.2020.1805900.

414 17. Gallego V, Nishiura H, Sah R, Rodriguez-Morales AJ. The COVID-19 outbreak and
415 implications for the Tokyo 2020 Summer Olympic Games. Travel Medicine and Infectious
416 Disease. 2020;34. doi:10.1016/j.tmaid.2020.101604.

417 18. D B, K C, C F. The pitch invader-COVID-19 canceled the game: what can science do for us,
418 and what can the pandemic do for science? International Journal of Sports Physiology and
419 Performance. 2020;15:917–9. doi:10.1123/ijspp.2020-0467.

420 19. Milin R, Kutcher S, Lewis SP, Walker S, Wei Y, Ferrill N, et al. Impact of a Mental Health
421 Curriculum on Knowledge and Stigma among High School Students: A Randomized Controlled
422 Trial. J Am Acad Child Adolesc Psychiatry. 2016;55:383-391.e1.
423 doi:10.1016/j.jaac.2016.02.018.

424 20. Vahia I V., Blazer DG, Smith GS, Karp JF, Steffens DC, Forester BP, et al. COVID-19,
425 Mental Health and Aging: A Need for New Knowledge to Bridge Science and Service. American
426 Journal of Geriatric Psychiatry. 2020;28:695–7. doi:10.1016/j.jagp.2020.03.007.

427 21. Yip PSF, Cheung YT, Chau PH, Law YW. The impact of epidemic outbreak: The case of
428 severe acute respiratory syndrome (SARS) and suicide among older adults in Hong Kong. Crisis.
429 2010;31:86–92. doi:10.1027/0227-5910/a000015.

430 22. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and
431 associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic
432 among the general population in China. Int J Environ Res Public Health. 2020;17:1729.
433 doi:10.3390/ijerph17051729.

434 23. Crawford G, Gosling VK. The Myth of the 'Puck Bunny.' Sociology. 2004;38:477–93.
435 doi:10.1177/0038038504043214.

436 24. Bernhardt PC, Dabbs JM, Fielden JA, Lutter CD. Testosterone changes during vicarious
437 experiences of winning and losing among fans at sporting events. Physiol Behav. 1998;65:59–
438 62. doi:10.1016/S0031-9384(98)00147-4.

439 25. Stroud LR, Salovey P, Epel ES. Sex differences in stress responses: Social rejection versus
440 achievement stress. Biol Psychiatry. 2002;52:318–27. doi:10.1016/S0006-3223(02)01333-1.

441 26. Higgins GE, Tewksbury R, Mustaine EE. Sports fan binge drinking: An examination using
442 low self-control and peer association. Sociol Spectr. 2007;27:389–404.
443 doi:10.1080/02732170701313472.

444 27. Mastromartino B, Ross WJ, Wear H, Naraine ML. Thinking outside the 'box': a discussion
445 of sports fans, teams, and the environment in the context of COVID-19. Sport Soc.
446 2020;23:1707–23. doi:10.1080/17430437.2020.1804108.

447 28. 6.3 - Estimating a Proportion for a Small, Finite Population | STAT 415.
448 https://online.stat.psu.edu/stat415/lesson/6/6.3. Accessed 12 Nov 2020.

449 29. Uganda | Factsheets | Youthpolicy.org.
450 https://www.youthpolicy.org/factsheets/country/uganda/. Accessed 12 Nov 2020.

451 30. Ishaka (Division, Uganda) - Population Statistics, Charts, Map and Location.
452 https://www.citypopulation.de/en/uganda/western/admin/bushenyi/SC0720__ishaka/. Accessed

12 Nov 2020.

31. Bystritsky A, Kerwin L, Feusner JD. A pilot study of Rhodiola rosea (Rhodax®) for generalized anxiety disorder (GAD). J Altern Complement Med. 2008;14:175–80. doi:10.1089/acm.2007.7117.

32. State-Trait Anger Expression Inventory-2 (STAXI-2) - Statistics Solutions. https://www.statisticssolutions.com/psychological-personality-state-trait-anger-expression-inventory-2-staxi-2/. Accessed 12 Nov 2020.

33. Sipsma HL, Callands T, Desrosiers A, Magriples U, Jones K, Albritton T, et al. Exploring Trajectories and Predictors of Depressive Symptoms Among Young Couples During Their Transition to Parenthood. Matern Child Health J. 2016;20:2372–81. doi:10.1007/s10995-016-2064-3.

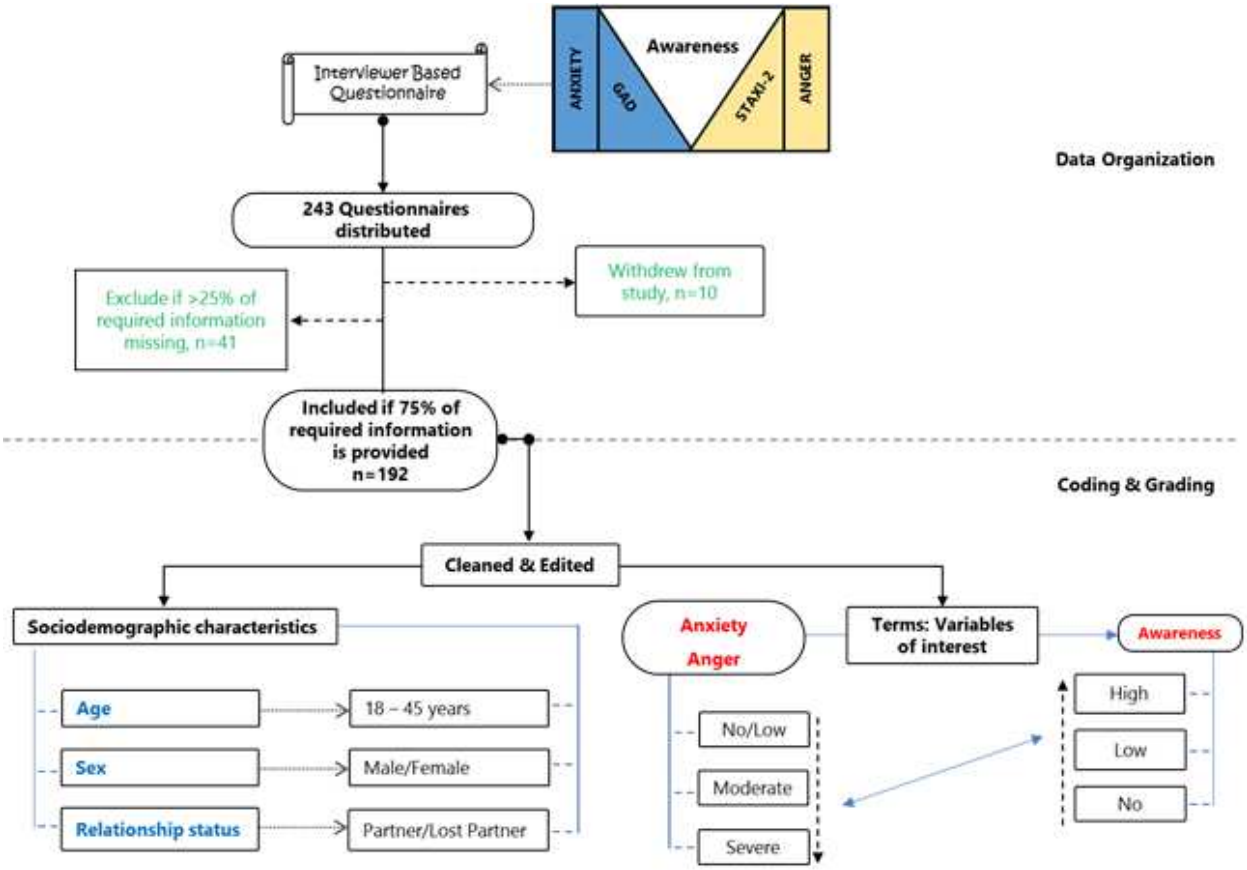

Figure 1: Experimental design

Table 1: Burt description of variable interaction (demographically un-categorized)

Variables	K-MHCS		Anxiety level			Anger level		
	No	Yes	High	Moderate	Low/No	High	Moderate	No/Low
K-MHCS.No	103 (52.5)	n/a	7 (3.6)	19 (9.7)	**77 (39.3)**	5 (2.6)	13 (6.6)	**85 (43.4)**
K-MHCS.Yes	n/a	93 (47.4)	2 (1.0)	24 (12.2)	**67 (34.2)**	2 (1.0)	13 96.6)	**78 (39.8)**
Anxiety level.High	n/a	n/a	9 (4.6)	n/a	n/a	5 (2.6)	2 (1.0)	2 (1.0)
Anxiety level.Moderate	n/a	n/a	n/a	43 (21.9)	n/a	2 (1.0)	12 (6.1)	29 (14.8)
Anxiety level.Low/No	n/a	n/a	n/a	n/a	144 (73.5)	0 (0)	12 (6.1)	132 (67.3)
Anger level.High	n/a	n/a	**5 (2.6)**	2 (1.0)	0 (0)	**7 (3.6)**	n/a	n/a
Anger level.Moderate	n/a	n/a	2 (1.0)	12 (6.1)	12 (6.1)	n/a	26 (13.3)	n/a
Anger level.No/Low	n/a	n/a	2 (1.0)	29 (14.8)	132 (67.3)	n/a	n/a	163 (83.2)

Note: Interactions between strata of similar variables are represented by n/a (not applicable) [interaction outcome of interest in bold blue]. **K-MHCS = knowledge** of mental health during COVID-19 associated with sports.

Table 2: Inertia and Chi-Square Decomposition

Dimensions	Singular value	Inertia	Chi-Square	%	Cum %	Histogram
1	0.5535	0.3064	540.40	46.21	46.21	**********
2	0.4171	0.1739	306.83	26.24	72.45	********
3	0.3204	0.1026	181.04	15.48	87.93	*****
4	0.2564	0.0658	116.01	9.92	97.85	***
5	0.1193	0.0142	25.11	2.15	100.00	*
TOTAL		**0.6629**	**1169.39**			

Note: %, percentage; Cum %, Cumulative percentage [bold blue are limits to Dim analysis].

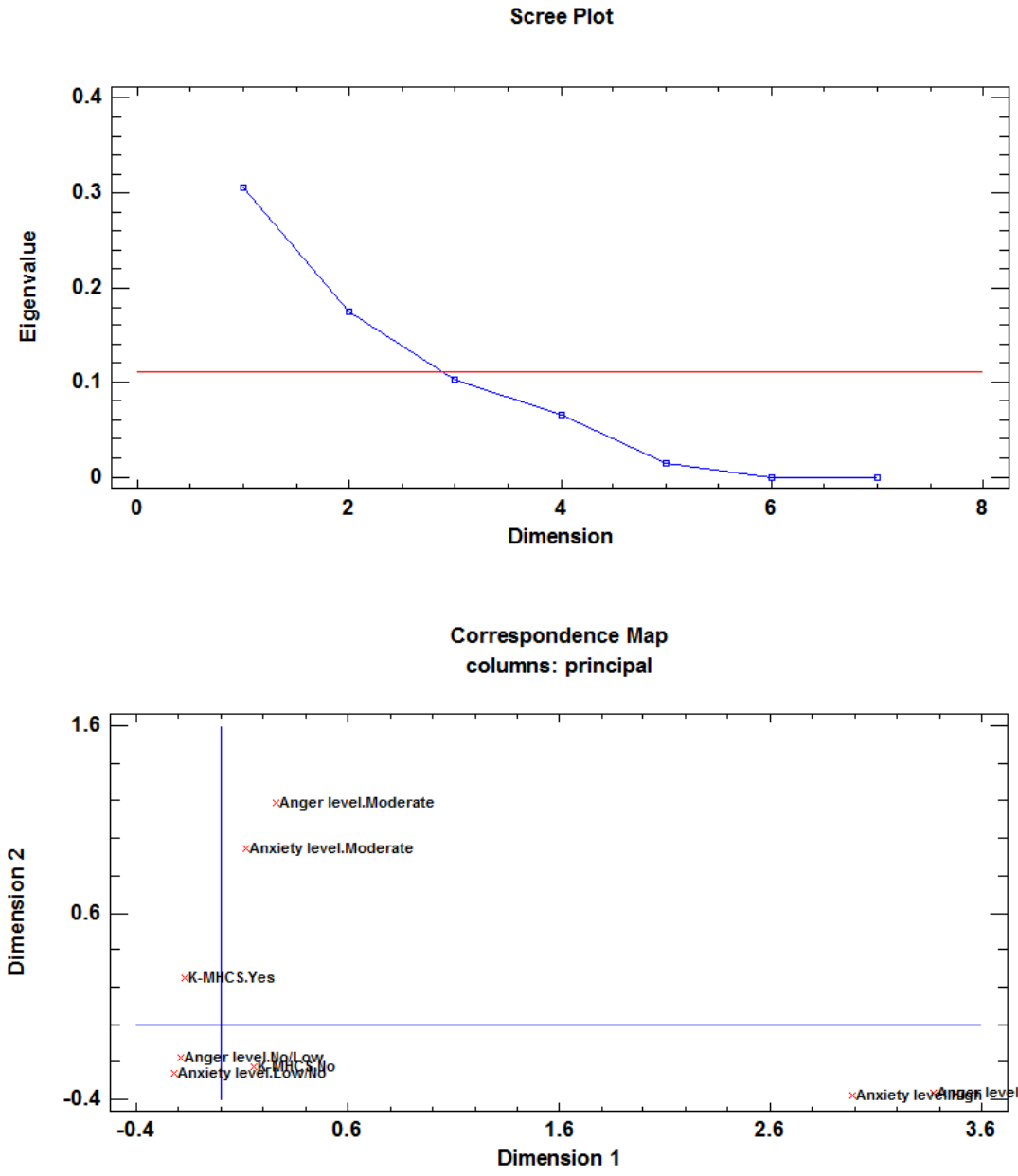

Figure 2: Scree plot of relevance and Multiple Correspondence Analysis Map.
Dimensions 1 and 2 are the most important in our study, and **there is strong inverse correlation between levels of mental health and knowledge.**

Table 3: Spearman Rho correlation of age, anxiety, and anger

Correlations	Age	Anxiety
Anxiety	0.010	

P-value	0.894	
Anger	-0.025	**0.625**
P-value	0.724	**<0.001**

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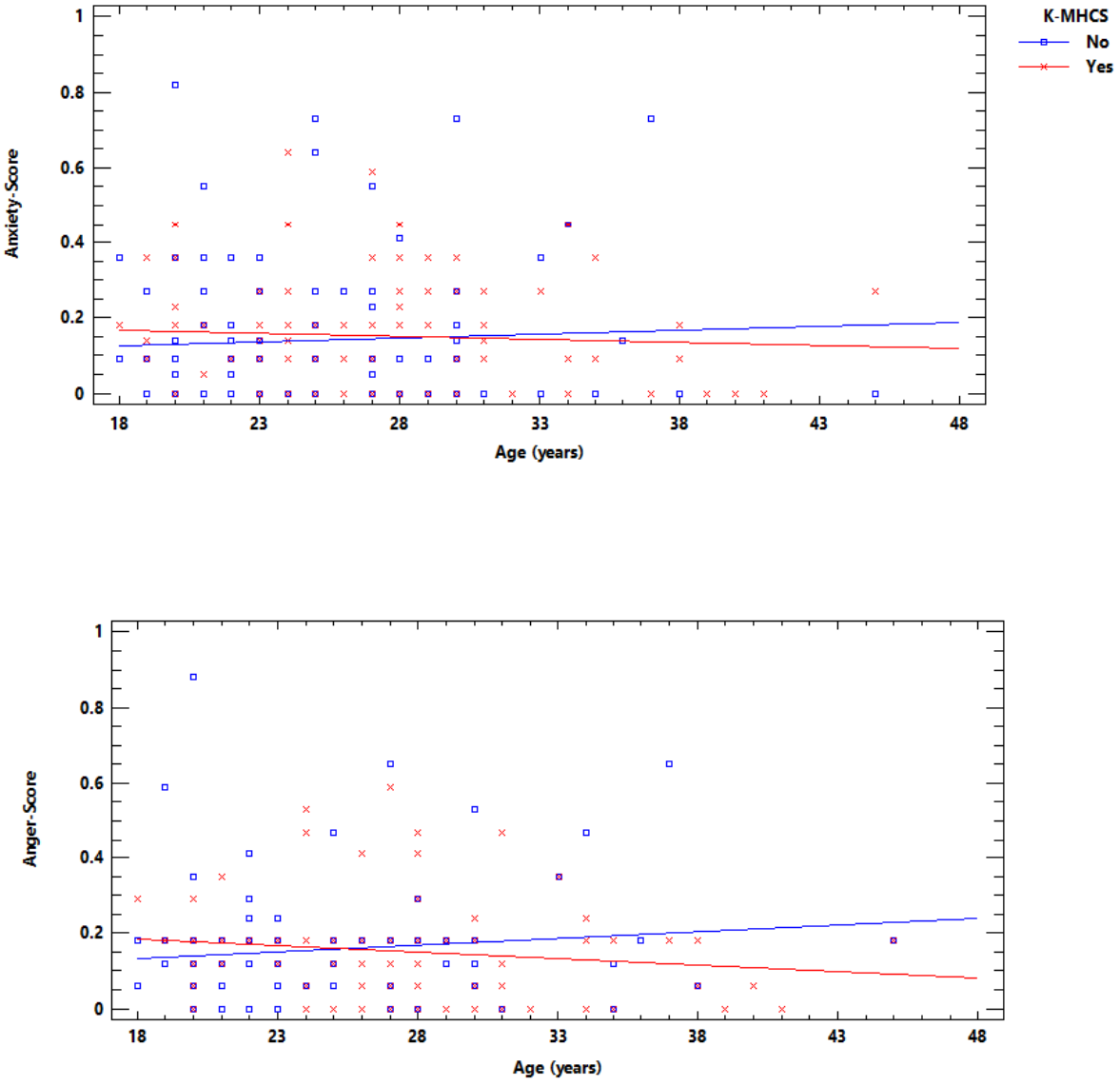

486

487 **Figure 3:** Scatter plot of anger and age, and comparison of regression lines of knowledge of MHC. With
488 aging having knowledge led to low levels of anxiety and anger. **K-MHCS** = knowledge of mental health
489 during COVID-19 associated with sports.

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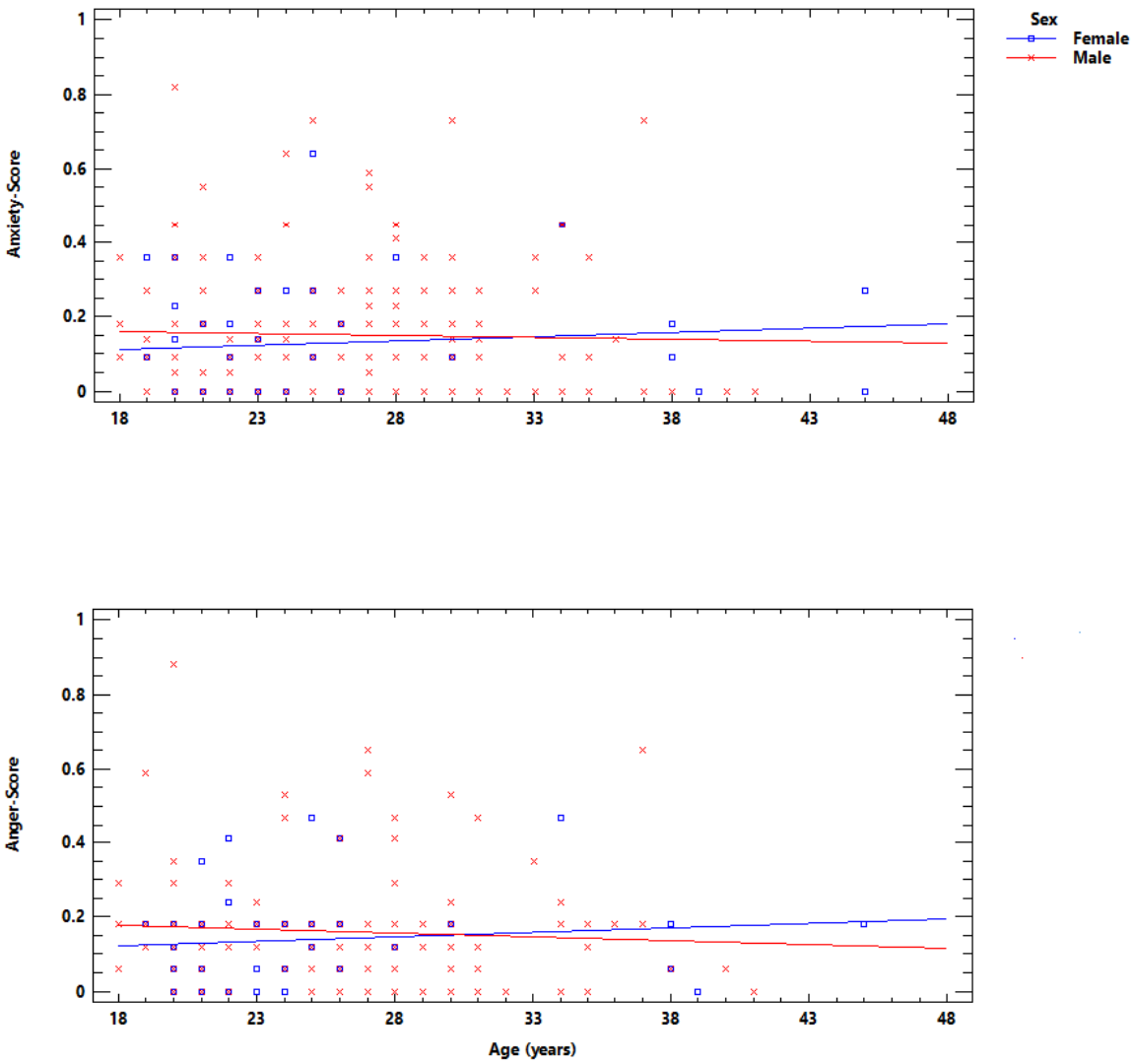
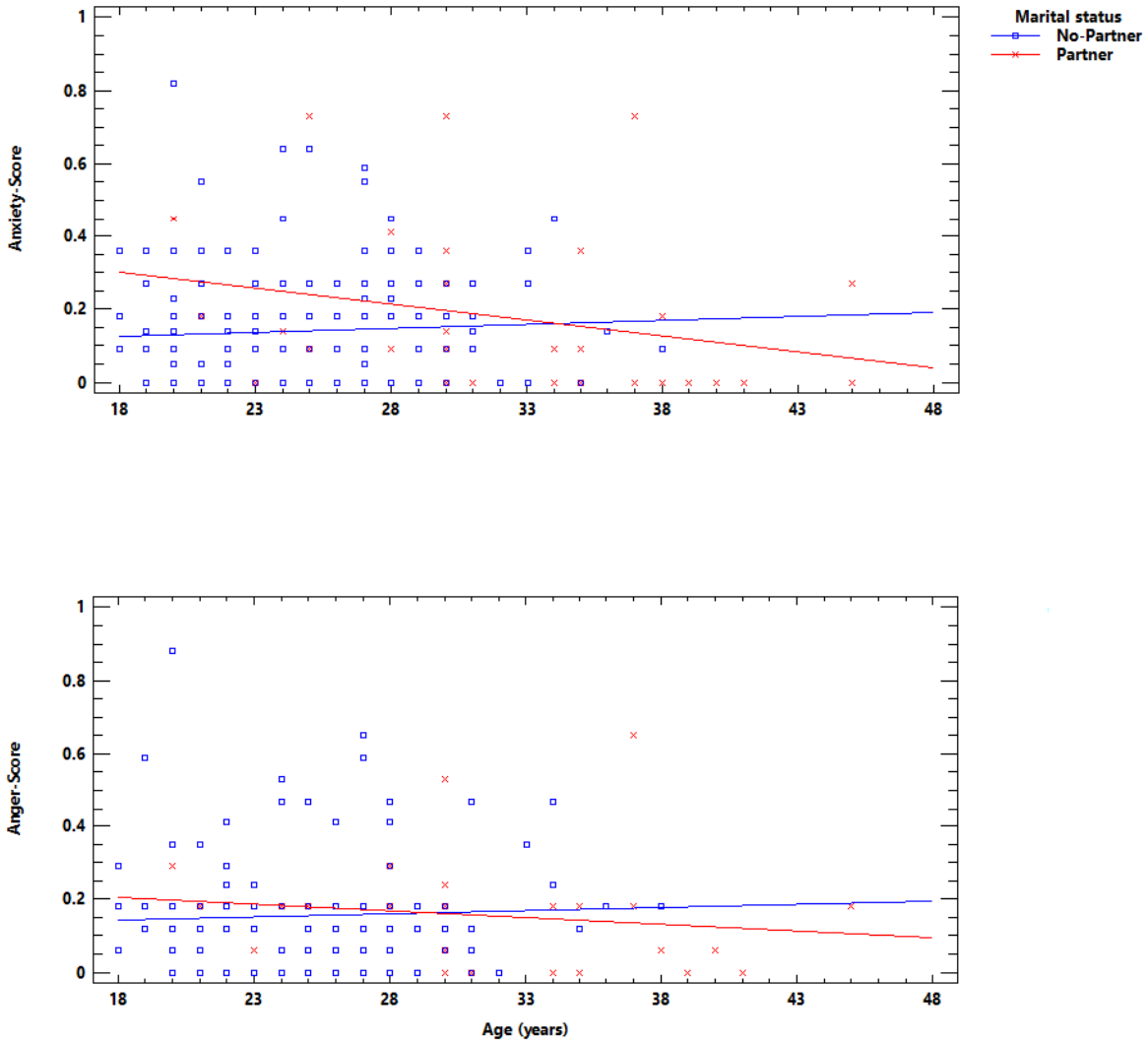


Figure 4: Scatter plot of anger and age, and comparison of regression lines of sex. Wth increasing age females had more mental burden levels than males.



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497 **Figure 5:** Scatter plot of anger and age, and comparison of regression lines of marital status.

498

Figures

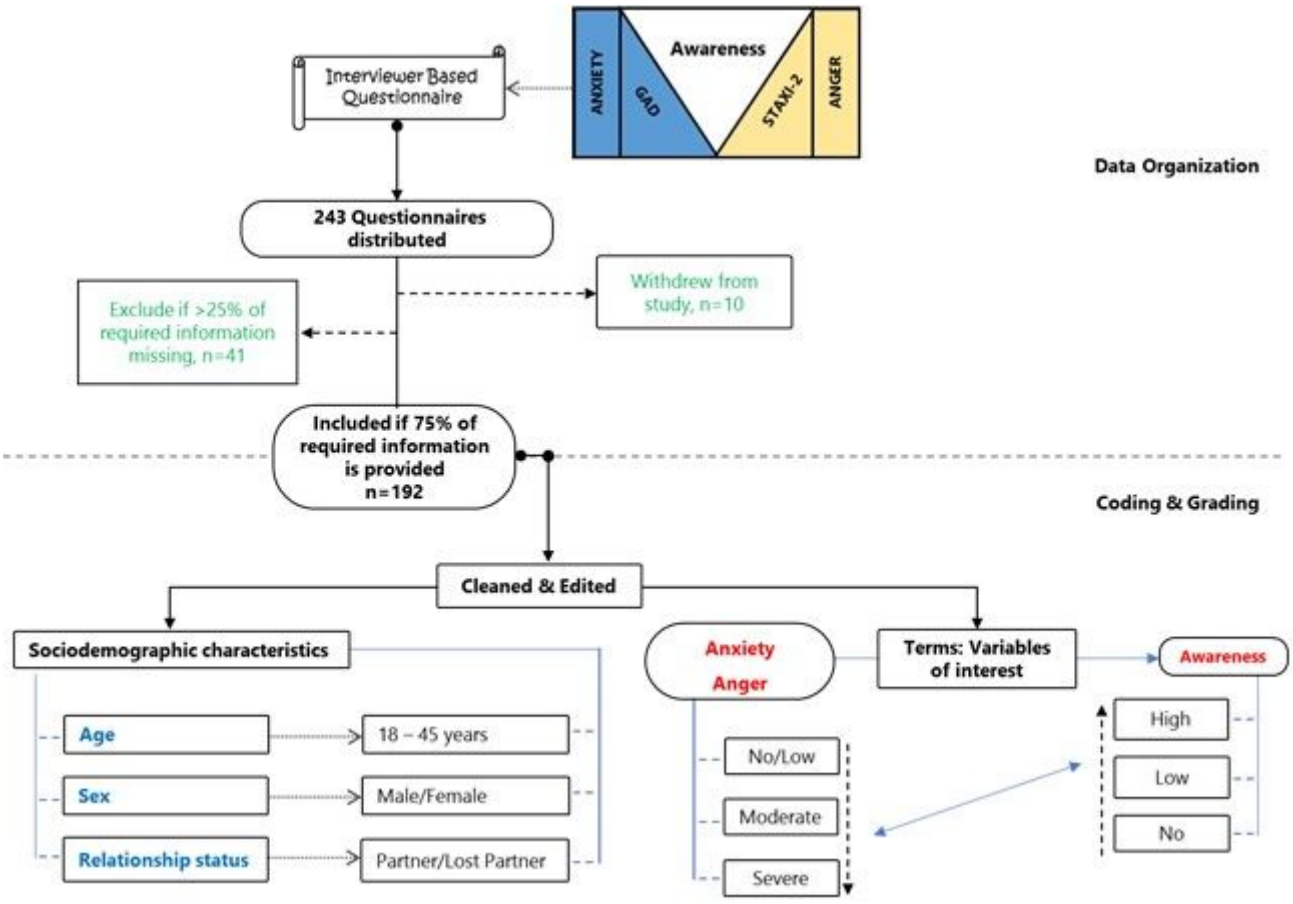

Figure 1

Experimental design

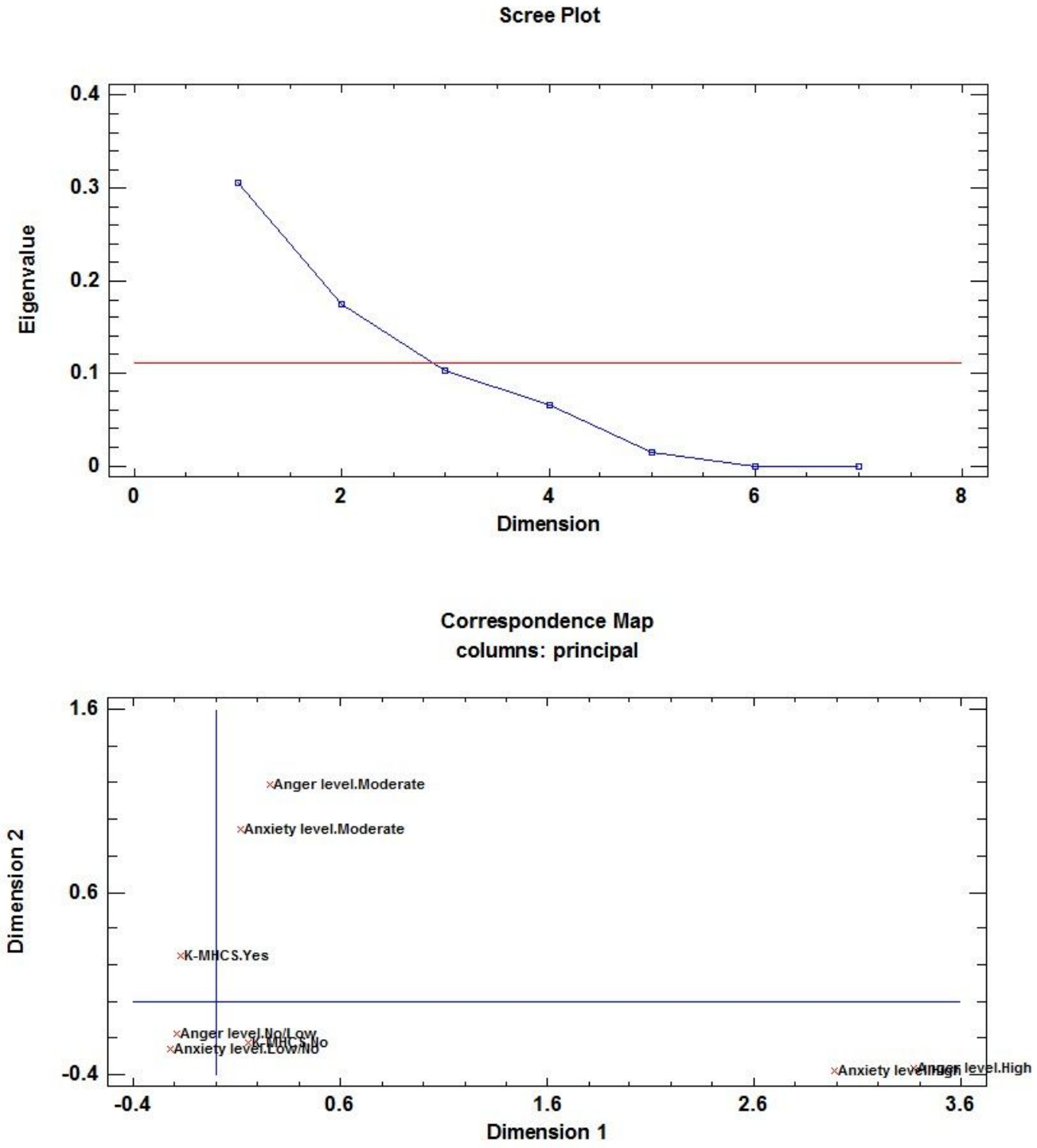

Figure 2

Scree plot of relevance and Multiple Correspondence Analysis Map. Dimensions 1 and 2 are the most important in our study, and there is strong inverse correlation between levels of mental health and knowledge.

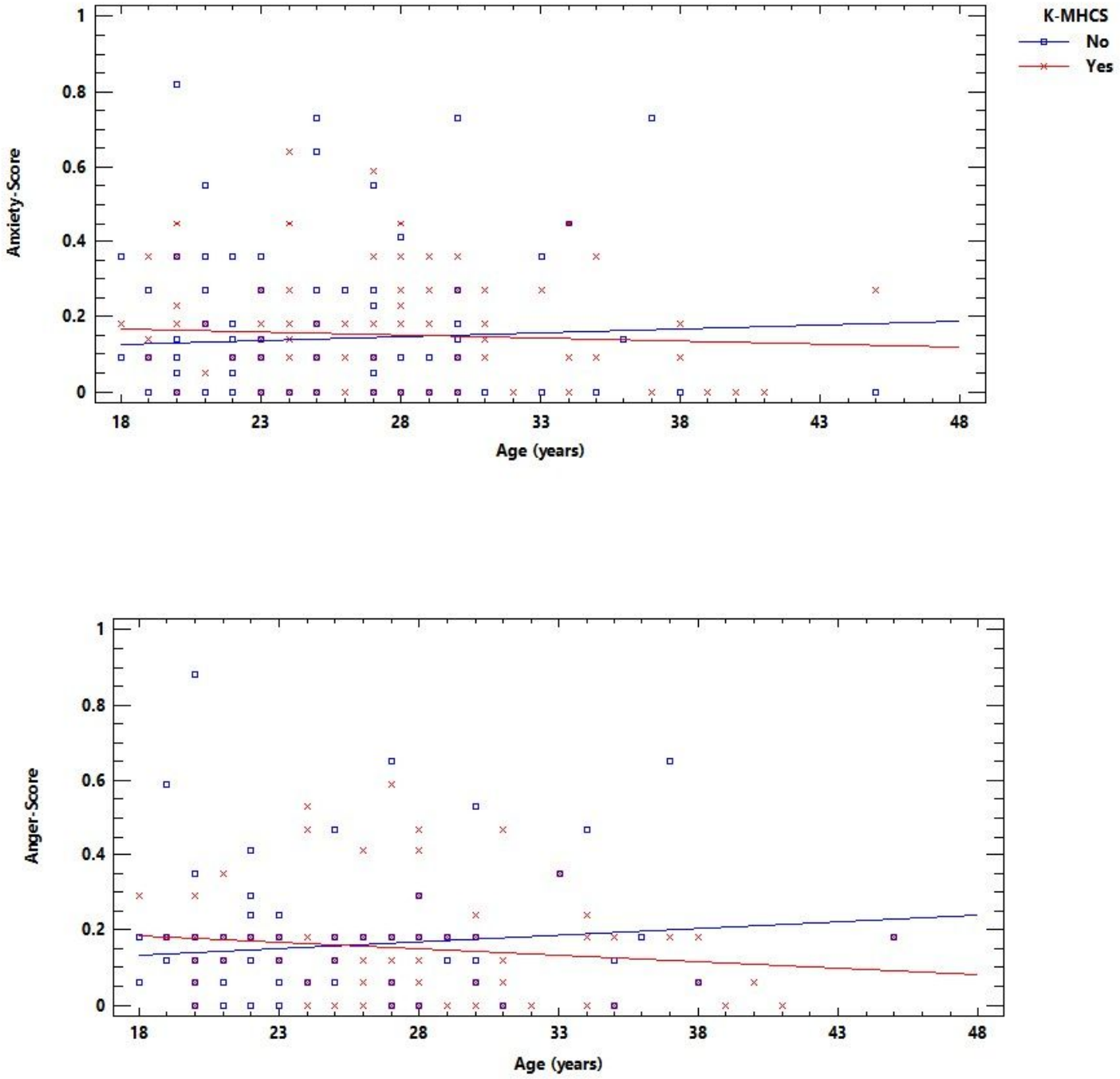

Figure 3

Scatter plot of anger and age, and comparison of regression lines of knowledge of MHC. With aging having knowledge led to low levels of anxiety and anger. K-MHCS = knowledge of mental health during COVID-19 associated with sports.

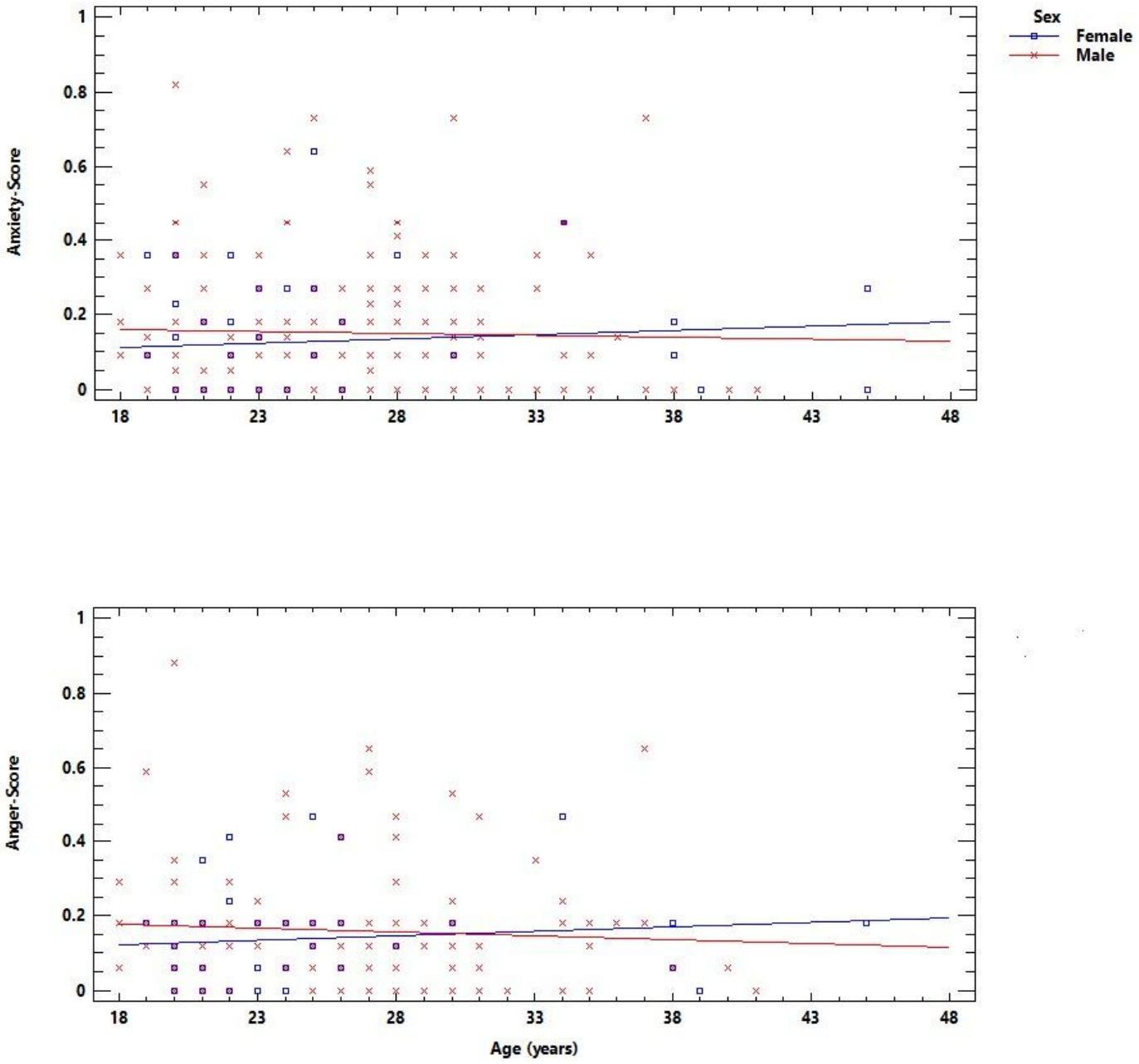

Figure 4

Scatter plot of anger and age, and comparison of regression lines of sex. Wth increasing age females had more mental burden levels than males.

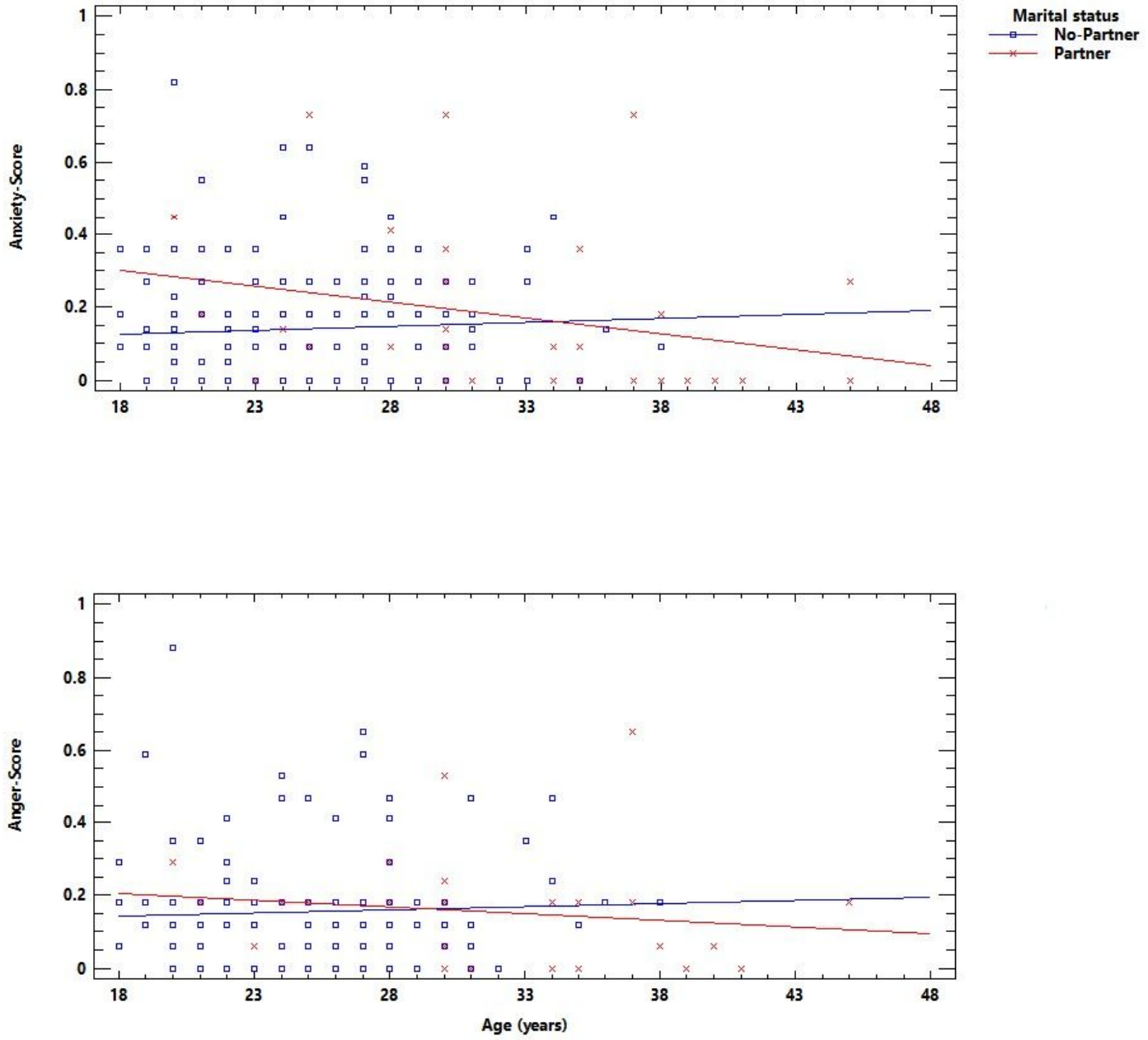

Figure 5

Scatter plot of anger and age, and comparison of regression lines of marital status.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- JohnetalQuestionaireSportMentalhealth.docx