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ASSESSING EXERCISE HABITS OF RETIRED DIVISION I NCAA FOOTBALL PLAYERS

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Abstract:
This study assessed the exercise habits among former NCAA Division I College football players. **Methods:** Former NCAA collegiate football players (n=56) from the USA completed two different questionnaires relevant to exercise habits. The Global Physical Activity Questionnaire GPAQ questionnaire was used to measure the time spent exercising once retired. The Exercise Benefits/Barriers Scale EB/BS questionnaire was used to determine the perception of exercise benefits and barriers. **Results:** The GPAQ identified 18% (10/56) of the retired football players as not engaging in an adequate amount of physical activity per week based on the recommendation of the World Health Organization (>600 MET-minutes/week of moderate and/or vigorous physical activity). Noting that 13% (7) of the participants reported no physical activity. The remaining participants 46/56 (82%) scored above the 600 MET-minute per week recommendation. The participants were also asked about the primary sources and time spent when engaging in physical activity (work, travel, or recreational activity). The results indicated that the primary source of physical activity (226±248 mean minutes per week) was engaging in recreational activities. The EB/BS was broken down into Benefits and Barriers Subscales to be evaluated independently. The Barriers subscale results indicated the participants responded strongly agreed/agreed (SA/A) to the questions ranged from 2% to 70% across 14 questions, noting only 3 questions where participants scored the questions as SA/A ≥50%. With the Benefits subscale, participants' SA/A answers ranged from 48% to 100% across 29 questions, noting 28 questions where participants scored the questions as SA/A ≥50 %. **Conclusion:** Within the parameters of this study, retired Division I college football players strongly perceive the benefits of exercise outweighs

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their perceptions of barriers to exercise, however, approximately 18% discontinued exercise.

Keywords: sedentary lifestyle, cardiovascular disease, body mass index (BMI), BMI shift, athletic identity, psychosocial health factors, metabolic equivalent (MET)

1. Introduction

Retiring from National Collegiate Athletic Association (NCAA) Division I college football happens to all athletes at some point in their careers. According to an article from the NCAA titled "Football: Probability of competing beyond high school" (NCAA, 2020) there were approximately 16,380 draft-eligible athletes in 2020 that played NCAA Division I college football and 1.6% of them went on to play professional football after. If their next step is not professional football, retirement comes with a new lifestyle and daily routine, likely much different from the one they have had since beginning their college career (Kim & Moen, 2001). Retired athletes then have the decision to continue or replace the activities they have been participating in so they can focus on new ones (Yao et al., 2020). One major part of every NCAA Division I college football player's daily routine that now becomes optional instead of a requirement is exercise (Durand-Bush & Salmela, 2002).

In order for NCAA Division I college football players to be successful in competition, it is necessary for these athletes to develop and maintain strength, conditioning, and muscle mass through different guided exercises from their strength coaches (Judge et al., 2015; Kraemer, 1983). The strength and conditioning programs are designed for the athletes throughout the entire year with the intensities and frequency fluctuating depending on the training emphasis (Hedrick et al., 2004). But once these athletes retire and are no longer required to participate in a strength and conditioning program, exercise now becomes optional. For a retired athlete, it is still extremely important to continue a lifestyle involving exercise to avoid a number of health-related issues (i.e. mental and physical) (Nystoriak & Bhatnagar, 2018; Sorenson et al., 2015; Garber et al., 2011).

Weight management after retirement from NCAA Division I College Football is an extremely important factor for physical health. Studies show if a retired elite athlete chooses a sedentary lifestyle they are predisposed to the leading contributor of poor cardiovascular health (Nystoriak & Bhatnagar, 2018). A sedentary lifestyle is characterized as consistently low levels of physical activity. Some examples of sedentary behavior include being reclined and doing the following: playing a video game, watching television, using the computer, or at a desk at work. Sedentary behaviors have a large and wide-range of negative impacts on the human body including all-cause mortality, cardiovascular disease mortality, cancer risk, and risks of metabolic disorders such as diabetes mellitus, hypertension, and dyslipidemia; musculoskeletal disorders such as arthralgia, and osteoporosis; depression; and, cognitive impairment (Park et al., 2020).

Body mass and the idea that "bigger is better" has become a common practice for athletes at all levels of football in attempts to enhance performance (Noel et al., 2003). For example, a BMI (body mass index) analysis by Pryor et al. (2016) demonstrated that the average BMI of players on an NFL team was BMI=32.2. According to BMI criteria, obesity is defined as a BMI≥30 (Fegal et al., 2010), hence the NFL team was technically obese. Data from Kerr et al. (2012) demonstrates that retired NFL players' BMI level of 30.3 which is relatively consistent with active NFL players. With BMI levels this high and remaining this high after retirement, choosing to transition to a sedentary lifestyle will likely cause a negative change in body composition, causing a BMI shift (Pryor et al., 2016). A BMI shift occurs when the athlete's BMI remains the same in retirement as it was while playing, but their muscle mass gained through training is lost and fat mass increases due to inactive lifestyle choices. Hence, exposing themselves to a greater risk for cardiovascular disease (Pryor et al., 2016; Witkowski & Spangenburg, 2008). Which happens to be a leading cause of morbidity and mortality across the world (Nystoriak & Bhatnagar, 2018).

The positive benefits exercise has on mental health are another reason exercise is so important after retirement. Remaining physically active has been proven to aid in alleviating psychosocial health factors like depression, anxiety, cognitive function, overall well-being, and quality of life (Sorenson et al., 2015; Garber et al., 2011). Additionally, post-retirement physical activity may help the former athlete disengage from the athletic identity they've acquired over their years of play (Sinclair & Orlick, 1993).

Athletic identity is defined as the extent to which one identifies with the athletic role (Brewer et al., 1993). The more the athlete identifies with that role, the more likely they are to engage in behaviors consistent with that role (Callero, 1985). This is because an individual monitors their behavior to match the behaviors that are in line with their respective identity role according to the identity theory (Reifsteck & Gill, 2013). Physical activity is one behavior that's consistently associated with and logically related to athletic identity (Reifsteck & Gill, 2013). Therefore, having a strong athletic identity is also related to active participation in physical activity. But if an athlete's identity is solely rooted in their performance in sports, and their behaviors are performed only for competition, they may struggle emotionally trying to find a new identity when transitioning out of that sport (Reifsteck & Gill, 2013; Douglas & Carless, 2009). This transition can be detrimental to their exercise habits as well if their sole purpose to exercise was for competition.

With the high number of NCAA Division I College football players finishing their playing careers, it would be of interest to assess the exercise habits of these athletes once they have retired. As such, the purpose of this study was to assess exercise habits among former NCAA Division I College football players as measured by the Global Physical Activity Questionnaire (GPAQ) (Armstrong & Bull, 2006; Yao et al., 2020) and Exercise Benefits/Barriers Scale (EB/BS) (Sechrist et al., 1978; Ortabağ, 2009; Bastug & Kocacan, 2018).

Picture 1: North American NCAA College football helmets: an inseparable element of the athlete's identity (Image courtesy of Southern Utah University Athletics).

2. Methods

2.1 Participants

The participants in this study were retired Division I NCAA college football players. Recruitment took place throughout the Division I NCAA Colleges and Universities in the United States. The study and consent forms were approved by the Southern Utah University Institutional Review Board (IRB) prior to recruiting the participants.

2.2 Instruments

Two questionnaires were sent to retired Division I college football players to determine the individual's current exercise perception and activity level. Specifically, the instruments used are the Global Physical Activity Questionnaire (Armstrong and Bull 2006; Yao et al., 2020) and Exercise Benefits / Barriers Scale (Sechrist et al., 1978; Ortabağ 2009; Bastug & Kocacan 2018).

The Global Physical Activity Questionnaire (GPAQ) measures the frequency, duration, intensity, and context of physical activity performed by the individual. The context portion of the GPAQ measures sub-domains of work, transportation, or leisure. The scale also displays the amount of time spent sedentary per day. Terms used for the sub-domains are: vigorous work, moderate work, travel, vigorous recreation, moderate recreation, and sitting (Armstrong & Bull 2006). To estimate the population's physical activity, the metabolic equivalent (MET) minutes per week are calculated. A metabolic equivalent (MET) is a unit of measure of the rate at which the body expends energy. It is based on energy expenditure while sitting at rest and is equal to 3.5 milliliters of oxygen per kilogram of body weight per minute (MET, N.D.). The GPAQ is considered a valid and reliable assessment of MET-minutes (Armstrong & Bull 2006).

The standard set by the World Health Organization (WHO) for physical activity, including activity for work, during transport, and leisure time, is: 150 minutes of moderate-intensity physical activity OR 75 minutes of vigorous activity OR an equivalent

combination of moderate- and vigorous-intensity physical activity equaling at least 600 MET-minutes per week.

The Exercise Benefits / Barriers Scale measures participant's perceptions of the benefits and barriers to participating in exercise (Sechrist et al., 1978). It is a list of 43 questions with the four answer possibilities of: strongly agree, agree, disagree, and strongly disagree. Answers are scaled in Likert format with the four answer choices ranging from strongly agree to strongly disagree. There are also two subscales: Exercise Barrier Scale and Exercise Benefit Scale. Questions used for the Exercise Barrier Scale from the questionnaire are: 4, 6, 9, 12, 14, 16, 19, 21, 24, 28, 33, 37, 40 and 42. The Benefits Scale questions are: 1, 2, 3, 5, 7, 8, 10, 11, 13, 15, 17, 18, 20, 22, 23, 25, 26, 27, 29, 30, 31, 32, 34, 35, 36, 38, 39, 41 and 43. The Benefits Subscale ranges from 29 being the lowest score to 116 being the highest. The higher the individual scored in the benefits subscale, the more the individual perceives exercise as beneficial. The Barrier Scale ranges from 14 being the lowest score to 56 being the highest. For Barrier Subscale the higher the score more an individual perceives barriers to exercise. Questions are answered in Likert format with the four answer choices ranging from strongly agree to strongly disagree. Likert format is used for these subscales where the higher the score, the more the participant believes in the Barriers/Benefits of exercise (Bastug & Kocacan, 2018). The Cronbach Alpha coefficient of the Exercise Benefits / Barriers Scale and subscales has been reported as 0.95-0.86 (Bastug & Kocacan, 2018; Ortabag, 2009; Sechrist, Walker & Pender, 1987).

2.3 Procedures

This study was conducted during the spring semester 2022 and was carried out through the use of an online platform via Google Forms. Following approval from the SUU IRB committee (IRB APPROVAL #24-012021d) contact with former football players was made through email and posted on Twitter. The posts to Twitter asked for any retired division I college football players to participate by clicking on the questionnaire link. Email addresses of retired Southern Utah University football players were provided by the Southern Utah football program. Through email they were then sent the Google Forms link directly, allowing them to participate by opening the questionnaire if interested.

Once the link was opened, participants were redirected to the landing page where informed consent to participate in the study was carried out. Potential participants were informed that their participation was completely voluntary, and if at any time they felt uncomfortable with the questions they could withdraw themselves without penalty. Participants were also informed that they were anonymous, and to please answer the questions with complete honesty. Individuals that agreed to the consent form on the landing page were then moved forward to the questionnaires. The participants first completed the 43 question EB/BS and then advanced on to the GPAQ. The link to the questionnaire on the Google Form's page was available for two weeks and the participants had to complete their study involvement within that time frame.

2.4 Analysis

The mean and standard deviations for the EB/BS and GPAQ questionnaires were calculated. The MET minutes per week were calculated to display the population's total physical activity level in comparison to the World Health Organization's recommendations. Frequency distributions of the EB/BS subscale scores were also generated as well as a tabulation of the number of questions in which the respondents selected strongly agree or agree ≥ 50%.

3. Results

Fifty Six former NCAA Division I College football players completed the study.

Figure 1 provides each individual's MET-Minutes per week GPAQ scores of retired football players. Figure 2 provides the Group EB/BS answer percentages for the subscales scale.

Table 1 provides the mean and SD for the EB/BS and GPAQ surveys. Table 2 provides the number & percentage of Former Division I NCAA football players not meeting exercise recommendations. Table 3 shows the total minutes, mean and standard deviation of time spent in each environment that the participants engaged in exercise as recorded on the GPAQ. Table 4 displays information regarding the responses to the exercise benefits and barriers questions. Table 4 presents the percent range of strongly agree/agree responses to the questions as well as the number of questions with responses ≥50% strongly agree/agree.

4. Discussion

The purpose of this study was to assess the exercise habits of former NCAA Division I College football players. The instruments used to gather information on exercise habits were the Global Physical Activity Questionnaire (Armstrong & Bull, 2006; Yao et al., 2020) and Exercise Benefits / Barriers Scale (Sechrist et al., 1978; Ortabağ, 2009; Bastug & Kocacan, 2018). In order to complete the study, retired NCAA Division 1 football players were recruited via email and social media (i.e. Twitter) to complete the questionnaires via an online platform (Google Forms).

With the GPAQ, the mean MET-minutes per week for participants were reported as 4,320 ± 4,405. Results from the study demonstrated that 10 out of 56 (≈18%) participants did not meet the recommendation from the WHO of at least 600 MET-minutes per week of moderate and/or vigorous physical activity. These individuals are placing themselves at extremely high risk for serious health issues and should see a healthcare provider as soon as possible in order to develop an evidence-based exercise prescription program. The remainder of the group 46/56 (≈82%) scored above the 600 MET-minute per week recommendation. Among the group of 46, there were 2 individuals that reported 720 MET-minutes per week of physical activity placing themselves near the 600 MET-minutes per week cut-off. Both individuals reported their exercise comes only from recreational activity each week. Therefore, if they were to miss more than two hours of recreation

during a given week they would drop below the 600 MET-Minute per week recommendation. Of the 10 (18%) individuals that did not meet the 600 MET-Minute per week recommendations, there were 7 (13%) individuals placing themselves at extremely high risk of the health complications associated with sedentary behavior. These individuals reported no physical activity per week and at least 60 minutes of sedentary time spent per day; one of which reported 9 hours of sedentary behavior a day with no physical activity per week.

As Nystoriak & Bhatnagar (2018) stated, a sedentary lifestyle is recognized as a leading contributor to poor cardiovascular health. Reifsteck (2011) employed the Godin Leisure-Time Exercise Questionnaire and found a decline in physical activity among 83% of retired Division I college athletes and inactivity reported by 25% of the participants. Reifsteck's results suggested a similar proportion of sedentary behavior since retiring as that found in the current study. Melekoglu et al. (2019) studied the effects of a physically active lifestyle on the health of 60 former professional football players between 40-50 years of age via the International Physical Activity Questionnaire (IPAQ). Participants that scored ≥ 3000 MET/minutes per week were considered as active while the others were considered as living a sedentary lifestyle. The results demonstrated that among retired football players, those with "*higher levels of physical activity have advanced body composition, respiratory functions and serum lipids compared to former footballers with less active lifestyles*".

The EB/BS questionnaire results were evaluated by the two subscales for the benefits and barriers. With the benefits subscale, participants answered strongly agree/agree 48-100% of the time across the 29 questions. Noting that there were 28 of those questions where participants answered strongly agree/agree ≥50 %. Regarding the Barriers Scale, the percentage of participants scoring strongly agree/agree to the 14 questions in the subscale ranged from 2-70%. From those 14 questions, there were only 3 questions where participants answered the questions with strongly agree/agree ≥50 %.

The primary exercise barriers were identified as: it is hard work, tiring, and causes fatigue. However, these answers may be interpreted as both positive and/or negative views for an individual. For many, the purpose of the exercise is to cause responses consistent with what might be considered a barrier. For example, while a workout session is hard work and tiring (barriers), the purpose of performing a workout session is to exercise the muscle by working it hard enough to increase or maintain muscle mass and strength (benefit) (Lee, 2016). Therefore, the responses recorded could be interpreted as either barriers or benefits when the individual is answering the question. The following are the next highest barriers: Exercise takes too much of my time, Exercise takes too much time from my family responsibilities, my family members do not encourage me to exercise, and Exercise takes too much time from family relationships. From these results, it can be determined that the largest reason the participants in the current study view exercise as a barrier relates to the competing demands of time.

Through examination of the data in the benefits subscale (displayed by the blue bars in Figure 2) the lowest scores of agreement came from the questions relating to meeting/contacting others and being accepted by others while exercising. A potential

conclusion might be that the participants from the study feel that the least beneficial construct to come from exercise is a social environment or social entertainment. Such a conclusion would be supported based on the serious and structured environment they were habituated to during their training as an athlete. For the participants that did not find a social benefit related to exercise, it may help the transition away from the athletic identity as a college football player to continue to find physical activity venues that do not promote social environments (Sinclair & Orlick, 1993).

Results of the participants that reported physical activity levels below the WHO recommendations on the GPAQ were further examined to see the reasons why they were living sedentary. The reasons reported based on the questions asked pertained to exercise being tiring or fatiguing, hard work, and not entertaining, and three individuals they reported not enjoying exercise. Interestingly, all of these individuals agreed that exercise improves mental health, prevents heart attacks, and promotes better sleep along with the potential to extend longevity. This paradox might be explained in that the participants realize how important exercise is, but don't realize how detrimental a sedentary lifestyle is.

As a whole, the participants' consensus perception of exercise from the EB/BS survey is that the benefits strongly outweigh the barriers. However, the results from the GPAQ suggest that there are some individuals not exercising enough (or at all). There were 10 out of 56 (18%) of the participants that did not meet the recommendation from the World Health Organization of at least 600 MET-minutes per week of moderate and/or vigorous physical activity. With the participant's perception of exercise being beneficial but still not performing enough (or any) exercise per week, it is possible that this discrepancy could be attributed to an old injury that creates an additional barrier to exercise and/or physical activity. This notion is supported by Simon & Docherty (2017) who demonstrated that a previous injury may inhibit a retired athlete's ability to stay physically active.

Tracey & Elcombe (2004) reported that former athletes feel discouraged to exercise because of their loss of athletic identity. As Reifsteck (2011) reported, 97% of Division I athletes identified as "athletes" during college and only 30% identified the same way once retired. The decline found in athletic identity once retired appears to parallel with a decline in physical activity (Reifsteck, 2011). The reported findings in the aforementioned studies (Simon & Docherty, 2017; Tracey & Elcombe, 2004; Reifsteck, 2011) could be related to the decline in physical activity noted in the current study.

Future research regarding exercise habits among retired Division I college football players should include an examination of the participant's BMI levels along with their exercise levels. For example, a longitudinal effort examining Division I college football players exercise routines and BMI ranging from the active time of play through various time points in retirement may serve beneficial with regards to identifying the transitory time frame to a sedentary lifestyle as well as providing a time stamp regarding the potentiality of a BMI shift.

5. Conclusions

The results from this study indicate there is a concerning occurrence of retired NCAA Division I college football players eliminating exercise from their weekly routines. The results from this study should alert retired division I college football players, current players, family members, coaches, Universities, athletic trainers, and strength coaches regarding the health ramifications of ceasing to exercise following retirement. On a positive note, and of equal importance is that 82% of retired Division I college football players continue to meet the WHO's minimum 600 MET-Minute per week recommendation. Likewise, Division I college football players strongly perceive the benefits of exercise outweighs their perceptions of barriers to exercise.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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Appendixes

A. GPAQ Total MET-Minutes per Week

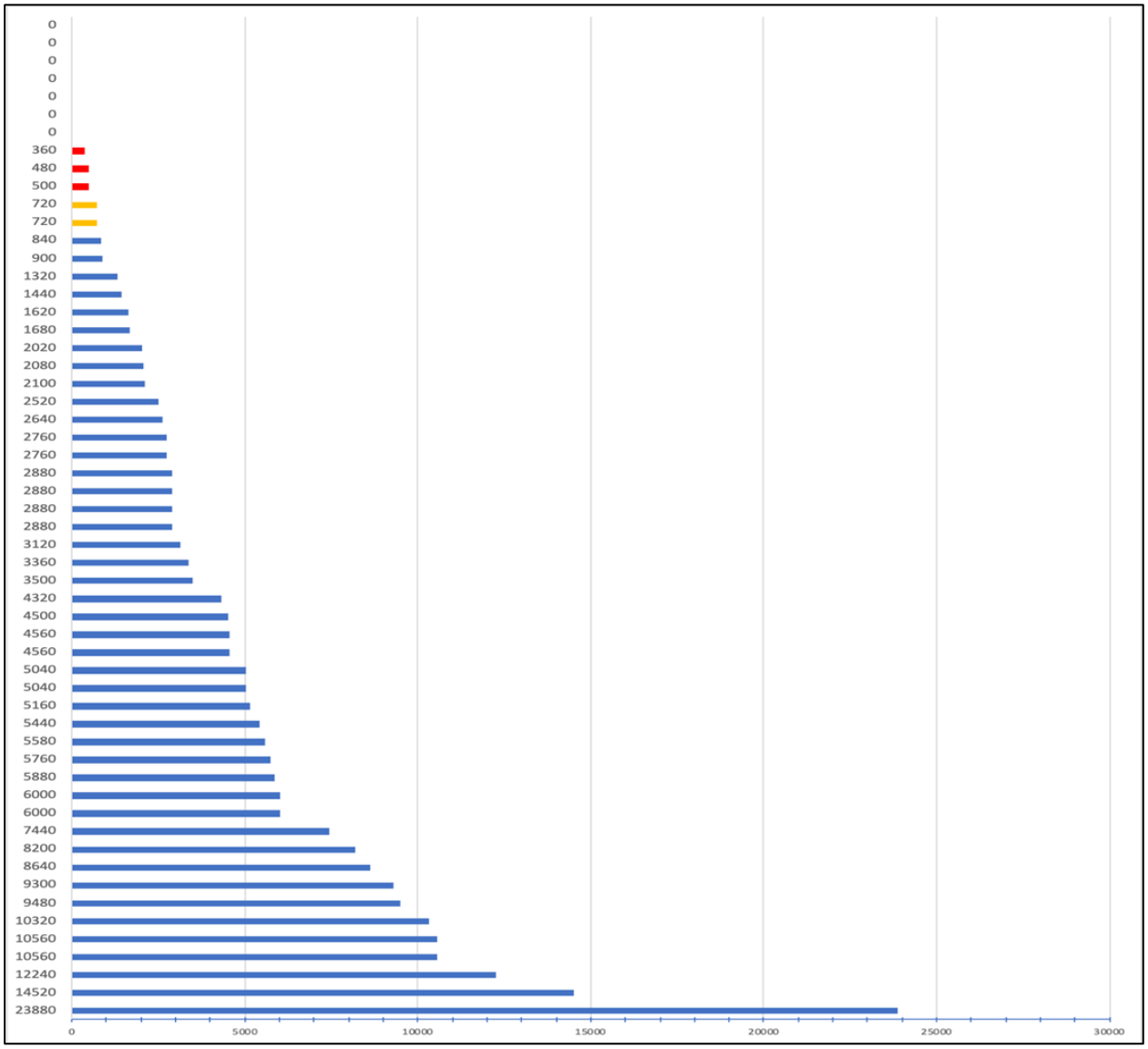

Figure 1: Individual GPAQ scores for former division I collegiate football players (n=56)

The red bars as well as the no scores represent a score <600 MET-minutes per week indicating the individual does not perform enough physical activity per week according to the WHO. The yellow and blue bars represent a score >600 Met-min per week.

B. Full Exercise Benefits/Barrier Scale Results

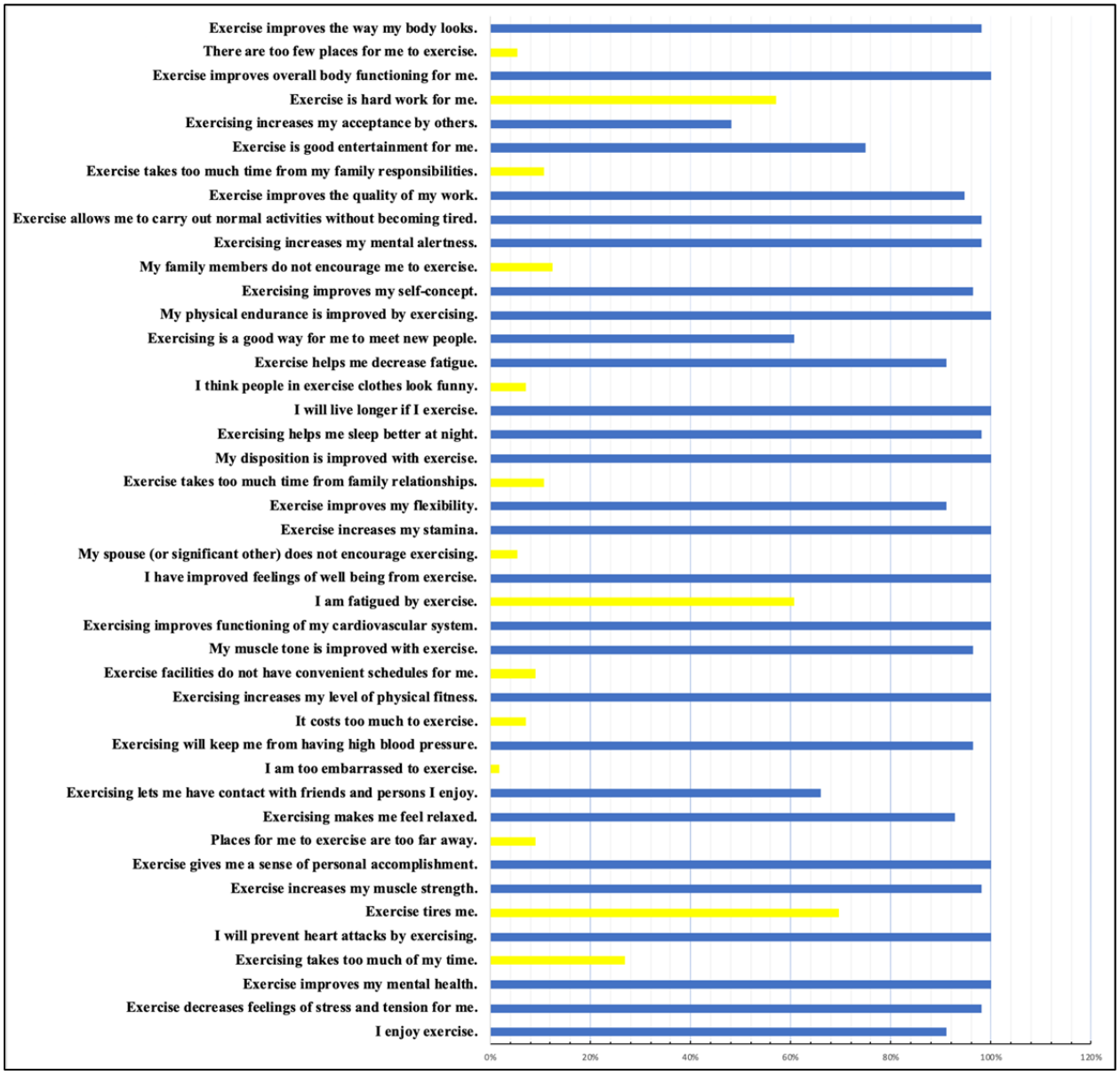

Figure 2: Group EB/BS percentages for former division I collegiate football players (n=56)

Four answer options range from Strongly Agree to Strongly Disagree. The higher the percent, the stronger the group agreed with the question asked. The blue scores represent benefit questions, and the yellow represent barrier questions. Example interpretation. Question 2: There are too few places for me to exercise: only 5% agreed or strongly agreed.

Table 1: Descriptive Statistics for the EB/BS & GPAQ

Subscale	Mean	SD
Barriers Scale	26	27
Benefits Scale	99	14
GPAQ Total	4,320	4,405

Note: Mean scores were determined by summing the scores for each subscale and dividing by the number of athletes in the study. The maximum score possible on the Barriers Scale is 56, and the low is 14. The maximum score possible for the Benefits Scale is 116, and the low is 29. The minimum recommended MET-Minutes per week for the GPAQ questionnaire is 600. These results can be seen in Figures 1 & 2.

Table 2: Number & Percentage of Former Division I NCAA football players not meeting exercise recommendations (<600 MET-min/week)

Questionnaire	*f*	%
GPAQ	10	18

Note: The number of former NCAA football players that reported not meeting the MET-Minutes per week recommendation, followed by the percent of participants that did not meet requirements out of the entire study population (Participants=56) . The World Health Organization's recommendations for MET-Minutes per week: GPAQ score>600.

Table 3: Time spent in each activity the participants identified on the GPAQ survey

Type of Physical Activity	Mean±SD (minutes)
Minutes spent on average per day in work-related physical activity.	149±310
Minutes spent on average per day in transport-related physical activity.	14±36
Minutes spent on average per day in recreation-related physical activity.	226±248
Sedentary time in minutes per day.	273±216

Note: Participants were asked to list the number of minutes per week spent in each of these settings, if they performed no exercise in this setting the participant was asked to leave the section blank.

Table 4: Exercise Benefits Barriers Question Responses

Subscale	Percent Range Strongly Agree/Agree	Number of Question Responses ≥50% Strongly Agree/Agree
Barrier Questions (n=14)	2-70%	3
Benefits Questions (n=29)	48-100%	28