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## Research Article

# Character development through sports: Viewpoint among student-athletes

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### ABSTRACT

This qualitative study narrated the character development through sports: Viewpoint among student-athletes. A narrative approach was used, and 12 participants were selected for this study. Data were collected using semi-structured interviews. To analyse and interpret the data gathered, the researchers used thematic analysis following the step-by-step process of familiarizing, generating codes, producing themes, and reviewing and defining themes. Consistence with the narrative research, the research retold involved stories of experiences from the participants about the challenges they have faced during sports training and competition and what character developed to them through sports. The researchers, therefore, recommended that student-athletes should take first the physical conditioning, meditation, and sports practice before competing to release the tension in their body and relieved pressure, nervous, and self-doubt. Coaches must also ensure that student-athletes are not overworked, must have proper trainings, and must not experience overtraining to prevent injuries, bodily fatigue, etc. Sports administrators should also provide or add necessary equipment and facilities, sufficient funds in sports necessities which can help student-athletes for their trainings, and counsel for student-athletes on how to manage time to ensure that their academic work and sports do not suffer. Finally, Government agencies such as the Department of Education and Commission on Higher Education should formally integrate character education in athletes/sport coaching programs and sports competitions, continue to recognize all student-athletes whether in competitions, trainings, and other necessities, conduct sports events and programs as it will promote the essence of sports engagement not just in their academic and sports performance or their personal skills but also for their character development.

**Keywords:** Character development, Sports, Student-athlete, Viewpoint

## INTRODUCTION

Sports are known as a major part of our society and cultures that contribute in building character and also helps much more in physical and mental aspects. It builds character, teaches thinking-analytical and strategic, leadership skills, goal setting, and much more. Meaning to say, sports can contribute especially to athletes in learning character and behavior traits that help fill out their personalities and achieve their best level of sports performance which will fall in developing their human character. Moreover, people take part in sports for a variety of reasons, including fitness and health, stress reduction, socialization, and relaxation, among others. However, character development is one of the “other” causes.

Youth participation has increased throughout the years and up to the present, and that’s led to the beneficial growth of character and other personal attributes. In addition to encouraging physical activity and a healthy lifestyle, parents allow their kids to play sports due to the good character traits that sports have been shown to develop (Romand and Pantaleon, 2007). Life skills as suggested by the World Health Organization (1999), play a key role in the healthy development including the character and values of athletes.

The United Nations Educational, Scientific and Cultural Organization (2020) supports the claims that engaging in sports impart qualities such as fairness, teamwork, equality, discipline, inclusion, perseverance, respect, integrity, sportsmanship, leadership, responsibility, and so on. Furthermore, sports have the capacity to offer a universal framework for acquiring good character traits, aiding in the development of the needed self-skills and moral values for responsible citizenship.

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However, even sports provide a good indicator of the key attributes to athletes in developing character traits such as courage, perseverance, honesty, loyalty, humility and passion, integrity, compassion, self-discipline, competence, and critical thinking just to name a few, have all been known to be developed through sports; there are still some experiences of athletes through practice and the play of sport that can have both positive and negative influences (Voelker *et al.*, 2011). Dodge and Robertson, (2004) stated that sports ethicist is more concerned about the nature of character manifested by athletes during play. He also observes that ethical behavior of sports participations concerning the athlete's character has become a topic that has garnered much attention in many countries the world over. There is growing national and international concern about ethical issues bordering on the character of athletes in sports. These include decline in the standard of sporting conduct, lack of respect for officials, tacit acceptance of rule-bending, and violence in the field (Brackenbridge, 2001; McNamee, 2001).

According to the recommendation of Clifford and Freezel (1997), in *Coaching for Character*, to promote the principles of good character through sports, and to avoid its negative effects, there is a set of measures and initiatives that should be adopted by the coaches and parents, as well as other role models, which is one of the support systems of every athlete. More specifically, these should implement such as (1) integration of empathy into the goals of physical education or sports, (2) dialogue, (3) team-building exercise, (4) positive reinforcement, (5) self-improvement rather than self-comparison, (6) inclusion rather than an exclusive dynamic, (7) frequent encouragement and corrective coaches' feedback, and (8) youth empowerment.

On the other hand, Philippine Sports Commission also provides a 5-year sports development plan (Second Cycle) 2017–2022 programs and projects that promote the human development through sports and its goal is to foster the growth in the individual's character within the community through sports. The challenge, however, lies on providing access and spreading awareness among Filipinos about the positive impact of sports for everyone; irrespective of gender, age, and sociocultural background. It is a goal that will overcome any challenges in sports.

There are (6) Mission Statements of Philippine Sports Commissions that include the PSC Governance that focuses on enhancing the capability and accountability of PSC to lead, manage, implement, and assess sports programs in the country. Next is sports awareness which intended to enhance the sports awareness of Filipinos on the role of sports as a vehicle for character and community development. Another one is sports accessibility which makes sports accessible to

the greatest number of Filipinos through grassroots sports programs that generate a healthy lifestyle and globally competitive athletes. Finally, it is Institutionalization of Philippine Sports Institute (PSI) that operates PSI as the country's premiere training, educational, and research center intentions for the development of sports and also there are sports facilities development and sports linkages that were also focused on strengthening the local and international linkages in sports.

Brown (2013) creates a game plan for character development in addressing social issues and providing an alternative path for those who involved in athletic competition and as one of the powerful tools for developing character. This plan focused on the development of five core values such as respect, responsibility, integrity, servant leadership, and sportsmanship which the primary goal of this program is to develop young people specially athletes the good character and positive habits. Brown points out the essence of respect which athletes demonstrate respect by developing consistent work habits as part in developing character and one of the most important lessons that athletes can learn from sports is the ability to work. An athlete who can learn to focus, and perform physical and mental work necessary to be successful, can carry it over into the other work fields and his/her profession. Like other character traits, it becomes who you are (a good and dependable worker), and proudly spreads to the entire team. Reliable work habits in sports foster deep and lasting friendship, loyalty, love, and most of all respect.

The primary focus of this study is to narrate the character development through Sports: Viewpoints among student-athletes in Catanduanes State University. This study is restricted its coverage to the 12 student-athletes in Catanduanes State University which will use the (6) mandatory sports of DepEd as basis in selecting these participants.

## METHODS

This study utilized qualitative research design. The process of research involved empirical work which means that it was based on observation and measurement of phenomena and derives knowledge from actual experience rather than form of theory or belief which utilizes a set of research questions that guide the investigation to carried out the collection of data as well as to provide understanding about the phenomenon. It aimed to uncover the richness of people's lives and their lived experiences. This was basically an exploration of their beliefs, values, perceptions, present events, and personal interpretation of the present phenomenon (Wicks and Whiteford, 2006). Qualitative research involves a process known as induction whereby data are collected relating to a specific area of the study and from this data, the researchers

construct different concepts and theories. It is considered more relevant to undertake this research as it allowed greater capacity to gain more depth and meaning based on individual's empirical response and experiences, along with their beliefs and feelings about sports contribution to the character development of an athlete opposed to quantitative method, which was more structured, broader in scale, and numerically based (Creswell *et al.*, 2007).

In this study, the primary sources of data were the (12) participants who are athletes during elementary, high school, and college who competed once or twice in provincial or regional level competitions and now enrolled in Catanduanes State University.

## RESULTS AND DISCUSSION

Difficulties and challenges in training, competition, and character developed among athletes

Figure represents the summary of themes identified in the study:

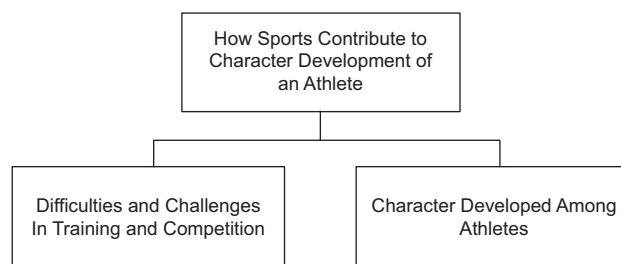
Table 1 presents the summary of subthemes along the difficulties and challenges in sports training as shown from the responses of the participants.

It can be gleaned in Table 1 that there are eight out of 12 participants who consider the different strategies of training and seven out 12 responded in muscle and body pain as their challenges encountered during training while sports-related injury received four out of 12 participants and lack of proper training received three responses.

It is observed in Table 2 that there are eight out of 12 participants who had an experience in competing under pressure, and while the incidents of experiencing nervous during competition got five out of 12 and lastly is self- doubt received three responses from out of 12 participants.

Table 3 presents the summary of subthemes along the Character that being developed Through Sports as shown from the responses of the participants.

Table shows that ten out of 12 participants mostly responded that they developed self-discipline while ten out of 12 participants agreed that they also develop good sportsmanship in winning or losing ingame influenced by the difficulties and challenges they encountered in sports training and competition. On the other hand, acquiring respectful manner toward other got seven out of 12 while building self-confidence obtain six out 12, having sense of responsibility received four out of 12 and the spirit of camaraderie, got the three out of 12 of responses.



**Figure 1:** Identified themes

**Table 1: Difficulties and challenges in sports training**

| Subthemes                           | Participants             |
|-------------------------------------|--------------------------|
| 1. Different Strategies of Training | 2, 3, 7,8, 9, 10, 11, 12 |
| 2. Muscle and Body Pain             | 2, 3, 7,8, 9, 10, 11     |
| 3. Sport-Related Injury             | 1, 7, 9, 12              |
| 4. Lack of proper training          | 4, 5, 6                  |

**Table 2: Difficulties and challenges during competition**

| Subthemes                          | Participants            |
|------------------------------------|-------------------------|
| 1. Competing under pressure        | 2, 3, 5, 6, 7, 8, 9, 10 |
| 2. Nervous during Competition      | 1, 4,5, 8, 9, 11,12     |
| 3. Self-Doubt for own capabilities | 5, 9, 12                |

**Table 3: The Character development of student athletes through sports**

| Subthemes                                      | Participants             |
|--|--------------------------|
| Developing Self-discipline                     | 1, 2 7, 8, 9, 10, 11, 12 |
| Having Good Sportsmanship in winning or losing | 1,2, 3, 4, 5, 7, 8, 10,  |
| 3. Acquiring Respectful manner towards other   | 1, 3, 4, 5, 8, 9, 10,    |
| 4. Building Self-Confidence                    | 1,3,5,8,9,12             |
| 5. Having Sense of Responsibility              | 3, 6, 9, 11              |
| 6. Spirit of Camaraderie                       | 1,6,11                   |

## CONCLUSION

This study is a qualitative design using narrative format and intending to narrate on how sports on contribute to the character development of an athlete.

The 12 selected participants furnished the needed data of the study through semi-structured interview as a method for gathering our data.

The character development of an athlete through sports was divided into two themes such as difficulties and challenges in Training and competition and the character developed to an athlete through sports.

All the participants shared their experiences differently on how sports contribute to their character development as an athlete. Difficulties including the different levels of training, muscle and body pain, injuries, and lack of training are the challenges encountered by our participants. This was supported by (Addison *et al.*, 1998; Cook and Koltyn, 2000) Muscle and body pain is often associated with the athletic experience. Being able to “play hurt” is often cited as important for success in any sports. Authors Iso-Ahola and Hatfield, (1986) contend that pain tolerance is the most critical differentiator between successful and unsuccessful athletes in sports.

In addition, Parker and Stiehl (2004) supported that with all those challenges and difficulties, positive character traits such as personality believed can and still should be learned and acquired in any sports training and physical activity setting. In terms of difficulties and challenges during competition, it is common to experience anxiety as most of the participants responded in which they had experience being pressured and nervous during competition and having self-doubt in their own capabilities.

In terms of character development of an athlete, participants stated that they developed self-discipline, as it strengthens their character to enable them to maintain focus toward accomplishing their goals without being distracted, then they acquired good sportsmanship in winning or losing in game and acquiring respectful manner toward other, as it both simply treating others with respect no matter what circumstances it may be. Building self-confidence through sports has been developed also together with having sense of responsibility and spirit of camaraderie. We cannot deny the fact that everyone responded that they developed their character but in different personality traits which are because they encountered different difficulties and challenges but above all, sports gave its intended outcomes which are to develop the character of every individuals especially those athletes who gave their dedication and optimum efforts in participating sports. Thus, sports and character are blended together optimally due to its unique goal which is to change one’s life through sports experiences and build wholesome personality development both on the field and off it.

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## Research Article

# Brain Breaks Physical Activity Solutions® in higher education: Randomized controlled trial among Turkish university students

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## ABSTRACT

A substantial volume of empirical evidence exists regarding the positive effects of technology-supported physical activity (PA) solutions in school children. However, a lack of potential impact of these solutions in higher education settings exists. The aim of this study was to examine the effects of Brain Breaks PA Solutions® on university students' attitudes toward PA. This study used a pre-test and post-test with a quasi-experimental design and convenience sampling. Students ( $n = 521$ ) from seven different faculties of a public university in the Cappadocia region of Turkey volunteered as study participants and were randomly assigned to either experimental ( $n = 263$ ) or control ( $n = 258$ ) groups. During a 3-month intervention, the experimental groups received Brain Breaks PA Solutions® videos. Student attitudes toward PA were measured using the attitudes toward PA Scale (APAS) before and after the intervention. Repeated measures analysis of variance indicates a time interaction effect for PA benefits. Time-by-group interaction effects with varying effect sizes were found for most APAS variables with the greatest gain noted in the experimental groups for fun, followed by learning from the videos, and self-efficacy ( $P < 0.05$ ). This study provides evidence that technology-supported PA programs in higher education settings positively impact students' attitudes toward PA.

**Keywords:** Physical activity, Public health, Technology, Youth

## INTRODUCTION

More physically active individuals for a healthier world are needed and is stated as a goal in the World Health Organization (WHO) 2018–2030 Global Action Plan on Physical Activity (PA) (WHO, 2022). This need is justified because 23% of adults and 81% of young people between the ages of 11 and

17 do not meet WHO's recommendations for PA needed for better health. Likewise, Guthold *et al.* (2018) reported worldwide insufficient PA from 2001 to 2016 in 1.9 million participants from 168 countries. The age-standardized physical inactivity rate was 27.5% (Guthold *et al.*, 2018) Individuals were considered physically active by using guidelines from the American Dietetic Association and the American College of Sports Medicine. The physically active individual is required to do moderate-intensity PA for at least 30 min every day or most days of the week. PA is considered an essential determinant for improving quality of life, adding

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to a healthy lifestyle, and reducing chronic disease risks such as hypertension, obesity, and diabetes (Anderson and Durstine, 2019). The aim of increasing PA directly contributes to the United Nations' sustainable development goals (SDG) (2020), particularly to SDG#3 (Good health and well-being) (Popeska *et al.*, 2022; Salvo *et al.*, 2021; Uvinha *et al.*, 2022). Information found in the literature supports that sedentary lifestyles are on the rise globally, associated with increased computer use, video game use, and television watching (Barwais *et al.*, 2013; Gao *et al.*, 2019) and the health effects of individuals at all ages are negatively impacted (Ferreira *et al.*, 2022). Decreased PA levels can start in early adolescence and continue to decline into late adolescence and early adulthood (Corder *et al.*, 2019; Winpenny *et al.*, 2020; Liu *et al.*, 2018; Chai *et al.*, 2022). Life events such as life transitions are known to negatively affect PA levels and other lifestyle behaviors Winpenny *et al.*, 2020). As these early life years are an important period for life change, students are often faced with increased stress, loneliness, nostalgia; decreased level of self-confidence, and lack of peer communication. These factors often lead to misunderstanding and conflict (Liu *et al.*, 2018; Conley, Travers and Bryant, 2013; Kim and Kuan, 2020). The transition of graduating from public school to attending a university is an important time when youth need support in preventing PA decline (Winpenny *et al.*, 2020; Gropper *et al.*, 2020). Conversely, PA participation in many different forms accrues countless benefits. Students involved in moderate and high-level PA have better psychological well-being (Granero-Jiménez *et al.*, 2022; Lapa, 2015), and greater quality of life (Abdullah *et al.*, 2019; Zhang, Chen, B., and Chen, W, 2021). These health benefits increase with increased weekly PA participation (Broáni *et al.*, 2013). Most university students have difficulty engaging in adequate PA due to excessive class hours and course requirements, lack of self-discipline, lack of PA facilities, and/or PA amenities. Ferreira Silva *et al.* (2022) identified lack of time, motivation, and available facilities as main barriers to being PA among high school and university students. A Turkish study (Ölçücü *et al.*, 2022) confirmed lower university students PA rates while more than half of students evaluated had no regular PA participation or had insufficient PA levels. Therefore, identifying and recommending different PA forms that do not require extensive time, finances, specific facilities, and facility access is needed.

Using short PA breaks to combat sedentary lifestyles provides insight into behavior change. For instance, Taylor *et al.* (2013) used workplace booster breaks to promote health through increased PA. Henning *et al.* (1997) found positive productivity and well-being resulting from frequent short rest PA breaks while doing computer work. Barwais *et al.* (2013) used personal activity monitor-based intervention programs to reduce sedentary behavior and increase PA levels in daily living among sedentary adults. Bedard *et al.*

(2019) completed a systematic review and meta-analysis on studies evaluating school-aged children and found improved educational outcomes were best impacted in classrooms incorporating PA when compared to traditional sedentary classrooms. Papadopoulos *et al.* (2022) recently conducted a systematic review regarding brief periods of classroom-based PA intervention on primary school-aged children and found enhanced enjoyment and well-being benefits. Schools are known as special places for promoting PA as children spend much of their time in school. In this regard, when considering university students, universities also have an important role in promoting PA by providing facilities and amenities encouraging regular PA participation. One way that PA is incorporated into the classroom is through the use of learning that incorporates PA breaks or brain breaks. (Carlson *et al.*, 2015; Käll *et al.*, 2014). When considering the length of teaching hours, longer teaching periods often used in university settings is tiring for both students and instructors. During long teaching sessions, students and instructors can easily participate in videos such as the ones developed by Brain Breaks PA Solutions®. The literature clearly supports that using PA classroom breaks contributes to enhanced productivity, well-being, self-efficacy, and better attitudes toward PA participation (Carlson *et al.*, 2015; Käll *et al.*, 2014). Therefore, incorporating active breaks into higher education settings potentially increases students' mood, promotes effective learning, and likely enhances instructors' productivity.

Studies conducted with elementary and middle school children provide strong evidence for the positive effects of classroom PA breaks. HOPSports Brain Breaks PA Solutions® is one such program using multilevel interventions combining classroom-based PA with modern technology (Chin *et al.*, 2012). This technology-supported intervention integrates various types of body movements in 3–5-min online videos aimed to enhance PA during educational lessons promoting students' interest in learning and well-being. Online exercises are designed specifically for use in individual or group settings to encourage students to become physically active, acquire new motor skills, learn new languages, and develop an appreciation for cultural knowledge in art and music (Chin *et al.*, 2012). Information found in the literature supports conclusions that Brain Breaks PA Solutions® positively impact cognitive functioning (Mullender-Wijnsma *et al.*, 2015), academic achievement (Donnelly *et al.*, 2016; Watson *et al.*, 2017), enhanced attitudes toward PA (Bonnema *et al.*, 2020; Emeljanovas, 2018; Mok *et al.*, 2020; Uzunöz *et al.*, 2017), self-efficiency in learning (Glapa *et al.*, 2018; Popeska *et al.*, 2018), increased PA interest (Abdullah *et al.*, 2019; Zhou *et al.*, 2021), improved physical fitness (Bonnema *et al.*, 2020), Improved goal orientation (Mok *et al.* 2020; Mok *et al.*, 2016), improved holistic learning (Uzunöz *et al.*, 2017; Popeska *et al.*, 2018; Kuan *et al.*, 2019), and improved classroom behavior (Podnar *et al.*, 2018). Brain

Breaks PA Solutions® are also associated with improved cognitive and behavioral processes and internal feelings (Rizal *et al.*, 2019). Teachers also find PA break videos useful to improve student focus, improved cooperation, and better interaction with children (Rizal *et al.*, 2019). Study subjects report that PA breaks are enjoyable (McMullen *et al.*, 2014) while instructors note PA breaks are easy to apply (Jovanova-Mitkovska and Popeska, 2019).

Although many studies are found in the literature regarding the effect of Brain Breaks PA Solutions® on school children, few studies exist regarding the influence of brain PA breaks on university students. Thus, the study aimed to examine the effects of Brain Breaks PA Solutions® on university students' attitudes toward PA in the Cappadocia region of Turkey.

## METHODOLOGY

### Study Design and Participants

This quantitative study used a pre-test and post-test with a quasi-experimental design. The study participants comprised 521 university students from seven faculties of a public university found in the Cappadocia region of Turkey (Education Sciences, Health Sciences, sports sciences, Theology, Foreign Languages, Science and Literature, Economics, and Administrative Sciences). Availability and volunteerism (Onwuegbuzie and Collins, 2007) were the basis for sample selection. Thus, Tourism, Fine Arts, and Engineering Faculties were not included in this study. Participant's characteristics are presented in Table 1.

All university academic faculties were represented in both experimental and control groups. Classrooms from academic faculties were randomly assigned to either experimental or control groups. Starting study participants were 579 students (265 males and 314 females). Subjects beginning in the experimental group were 313 and in the control group were 266. Forty-nine males and one female from the experimental group and five males and three females from the control group did not meet the requirements for continued study protocol participation. Consequently, a total of 58 students were omitted from statistical analysis. Initially, equal number of males and females were assigned to the experimental and control groups, but more males in the experimental groups were unable to complete the study protocol participate. Thus, more female students finished study protocols. After data extraction, final male numbers were 211 (40.5%) and female numbers were 310 (59.5%) (Mean age = 20.67, SD = 2.4 years). The total number of participants finishing the experimental group was  $n = 263$  and total participants finishing the control was  $n = 258$ .

Independent sample t-tests showed that no significant statistical difference existed between the experimental and control groups at pre-test in participants' attitudes toward PA as measured by the PA Scale (APAS) variables ( $P > 0.05$ ).

### Intervention: Brain Breaks PA Solutions®

Participants in the experimental group received Brain Breaks PA Solutions® (<http://hopsports.com/what-is-brain-breaks>) as a 12-week intervention completed three school days each

**Table 1: General characteristics of the participants (n=521)**

| Variables                           | Total n=521 (%) | Experimental Group<br>n=263 (50.5%) | Control Group<br>n=258 (49.5%) |
|-------------------------------------|-----------------|-------------------------------------|--------------------------------|
| Age (years)                         | 20.67±2.42      | 20.68±2.61                          | 20.66±2.22                     |
| Gender                              |                 |                                     |                                |
| Male                                | 211 (40.5%)     | 90 (34.2%)                          | 121 (46.9%)                    |
| Female                              | 310 (59.5%)     | 173 (65.8%)                         | 137 (53.1%)                    |
| Year level                          |                 |                                     |                                |
| Year 1                              | 166 (31.9%)     | 110 (41.8%)                         | 56 (21.7%)                     |
| Year 2                              | 115 (22.1%)     | -                                   | 115 (44.6%)                    |
| Year 3                              | 240 (46.1%)     | 153 (58.2%)                         | 87 (33.7%)                     |
| Faculties                           |                 |                                     |                                |
| Education Sciences                  | 115 (22.1%)     | 63 (23.9%)                          | 52 (20.2%)                     |
| Health Sciences                     | 113 (21.7%)     | 52 (19.8%)                          | 61 (23.6%)                     |
| Sport Sciences                      | 70 (3.4%)       | 35 (13.3%)                          | 35 (13.6%)                     |
| Theology                            | 69 (13.2%)      | 47 (17.9%)                          | 22 (8.5%)                      |
| Foreign Languages                   | 59 (11.3%)      | 27 (10.3%)                          | 32 (12.4%)                     |
| Science & Literature                | 55 (10.6%)      | 23 (8.7%)                           | 32 (12.4%)                     |
| Economics & Administrative Sciences | 40 (7.7%)       | 16 (6.1%)                           | 24 (9.3%)                      |

week in 3–5-min segments. Each Brain Breaks PA Solutions® video included warm-up exercises, elements from different sports, and traditional dances with customary or popular music from different countries. Before the intervention, university academic staff members for the experimental group were instructed by trained researchers in intervention implementation procedures and how to lead exercises. The academic staff was also provided with online access to the Brain Breaks PA Solutions® administration platform. Students in the control group did not receive any Brain Breaks PA Solutions® intervention and received only normal curriculum instruction. After providing information about the research, all testing was applied by researchers in classrooms and completed anonymously using a code designed to match students' responses at pre- and post-intervention testing without revealing the student's identity.

## Measures

The original APAS questionnaire (Mok *et al.*, 2015) was designed to measure students' attitudes toward PA and uses a four-point Likert scale with options of strongly disagree, disagree, agree, and strongly agree and contains seven scales:

- Benefits scale measures students' perceived benefits of PA with 10 items
- Importance scale measures students' perceived importance of PA with 5 items
- Learning scale measures students' learning from the videos with 11 items
- Self-efficacy scale measures students' self-efficacy in selecting video exercises for themselves with 4 items
- Fun scale measures students' interest in doing PA with 14 items
- The fitness scale measures students' confidence in their own fitness with 8 items
- Personal best scale measures students' orientation to their personal best goals when engaging in PA with 5 items.

Strong internal consistency and validity for APAS in school children was established by national studies completed in Poland (Glapa *et al.*, 2018), Macedonia (Popeska *et al.*, 2018), Turkey (Uzunöz *et al.*, 2017), Lithuania (Emeljanovas *et al.*, 2018), Malaysia (Kuan *et al.*, 2019; Rizal *et al.*, 2019; Hajar *et al.*, 2019), and international studies (Mok *et al.*, 2015; Mok *et al.*, 2020).

Adaptation of the APAS for higher education students in Turkey was conducted by Dinc *et al.* (2019). The validity and reliability of the Turkish APAS version were verified for higher education population with 38 items consisting of six subscales: Benefits of PA (7 items), learning from videos (8 items), self-efficacy (3 items), fun (7 items), self-confidence on physical fitness (8 items), and trying to do personal best (5 items). Demographic information regarding students' age, gender, college year level, and faculty was gathered at the beginning

of the session when the APAS was completed. Both groups finished the Turkish APAS version for higher education in about 15 min both at pre- and post-intervention times (Dinc *et al.*, 2019).

## Ethical Approval Intervention: Brain Breaks PA Solutions®

This study was conducted in accordance with the Declaration of Helsinki and ethical approval was obtained from University's Institutional Review Board where this study was undertaken. All research procedures were conducted by following university ethical principles, and all participants took part voluntarily and signed informed consent forms.

## Statistical Analysis

The Statistical Package for the Social Sciences (SPSS, version 27.0) was used for data analyses. Data from all academic faculties were pooled after cleaning and matching data from pre-test and posttest. Descriptive statistics were used to describe subject general characteristics (means, standard deviations). An independent samples *t*-test was used to compare the experimental and control groups at pre-test to assess the extent to which the groups were statistically comparable before intervention. Changes in variables from pre-test to posttest were evaluated using repeated measures of variance analysis (ANOVA) to determine time and time by group effects. Differences were considered statistically significant at  $P < 0.05$ . Effect sizes of significant differences were evaluated using partial eta-squared ( $\eta^2$ ). Values of partial  $\eta^2$  equal to 0.006, 0.009, 0.011, and 0.012 were considered as small effects according to Richardson (Richardson, 2011).

## RESULTS

Study results demonstrated that the experimental group gained significantly more benefits than the control group from pre-test to post-test. A repeated-measure ANOVA indicated significant time and time by group interaction effects for some subscales of the APAS as shown in Table 2.

Time by group interaction effect was significant for three subscales of APAS, namely, "Fun" ( $F = 6.226^*$ ,  $P < 0.05^*$ ); Learning from videos" ( $F = 5.533^*$ ,  $P < 0.05^*$ ) and "Self-efficacy" ( $F = 4.642^*$ ,  $P < 0.05^*$ ) and time effect was significant for the "Benefits of PA" subscale ( $F = 5.382^*$ ,  $P < 0.05^*$ ). Based on the partial  $\eta^2$ , magnitude of the effect of the time by group interaction was small for the scores on these variables.

## DISCUSSION

The aim of this study was to examine the effects of Brain Breaks PA Solutions® on university students' attitudes

**Table 2: Descriptive statistics of the Experimental ( $n=263$ ) and Control Groups ( $n=258$ ) at pre-test and post-test, and the results of repeated measures ANOVA**

| Variables     | Groups | Pre-test        | Post-test       | Time        |          | Time x Group |          |
|---------------|--------|-----------------|-----------------|-------------|----------|--------------|----------|
|               |        | M $\pm$ SD      | M $\pm$ SD      | $F$ ( $p$ ) | $\eta^2$ | $F$ ( $p$ )  | $\eta^2$ |
| Benefits      | EXP    | 3.41 $\pm$ 0.46 | 3.52 $\pm$ 0.44 | 5.382*      | 0.010    | 3.393        | 0.006    |
|               | CON    | 3.40 $\pm$ 0.57 | 3.42 $\pm$ 0.49 |             |          |              |          |
| Learning      | EXP    | 3.03 $\pm$ 0.54 | 3.18 $\pm$ 0.53 | 0.850       | 0.002    | 5.533*       | 0.011    |
|               | CON    | 3.07 $\pm$ 0.56 | 3.07 $\pm$ 0.55 |             |          |              |          |
| Self-efficacy | EXP    | 3.27 $\pm$ 0.53 | 3.42 $\pm$ 0.49 | 0.209       | 0.000    | 4.642*       | 0.009    |
|               | CON    | 3.21 $\pm$ 0.59 | 3.23 $\pm$ 0.59 |             |          |              |          |
| Fun           | EXP    | 3.05 $\pm$ 0.51 | 3.20 $\pm$ 0.52 | 0.480       | 0.001    | 6.226*       | 0.012    |
|               | CON    | 3.10 $\pm$ 0.55 | 3.12 $\pm$ 0.52 |             |          |              |          |
| Fitness       | EXP    | 3.21 $\pm$ 0.55 | 3.27 $\pm$ 0.56 | 1.523       | 0.003    | 0.309        | 0.001    |
|               | CON    | 3.22 $\pm$ 0.57 | 3.25 $\pm$ 0.55 |             |          |              |          |
| Personal Best | EXP    | 3.28 $\pm$ 0.59 | 3.36 $\pm$ 0.58 | 0.059       | 0.000    | 0.164        | 0.000    |
|               | CON    | 3.27 $\pm$ 0.66 | 3.32 $\pm$ 0.56 |             |          |              |          |

Notes: M=Mean, SD=Standard deviation, EXP=Experimental group, CON=Control group, \* $P<0.05$ . ANOVA: Analysis of variance

toward PA in the Cappadocia region of Turkey. The findings support that 12 weeks of classroom PA break participation positively affected university students' attitudes toward PA with improvements in three of the six APAS variables. The experimental group significantly increased attitudes toward PA enjoyment when engaging in PA, learning from videos, and self-efficacy in using exercise videos when compared to the control group. Significant improvements in perceived PA benefits were also found in the experimental group.

This study revealed that technology-assisted videos do support regular PA participation. Students indicated that PA during class time was interesting and fun, and the videos had a positive effect on student enjoyment and improved their motivation for becoming PA. The use of short exercise videos supports the claim of Bonnema *et al.* (2020) who reported that technology provides a higher level of enjoyment for school children in South Africa. Findings from this study are also supported by studies conducted in China (Zhou *et al.*, 2021), Lithuania (Emeljanovas *et al.*, 2018), Macedonia (Popeska *et al.*, 2018), Malaysia (Rizal *et al.*, 2019; Hajar *et al.*, 2019), Poland (Glapa *et al.*, 2018), Singapore (Balasekaran *et al.*, 2021), and Turkey (Uzunoz *et al.*, 2017). In these studies, the effectiveness of classroom Brain Breaks PA Solutions® videos on school children were evaluated using quasi-experimental designs. (Mok *et al.*, 2020) made comparisons of Brain Breaks PA Solutions® videos in participants from eight different countries. When the results from Mok *et al.* (2020) of school children are compared with the results of this present study also using Brain Breaks PA Solutions® videos, university students have similarities regarding the perceptions of fun and enjoyment while engaging in PA, learning from videos, and promoting self-efficacy by

using exercise videos. These findings are related to the video content which combines elements from various sports, warm-up exercises, music, and traditional dances with customary or popular music from different countries. Participants learned from the videos the structure for PA breaks, regular PA participation, and skills gained by using technology while having the autonomy to choose different videos. The results also support that university students' can effectively learn from videos and gain self-efficacy in using exercise videos. Sprenger and Schwaninger (2021) state the use of digital learning technologies in higher education is becoming increasingly widespread due to advantages such as easy of applicability, affordability, and measurability in crowded classrooms. These factors are considered supportive for university lecturers to use Brain Breaks PA Solutions® in higher education courses. Short PA breaks to refresh the mind and the body while allowing for a renewed focus on the same task.

University lecturers involved in the implementation of this study protocols provided feedback concerning the use of in-class exercise videos. Their comments support that students who are involved in sports or PA, participated in the class short video exercises without hesitation or boredom. On the contrary, students who had given up sports and PA, at times had difficulty in performing video exercises but slowly improved self-efficacy with learning from video exercises. All participants when asked reflected on their enjoyment in PA participation. Significant improvements in self-efficacy in using exercise videos is linked with the construct of Bandura's (1997) social cognitive theory which relates to the belief in one's own ability to take the necessary actions to achieve desired outcomes. Even students who have



never played sports, or who have never been involved in PA, given the opportunity to dance, demonstrate improved skills specific to different cultures and moved throughout the classroom exercise videos. These applications influence students' behavior preferences and encourage chosen behavior. Therefore, after the implementation of Brain Breaks PA Solutions® PA interventions, university students' confidence in achieving and maintaining behavioral change regarding PA was enhanced. This finding is also in line with the results of Papalia *et al.* (2018) who in working with college students suggested that using information technology-based tools such as smart watches, pedometers, and heart rate monitors was important to increase motivation for PA participation. Unlike students studying in the education and sport sciences fields, Brain Breaks PA Solutions® created a very different and novel atmosphere when combined with traditional teaching methods, especially for students studying in other university academic disciplines (e.g., Theology, Science and Literature, Economics, and Administrative Sciences).

As reported in other studies conducted with children (Bonnema *et al.*, 2020; 2022; Glapa *et al.*, 2018; Popeska *et al.*, 2018; Zhou *et al.*, 2021; Hajar *et al.*, 2019; Balasekaran *et al.*, 2021), university students lacked significant improvements in self-perception of physical fitness and trying to achieve personal best when doing PA. This difference is likely attributed to the amount of time and intensity of movement during exercise videos. To ensure active regular PA participation, especially in this age group, a competitive environment was suppressed and fun by the videos was emphasized. Implementing videos featuring moving to music in an enjoyable manner was deemed more important for university students to relax. At the same time, participating in combat and fun-type sports were vehicles for university students to get away from academic routines. Reported research findings predicate immediate effects during a PA session when accompanied by music (Terry *et al.*, 2020). The music reduces physical exertion, increases activity engagement and enjoyment, and is associated with higher exercise intensities (Terry *et al.*, 2020). Unlike the findings of the present study where physical fitness did not improve, Bulca *et al.* (2022) used Fitnessgram Test Battery in Turkey school children and Bonnema *et al.* (2022) used EUROFIT test battery in South Africa school children found physical fitness level improvements after applying Brain Breaks PA Solutions® PA programming. The different finding may be related to the selected videos that solely focused on improving children physical fitness levels. A different perspective is that a challenging skill resulting in children development is easier for university students when the activity is perceived as fun. Zhou *et al.* (2021) states that Brain Breaks PA Solutions® videos consisting of movements from simple to complex with difficulty increasing linearly are more effective for children self-perception of physical fitness, and thus, children work harder to do their best in PA

participation. Therefore, academic university professionals might choose video containing physically demanding movements to encourage university students to do their best at PA participation.

As with all studies, this study had limitations that future studies should address. Accordingly, the most commonly used Brain Breaks PA Solutions® intervention implementation process was followed using a 12-week intervention period to evaluate attitude and behavior change toward PA while the impact of longer intervention periods is unknown. The unique aspect of this quasi-experimental study was the evaluation of the Brain Breaks PA Solutions® experiences in higher education settings, and the sample was representative of a broad group of academic faculties. Although this study can be used as a guide because of the quantitative research methodology used, in-depth evaluation of student and teacher opinions using quantitative methodology needs to be completed and will add significantly to the literature. As only verbal feedback from professors involved in this intervention, these comments were not included in data analysis. All data collected were student self-reported, and an imbalance in the number of 2<sup>nd</sup> year university students existed among the experimental and control groups. Future research studies should consider a much larger number of higher education institutions at both the national and international levels. Finally, studies are needed that randomized subject allocated to the experimental and control groups within each category (e.g., gender, student academic year level, and academic faculty), and use a larger number of subjects would provide greater statistical power.

## CONCLUSION AND RECOMMENDATIONS

The aim of this study was to examine the effects of Brain Breaks PA Solutions® on university students' attitudes toward PA using subjects from the Cappadocia region of Turkey. Results support that 12 weeks of regular participation in classroom PA breaks positively affected university students' attitudes toward PA. Improvements were found in fun and enjoyment gained when engaging in PA, learning from videos, and promoting self-efficacy by using exercise videos. In this respect, based on the results of related studies found in the literature, children and higher education students are not different. In conclusion, the technology-supported Brain Breaks PA Solutions® has a positive impact on promoting PA in higher education settings. When implementing the findings of this study, collaboration between researchers, higher education administrators, and public school administrators and teachers are important. Such involvement will likely provide better PA participation within the context of holistic student education, teachers, and instructors.

## AUTHOR CONTRIBUTIONS

Conceptualization, F.S.U., M.K.C.; methodology, F.S.U., S.C.D.; validation, S.C.D., M.M.C.M, formal analysis, F.S.U., S.C.D., M.M.C.M; investigation, F.S.U., S.C.D., B.P., G.K.; resources, M.K.C.; data curation, S.C.D., M.M.C.M; writing-original draft preparation, F.S.U., B.P., G.K.; writing-review and editing, F.S.U., G.K., M.M.C.M, I.C., C.R.E., J.L.D.; visualization, M.K.C., M.M.C.M; supervision, M.K.C.; project administration, M.K.C. All authors have read and agreed to the published version of the manuscript.

## DATA AVAILABILITY STATEMENT

Data are available from the corresponding author on reasonable request. The data are not publicly available due to privacy restrictions.

## DECLARATION OF COMPETING INTEREST

All authors declared that there are no real or potential conflicts of financial or personal interest.

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## Research Article

# A comparative study of personality traits of Mysore University intercollegiate female volleyball players playing in different positions

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### ABSTRACT

Volleyball is one of the most successful and popular competitive and recreational sports in the world. There are five positions filled in every volleyball team at the elite level. They are as follows: (1). Attackers, (2). blockers, (3). setter, (4). libero (Defense Specialist), and (5). all-rounders. Personality evolves from a number of influences that may be divided into three broad categories – physical, personal, and sociocultural. The present study has been undertaken by the investigator to compare the personality traits among Mysore University intercollegiate women volleyball players playing in different positions. For the purpose of present study, 75 ( $n = 75$ ) female volleyball players were selected in Mysore University Intercollegiate tournament. The total subjects were randomly selected from different colleges in the year 2020–2021. For each position, 15 players were selected. The investigator, in consultation with the guide, administered Eysenck's personality inventory questionnaire. Inferential statistics included in the present study are Cramer's V, analysis of variance – one way and two way, and Scheffe's *post hoc* test. The analysis revealed that there was a significant association between position of the players and their extraversion, introversion, and ambiversion nature. The investigator concluded that all the team game players required personality traits which help them during their competition. These personality traits directly or indirectly help the players of different games to perform better during the competition.

**Keywords:** Eysenck's personality inventory, Intercollegiate, Personality, Positions, University of Mysuru, Volleyball

### INTRODUCTION

Volleyball is one of the most successful and popular competitive and recreational sports in the world. It is fast and exciting, and the actions are explosive. There are five positions filled in every volleyball team at the elite level. They are as follows: (1). Attackers, (2). blockers, (3). setter, (4). libero (Defense Specialist), and (5). all-rounders. Each of these positions plays a specific key role in winning a volleyball match. Personality evolves from a number of influences that may be divided into three broad categories – physical, personal, and sociocultural. Physical influences are the inherited biological characteristics that cause people to differ from each other. There are some of the issues in research concerning personality and sport. Such

as, Is there a relationship between personality type and sport preference? How do people choose the sport they participate in? Would it be a matter of personality preference? Are certain personality types more attracted to certain sports, like in careers? Why some people prefer individual sports over team sports?

Considering the role of individual differences and the role of heredity and environment, this may cause individual differences and, thus, changes in personality characteristics among individuals. The investigator in the present study was interested in knowing if there are any specific unique or dominant personality traits among women volleyball players and the study representing a simple classification and agreement of personality of traits which may give a brief personality sketch of women volleyball players and the study of such, may be a step leading to further investigation. The present study has been undertaken by the investigator to compare the

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personality traits among Mysore University intercollegiate women volleyball players playing in different positions.

## Objectives of the Study

The objectives of the study are as follows:

1. To find out if any difference in personality traits existed among Mysore University intercollegiate female volleyball players playing in different positions
2. To develop an overall profile of inter-collegiate Female volleyball players playing in different positions in respect of the personality traits.”

## Hypotheses

For the purpose of the present study, it is hypothesized that

- H<sub>1</sub>: There is no significant difference in the personality traits of Mysore University intercollegiate female volleyball players playing in different positions.
- H<sub>2</sub>: There is no interrelationship in personality traits among Mysore University Intercollegiate female volleyball players playing in different positions.

## METHODOLOGY

### Selection of Subjects

For the purpose of the present study, 75 ( $n = 75$ ) female volleyball players were selected in Mysore University Intercollegiate tournament. The total subjects were randomly selected from different colleges in the year 2020–2021. For each position, 15 players were selected.

### Selection of Variable for the Study

The researcher examined the literature on the various psychological tests that would measure personality traits. It was decided by the investigator in consultation with the guide to administer Eysenck's personality inventory questionnaire.

### Procedure of Collection of Data

The investigator was personally visited the tournament venue. The questionnaire was administered during the free time available to the subjects. The data collection has taken for many days in this COVID-19 situation. The data were collected with the help of physical education teachers, coaches, and friends in their respective colleges, hostels, and residence. The investigator himself administrated the questionnaire. After students had completed the questionnaire, the researcher and his assistants collected the questionnaire. The responses were converting into raw scores that were in numerical form, these scores represent the data for the present study.

### Statistical Technique

The data collected were later subjected to statistical analysis using descriptive statistics such as frequency and percentages, mean and standard deviations. Inferential statistics included in

the present study is Cramer's V, Analysis of variance (ANOVA) – one way and two way, and Scheffe's *post hoc* test. Along with descriptive and inferential statistics, graphical presentations have been depicted wherever necessary.

Table 1 Result of one-way ANOVA reveled a non-significant mean difference between players playing in different positions. F-value of 0.808 is found to be non-significant ( $P = 0.525$ ). In other words, the mean extrovert-introvert score of players playing in different position is statistically same.

When category-wise classification of E-I was analyzed, following results or optioned. Among attackers, 73.3% of them were ambiversion and 26.7% of them were extraversion; among blockers, 86.7% of them were ambiversion and 13.3% of them were extraversion. In setters, 80% and 20% of them were found to be ambiversion and extra version, respectively. Among liberos, 73.3% of them for ambiversion and 26.7% of them for were extraversion. In All-rounders, 80% of them were found to be ambiversion and 20% of them were extraversion. On the whole, 78.8% of them were ambiversion and 21.3% of them were extraversion Table 2.

When category-wise association of E-I was analyzed following results are optioned. Among attackers, 20.0% of them were ambiversion and 40.0% of them were extraversion; among blockers, 46.7% of them were ambiversion and 60.0% of them were extraversion. In setters, 46.7% and 53.35 of them were found to be ambiversion and extraversion, respectively. Among Liberos, 86.7% of them were ambiversion and 13.3% of them extrversion. In All rounders, 60.0% of them were found to be ambiversion and 40.0% of theme were extraversion. On the whole, 50.7% of them were ambiversion and 49.3% of them extraversion Table 3.

## MAJOR FINDINGS

1. There is middle individual variation in E-I scores of the volleyball players and attackers are high in E-I score
2. There is a non-significant mean difference between players playing in different positions. In other words, the mean E-I score of players playing in different position is statistically same
3. There is mild individual variation in E-I scores of the volleyball players and attackers are found to be high in mean score

**Table 1: Result of one way ANOVA**

|                | Sum of Squares | df | Mean Square | F     | Sig.  |
|----------------|----------------|----|-------------|-------|-------|
| Between Groups | 25.787         | 4  | 6.447       | 0.808 | 0.525 |
| Within Groups  | 558.800        | 70 | 7.983       |       |       |
| Total          | 584.587        | 74 |             |       |       |

ANOVA: Analysis of variance

**Table 2: Extroversion and introversion category-wise position of volleyball players**

| EI_cat                     | Position  |          |         |         |              | Total |
|----------------------------|-----------|----------|---------|---------|--------------|-------|
|                            | Attackers | Blockers | Setters | Liberos | All rounders |       |
| Ambi                       |           |          |         |         |              |       |
| Count                      | 11        | 13       | 12      | 11      | 12           | 59    |
| Percentage within position | 73.3      | 86.7     | 80.0    | 73.3    | 80.0         | 78.7  |
| Extro                      |           |          |         |         |              |       |
| Count                      | 4         | 2        | 3       | 4       | 3            | 16    |
| Percentage within position | 26.7      | 13.3     | 20.0    | 26.7    | 20.0         | 21.3  |
| Total                      |           |          |         |         |              |       |
| Count                      | 15        | 15       | 15      | 15      | 15           | 75    |
| Percentage within position | 100.0     | 100.0    | 100.0   | 100.0   | 100.0        | 100.0 |

**Table 3: Neurotism category position-wise position of volleyball players**

| N_cat                      | Position  |          |         |         |              | Total |
|----------------------------|-----------|----------|---------|---------|--------------|-------|
|                            | Attackers | Blockers | Setters | Liberos | All rounders |       |
| Normal                     |           |          |         |         |              |       |
| Count                      | 3         | 6        | 7       | 13      | 9            | 38    |
| Percentage within position | 20.0      | 40.0     | 46.7    | 86.7    | 60.0         | 50.7  |
| Neuro                      |           |          |         |         |              |       |
| Count                      | 12        | 9        | 8       | 2       | 6            | 37    |
| Percentage within position | 80.0      | 60.0     | 53.3    | 13.3    | 40.0         | 49.3  |
| Total                      |           |          |         |         |              |       |
| Count                      | 15        | 15       | 15      | 15      | 15           | 75    |
| Percentage within position | 100.0     | 100.0    | 100.0   | 100.0   | 100.0        | 100.0 |

4. It is found that attackers had maximum neuroticism and liberos had less neuroticism scores and others in between
5. Among attackers, 73.3% of them were ambiversion and 26.7% of them were extraversion; among blockers, 86.7% of them were ambiversion and 13.3% of them were extraversion. In setters, 80% and 20% of them were found to be ambiversion and extra version, respectively. Among Liberos, 73.3% of them for ambiversion and 26.7% of them for were extraversion. In All-rounders, 80% of them were found to be ambiversion and 20% of them were extraversion. On the whole, 78.8% of them were ambiversion and 21.3% of them were extraversion
6. There was no significant association between position of the players and their extraversion, introversion, and ambiversion nature
7. Among attackers, 20.0% of them were ambiversion and 40.0% of them were extraversion; among blockers, 46.7% of them were ambiversion and 60.0% of them were extraversion. In setters, 46.7% and 53.35 of them were found to be ambiversion and extraversion, respectively. Among Liberos, 86.7% of them were ambiversion and 13.3% of them extrversion. In Allrounders, 60.0% of

them were found to be ambiversion and 40.0% of theme were extraversion. On the whole, 50.7% of them were ambiversion and 49.3% of them extraversion

8. In other words, there was a significant association between position of the players and their extraversion, introversion, and Ambiversion nature.

## DISCUSSION ON STUDY RESULTS

The reason for the present result may be the nature of the game volleyball and level of competition. The game volleyball demands extrovert players because the team player has to play untidy to achieve better performance. If all the players in a team were extrovert then the team has more integrity.

The results show as whole volleyball players were ambivert. The reason for this result may be the competition requirement of the game. During the game, the player has to adjust to the playing tempo and strategies of opponent then player as to exhibit their adjusting quality to playing situation. In this situation, ambivert quality helps the players to overcome opponents technique and tactics. Hence, the present result

obtained is true as analysed and compared to volleyball game situation.

## CONCLUSION

All the team game players required personality traits which help them during their competition. These personality traits directly or indirectly help the players of different games to perform better during the competition. We cannot neglect the role of psychological aspects in training and coaching the volleyball players. All sports persons need psychological knowledge to have control over the actions.

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## Research Article

# A comparative study on explosive power of volleyball and handball players of Mangalore University

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### ABSTRACT

Sports and games are the integral part of human life. Sports give special identification to persons particularly those who are participated state level, national level, interuniversity level, or international level competitions. The main purpose of this study was to find out the explosive power of volleyball and handball players of Mangalore University in the year 2021–2022. Research methodology is a way to analyze and evaluate the research problems very systematically. The data were collected through various tests such as standing board jump and vertical jump from the selected interuniversity volleyball and handball players. Scores obtained on explosive power by subjects were added separately and score sheets evaluated in accordance with the instruction laid down in the manual of the test. The collected data were analyzed by employed mean, standard deviation, and “t” test statistical techniques for further analysis. Explosive power variable of volleyball players in vertical Jump test was very good than handball players. Explosive power variable of volleyball players in standing broad jump test was very good than handball players.

**Keywords:** Comparative and players, Handball, Power, University, Volleyball

## INTRODUCTION

Sports and games are the integral part of human life. Sports give special identification to persons particularly those who are participated interuniversity, state level, national level, or international level competitions. Man needs to participate in physical activities to maintain good health. A game is a structured activity, usually undertaken for enjoyment and sometimes used as a competitive tool. The present study has taken into consideration of court game that is handball and volleyball. Court game is unique in the sense, that they are playing in a relatively small area and involve the handling of a ball or similar object and often an implement. Since court games often involve conditions during bouts of play at a vigorous rate, a high level of anaerobic endurance and also good jumping ability of great importance. The main purpose of this study was to find out the explosive power of volleyball and handball players of Mangalore University in the year 2021–2022.

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## Hypotheses

There would be a significant difference between volleyball and handball players on physical fitness (explosive power). There would be a significant difference between the game and different levels of achievement of volleyball and handball players on physical fitness (explosive power) variables.

## Objectives of the Study

The aim of this study was to study the influence of physical fitness (explosive power) variables in relation to playing ability of volleyball and handball players and to identify the predominant variables among the physical fitness (explosive power) in relation to the playing ability of both handball and volleyball.

## Limitations of the Study

The test was conducted during the off-session. Other criterion variables such as technical, tactical, psychological, various social, cultural, and economical differences, heredity and environmental factors, participants' diet and behavior, and the training program of the participants were not considered in the present study.

### Delimitations of the Study

The participants of the study were selected from the players who are participated in the interuniversity tournament for Mangalore University. The participants of the study were confined to 15 each volleyball and handball players. The age group of players was considered between 18 and 25 years. Only standardized tests standing broad Jump and vertical jump (explosive power) test conducted as testing procedure.

### Significance of the Study

The study may be useful to find out the importance of physical variables such as physical fitness (explosive power) on playing ability and physiological variables such as mean arterial pressure, aerobic power, resting pulse rate, and breath holding time of volleyball and handball players.

## METHODOLOGY

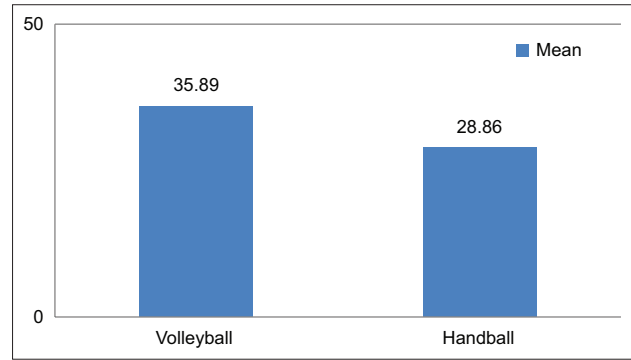
Research methodology is a way to analyze and evaluate the research problems very systematically. It is the scientific description of how a particular study has been carried out. A research design is the logical and systematic planning and direction of a piece of research. Research procedure is the most essential for any research work. The aim is to present a clear idea of the research procedure which was followed in this study. It is purely experimental based study.

## ANALYSIS AND INTERPRETATION OF DATA

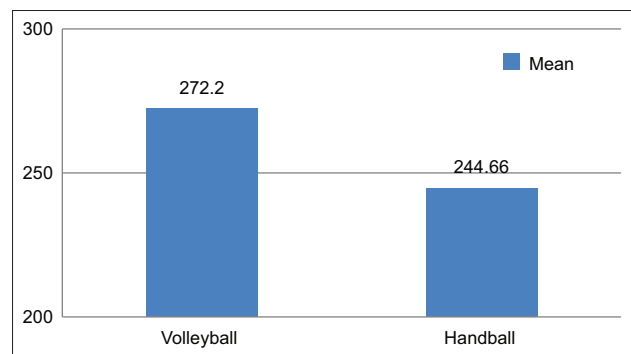
The data were collected from 15 male volleyball and handball interuniversity players, after the collection of data were analyzed by comparing the means and were again statistically analyzed by applying t-test to check the significant difference among selected physical test components. Therefore, separate tables and Graphs 1 and 2 have been presented for each physical test component. Each table gives the mean of both handball and volleyball players. Furthermore, the researcher can find the standard deviation of both handball and volleyball and also their mean difference is also been given in the table. The level of significance for the present study is kept at 0.05 level of significance in the calculation of “*t*” which is then compared with the calculated “*t*.”

Table 1 reveals that vertical jump scores mean value of handball players is 28.86 and the standard deviation is calculated handball players 1.55, respectively, the handball players data are again analyzed by applying “*t*” test. Then the calculated value of “*t*” is found as 1.32, which is less than tabulated “*t*” which is 2.02 at 0.05 level of significance.

Table 2 reveals that vertical jump scores mean value of volleyball players is 35.89 and the standard deviation is



**Graph 1:** Comparison of vertical jump scores among the volleyball and handball players



**Graph 2:** Comparison of standing broad jump scores among the volleyball and handball players

**Table 1: Vertical Jump scores among the Handball players**

| Variable      | Game     | Mean  | S.D. | ‘t’  |
|---------------|----------|-------|------|------|
| Vertical Jump | Handball | 28.86 | 1.55 | 1.32 |

Significant at 0.05 levels

**Table 2: Vertical Jump scores among the Volleyball players**

| Variable      | Game     | Mean  | S.D. | ‘t’  |
|---------------|----------|-------|------|------|
| Vertical Jump | Handball | 35.89 | 1.93 | 1.64 |

Significant at 0.05 levels

calculated volleyball players is 1.93, respectively, the volleyball players data are again analyzed by applying “*t*” test. Then the calculated value of “*t*” is found as 1.64, which is less than tabulated “*t*” which is 2.02 at 0.05 level of significance.

Table 3 reveals that standing broad jump scores mean value of handball players is 244.66 and the standard deviation is calculated handball players 13.46, respectively, the handball players data are again analyzed by applying “*t*” test. Then the calculated value of “*t*” is found as 1.38, which is less than tabulated “*t*” which is 2.02 at 0.05 level of significance.

**Table 3 : Standing Broad Jump scores among the Handball players**

| Variable            | Game     | Mean   | S.D.  | 't'  |
|---------------------|----------|--------|-------|------|
| Standing Broad jump | Handball | 244.66 | 13.46 | 1.38 |

Significant at 0.05 levels

**Table 4: Standing Broad Jump scores among the Volleyball players**

| Variable            | Game     | Mean  | S.D.  | 't'  |
|---------------------|----------|-------|-------|------|
| Standing Broad Jump | Handball | 272.2 | 10.93 | 1.53 |

Significant at 0.05 levels

**Table 5: Comparison of Standing Broad Jump scores among the Volleyball and Handball players**

| Variable   | Game       | Mean   | S.D.  | M.D   | 't'  |
|------------|------------|--------|-------|-------|------|
| Standing   | Volleyball | 272.20 | 10.93 | 27.54 | 2.02 |
| Broad Jump | Handball   | 244.66 | 13.46 |       |      |

Level of Significance=0.05

Table 4 reveals that standing broad jump scores mean value of volleyball players is 272.2 and the standard deviation is calculated volleyball players 10.93, respectively, the volleyball players data are again analyzed by applying "t" test. Then the calculated value of "t" is found as 1.53, which is less than tabulated "t" which is 2.02 at 0.05 level of significance.

Table 5 reveals that there is a difference between standing broad jump scores mean value of volleyball and handball players. Because the mean of volleyball players is 272.2 which is slightly greater than the mean of handball players which is 244.66 and therefore, the mean difference is 27.54 to check the significant difference between volleyball and handball players data that are again analyzed by applying "t" test. Before applying test, the standard deviation is calculated between volleyball and handball players which is 10.93 and 13.46, respectively, and then the calculated value of "t" is found as 2.02., which is equal than tabulated "t" which is 2.02 at 0.05 level of significance. Hence, the hypothesis which was given by the researcher is accepted. This is presented graphically in Figure 2.

## SUMMARY AND CONCLUSIONS

Physical fitness is to the human body what fine-tuning is to an engine. It enables us to perform up to our potential. Fitness

can be described as a condition that helps us look, feel, and do our best. The results of the study, with a complete overview of demographic information and data retrieved through the purpose of this study, were to A Comparative study on Explosive Power of Volleyball and Handball Players of Mangalore University. All data were entered into the statistical package for each research collection of score sheet data, including presentation of the data in tabular form.

Explosive power variable of volleyball players in vertical jump test was very good than handball players. Explosive power variable of volleyball players in standing broad jump test was very good than handball players.

## RECOMMENDATIONS

This type of study can be conducted on different college and university level students. The same study can be repeated to compare aerobic capacity, fat percentage, and body composition between different districts/states/rural and urban students. It is recommended that this study can also be conducted on national and international players.

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## Research Article

# Yoga – An oldest form of exercise for mental health and well-being in modern times

Ruma Biswas

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### ABSTRACT

**Objectives:** The aim and objectives of the study deal with the impact of yoga exercises, along with breathing and relaxation techniques one can achieve sound mental health and well-being. **Methods:** For this study, 30 people were chosen from different geographical locations age group ranges from 25 years to 76 years and the method used is qualitative studies. This study helps me to understand the true effectiveness of Yoga, Yoga mudra, and relaxation techniques impact on people who were suffering with stress and anxieties depression mild-to-moderate range, along with other lifestyle diseases. **Results:** After giving counseling sessions according to their particular problems, they were given Yogic exercises and relaxation techniques, a visible change is being observed in them from the 1<sup>st</sup> month onward; they seem happier, more connected, and contented with their lives than earlier. I have done this entire study during COVID periods, so no medical interventions were there at all. All are leading happy and healthy life now and they have included Yoga in their daily routine.

**Keywords:** Breathing techniques, Meditation, Mental health, Well-being, Yoga

## INTRODUCTION

Yoga is the oldest form of exercise that our ancestors lived and leaves for us to enjoy the pursuits and be blessed with good health. The origins of Yoga can be traced back to ancient India somewhere around 5000 years ago as the written texts suggest. The ancient yogic traditions were developed as a holistic practice comprised with physical posture (asanas), breath control (pranayama), and meditation (dhyana) which guides us an ethically principled and harmonious balanced life. By practicing yoga, one can achieve a quiet mind; positive mental health is a state of well-being in which every individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make positive contributions to his society. Yoga's aim is to create compassion within and a deep sense of unity and oneness with all forms of life as we all know through a flexible body, we gain a flexible mind. Well-being refers to the experience of health, happiness, and prosperity which includes good mental health high life satisfaction a sense of meaning or purpose, and ability to manage stress. Post-COVID mental health concerns

are escalating globally and our greatest loss while suffering from poor mental health is the inability to appreciate what we currently possess. Mind is where everything truly begins and ends our mental health determines how we look outside regardless of any materialistic belongings we should have a healthy mental state and to achieve that yoga is an accessible acceptable and cost-effective option for a harmonious mind and body connection.

An end number of studies have been conducted for the last four decades (1970 onward) that suggest that Yoga has a positive outcome for people of different ages to cope up with depression anxiety disorder, stress, behavioral disorders, ego management, conduct disorders, etc. Yoga improves emotional resilience and increased self-awareness, enhanced focus, and better sleep quality which were the primary factors for happiness and well-being. Hence, yoga practice is a low-risk, high-benefit approach to health and wellness in a holistic manner.

## HOW YOGA WORKS

Various research studies have been conducted on how yoga works on treatment, disease prevention, and health promotion its effectiveness on all the 11 systems running within our body (nervous system, cardiovascular system, endocrine

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system, etc.). Yoga postures are designed to release tension by stretching and pressurizing muscles, nerves, spine, glands, and internal organs. By these stretching blood circulation increases which stimulates the working of those muscles, most of them work on more than one aspect like if we consider spinal twisting asana benefits, they stimulate the spine, adrenal glands, liver, pancreas, and kidneys. As we find in Maharshi Patanjali's Yogasutra, "Yogascha chitta vritti nirodaha"... It means that yoga has the power to cure the vritti or cause of mind to.

Yoga is the holistic approach of well-being of individuals. Let us consider some of the common mental health issues which have been cured using yogic exercises, breathing techniques, and meditation only as I have mentioned earlier.

### **Stress Reduction**

First of all, we must have an idea what stress is? Although it is a medical condition, its definition is easily understood by any person clearly: Stress is a feeling of emotional or physical tension. It can come from any event or situation that makes you feel frustrated, angry, or nervous. It is our body's reaction to a challenge or demand due to that stressed people experience headaches, mild pain in any part of the body, sleeping difficulties, irritation, etc. Around an hour of yoga practice with relaxation and deep breathing, our parasympathetic nervous system gets stimulated/activated and in turn, it starts reducing the production of stress hormones and induced calmness. Stretching muscles in different parts of the releases endorphins which are a natural mood-boosting hormone, so it helps reduce stress. The stretching of muscles through body posture during asanas releases built-up tension in the muscles, particularly in the neck, shoulder, and back where stress accumulates generally. The release of these accumulated tensions helps that one reduces mental and emotional stress.

Relaxation techniques that we use in Yoga are slow and deep breathing which activates the body's relaxation response and calm the mind. After asana and pranayama or breathing techniques come the meditation part, yes, mindfulness meditation encourages being fully present in the moment and focusing on the breath, it redirects thoughts away from stressors and brings a state of lasting calmness. Yoga connects mind and body as a result of this mind-body connection people become self-aware and self-conscious and gained insight into their thoughts and feelings which helps them focus on positive thoughts and alleviating the negative one.

### **Anxiety and Depression**

Anxiety is a type of mental health condition and the prominent symptoms include nervousness, panic and fear, sweating, and rapid growth of heartbeats. Our task here is to use Yogic exercises and breathing techniques to overcome these symptoms and further prevent such occurrences. Here using slow and steady yoga poses (discussing below) reducing heart

rates and bringing calmness will be the priority. Sometimes, hormonal regulation balances the anxiety symptoms such as upside-down poses and restorative poses by stimulating parasympathetic nervous system. By regular yoga exercises, one prioritizes his/her physical and mental well-being which increases self-care and self-reflection, and it gives a sense of self-awareness and self-compassion by developing a healthier self-perception. With positive self-perception individuals withstand emotional challenges and setbacks. Self-compassion is very necessary when an individual faces challenging situations. Practicing Yoga in a supportive community foster social connections and a sense of belonging. This connection supports individuals build resilience.

### **Depression**

It is a mood disorder that causes a persistent feeling of sadness and loss of interest, generally, depression results from a mix of events and factors, an upsetting or stressful life event, such as bereavement, divorce, illness, redundancy, and worrying physical problems, childhood experiences, styles of thinking, drugs, and alcohol use. Yogic view is that depression is a sign of low prana as prana is responsible for enthusiasm. Regular practice of Yoga helps to increase the prana levels thereby reducing the symptoms of depression.

## **HERE ARE SOME OF THE ASANAS FOR STRESS ANXIETY AND DEPRESSION; LET US DISCUSS IN DETAILS**

### **Sukhasana or Easy Pose**

It is a meditative asana generally by sitting comfortably on the floor legs crossed while sitting and the spine erected. Comfortable sitting calms down the mind with giving you the feeling of being rooted as if nobody could unsettle you.

### **Balasana or Child Pose**

Child pose is a very relaxing pose, it soothes our spinal column by giving us completely relaxation while being grounded. In times of anxiety and distress, the feeling of being supported by the soil brings mental peace.

### **Adho Mukha Svanasana**

This posture boosts blood flow to our brain while stretching spine and strengthening arms, shoulders, and legs. This gives a flow to our prana by increasing circulation to these areas bringing mental clarity which helps us dealing with anxiety and stress.

### **Sarvangasana or Shoulder Stand**

This asana enhances blood flow to the brain which increases mental clarity and reduces negative feelings, there are some contraindications before doing this asana for the patient of neck injury or high blood pressure, menstruating.

### **Savanna or Corpse Pose**

This is the last asana at the end of any yoga sessions to allow us to absorb all of the energy and good vibes that we have received throughout our yoga sessions this posture helps us releasing stress, anxiety, and depression by giving an opportunity to relieve our life after each and every session of yoga.

## **HERE ARE SOME OF THE PRANAYAMA WHICH**

### **Anulom Vilom or Alternate Nostril Breathing**

This is one of the easiest and essential breathing exercises in yoga which involves conscious breathing regulation by inhaling through one nostril while keeping the other closed. The breath is retained for a short while and then exhaled out through the other nostril. We need to repeat this process for a few minutes to procure the best results. The aim of this breathing exercise is cleansing, it has numerous physiological and mental health benefits. When you breathe with more awareness, you allow your body to fully oxygenated, it induces a calm mind and filters toxins from the body. This pranayama eases stress, fear, anxiety, and balances a person's emotions with improved concentration and cognitive functioning.

### **Bhramari Pranayama**

The very name is being derived from the black Indian bee called Bhramari, the exhalation in this pranayama resembles the typical humming sounds of a bee, which explains why it is called so. This pranayama was effective, and it can instantly calm down the mind. It is one of the best breathing exercises to free the mind from agitation, anxiety, and frustration to a great extent. Bhramari relieves cerebral tension and reduces blood pressure it also eases insomnia as it induces a meditative state by harmonizing the mind and directing the awareness inward which brings bliss.

After pranayama comes he mudras which are equally powerful to eases the mind and like yoga practices, we do not need any specific place or time, or state of mind to perform the mudras. First, we will talk about.

### **Jnana Mudra**

Touching the tips of index finger and thumb forms the jnana mudra, it needs just a feather touch. It energizes the brain neurons, removes tension, and stress reduces anger. It is a philosophical vision that mudra joins the body and mind or soul. This is otherwise known as Dhyana mudra.

### **Vyana Mudra**

Bend the index and middle finger to touch the tip of thumb, and touch gently. This mudra improves circulatory system of

our body regulates blood pressure, activates energy sources in the body, and eliminates tension and depression.

## **AT LAST MEDITATION OR GUIDED MEDITATIONS**

Guided meditation brings our attention to the present moment and develops mindfulness and the ability to focus here and now. Guided meditation helps managing stress, anxiety, depression, and mental health issues.

All these above-mentioned yoga asanas must be done in the presence of a trained yoga instructor or therapist and should not be done by referring any social media platforms or YouTube to avoid injuries or other related problems.

The concluding words from the Bhagavad Gita Yoga as “samatvam” meaning that Yoga is equanimity at all levels which means Yoga can brings a perfect state of health wherein physical homeostasis and mental equilibrium occur in a balanced and healthy way.

The entire study was done by me during COVID-19 period (during lockdowns totally online) and the results are very positive and show Yoga curative and preventive powers serve mankind in a holistic, cost-effective, and sustainable way though ancient in approach but modern in each and every sense.

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## Research Article

# A study on physical fitness components of cricket players university and college level

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### ABSTRACT

The purpose of the study was to compare the talent-associated physical fitness components of cricket players at extraordinary level of competition. An organization of 40 topics aged 21–28 years participated within the study. The purposive sampling approach turned into used to gain the objectives of the study. They were similarly divided into agencies of 20 every (i.e.,  $N_1 = 20$ ; college and  $N_2 = 20$ ; university). The unpaired t-test was used to discover the good-sized differences among university and college male cricket gamers. To check the hypotheses, the level of significance becomes set at 0.05. The effects determined massive variations among university and university male cricket gamers on the variables, that is, response time, stability strength pace agility, and coordination and university level gamers completed higher than university game enthusiasts on all the variables.

**Keywords:** Physical fitness variables, Cricket players, University, College level

### INTRODUCTION

Cricket is an undertaking wherein fitness is historically no longer idea of as very essential. The importance of health in any exercise cannot be underlined. The healthy you are the better you could play. However, cricket is one such recreation which checks your game competencies, intellectual power, stamina, and bodily persistence as nicely. The distinct test playing nations have rightfully located more emphasis on fitness currently and are reaping the benefits. With the creation of in the future cricket and greater recently 20, the game has long past through major modifications and the bodily wishes made on a cricketer's body have additionally advanced dramatically.

Depending on the model of the game being completed and the position of the participant in the group, the significance of health will range: The health necessities of a fast bowler might be greater and also distinctive than that of an opening batsman, and 1-day cricket may be greater disturbing than a check in shape.

For the reason that cricket is a set recreation, all the gamers are required to be in motion. It takes plenty of stamina for bowlers

to throw the ball rapid, correct, and without overstepping. The fielders should be alert and at vigil all the time. They want to dash, chase the leather-based, and make a dive to prevent the ball earlier than it crosses the boundary line. The batsman must require the stamina to run constantly among the wickets and the energy needed to execute huge snap shots. The umpires too require masses of patience and flexibility to perform their obligations. However, the most “fittest” player in a cricket game is actually the wicket-keeper. Chirping and hoping at the back of the stumps, a wicket-keeper has to constantly stand on his feet. A wicket-keeper shows an exceptional degree of physicality.

Cricket is one of the most famous sports activities in India. It is far a game played using both male and lady throughout many age agencies and tiers of participation from leisure to professional sports. In India, the sport also is performed in any respect stages from beginner to professional competitions. India has been safely represented at both tiers, from intercollegiate to world championship, in both junior and senior ladies and men classes.

Cricket is a multi-faceted game with a couple of formats based totally around the usual of play, the desired degree of ritual and the time to be had. A critical department in terms of expert cricket is between suits restricted by time wherein

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**Table 1: Details of physical fitness components, tests**

| S. No. | Physical fitness components | Tests                          | Unit of measurement          |
|--------|-----------------------------|--------------------------------|------------------------------|
| 1.     | Reaction time               | Nelson hand reaction time test | In 1/10 <sup>th</sup> of sec |
| 2.     | Balance                     | Stork balance stand test       | In 1/10 <sup>th</sup> of sec |
| 3.     | Power                       | Standing broad jump            | Meters                       |
| 4      | Speed                       | 30-yard dash                   | In 1/10 <sup>th</sup> of sec |
| 5      | Agility                     | Illinois agility test          | In 1/10 <sup>th</sup> of sec |
| 6      | Coordination                | Eye-hand coordination test     | In 1/10 <sup>th</sup> of sec |

**Table 2: Mean, standard deviation, standard error of the mean, t-value, and P value of cricket players at different levels of competition**

| Variables     | Mean       |         | SD         |         | SEM        |         | t-value | P-value |
|---------------|------------|---------|------------|---------|------------|---------|---------|---------|
|               | University | College | University | College | University | College |         |         |
| Reaction time | 0.21       | 0.23    | 0.023      | 0.009   | 0.005      | 0.002   | 2.13*   | 0.0394  |
| Balance       | 27.45      | 24.10   | 5.48       | 4.81    | 1.23       | 1.08    | 2.05*   | 0.0469  |
| Power         | 2.28       | 2.03    | 0.31       | 0.43    | 0.07       | 0.09    | 2.02*   | 0.0499  |
| Speed         | 6.72       | 7.03    | 0.57       | 0.28    | 0.12       | 0.06    | 2.09*   | 0.0425  |
| Agility       | 6.71       | 9.24    | 0.66       | 1.31    | 0.14       | 0.29    | 7.69*   | 0.0001  |
| Coordination  | 22.45      | 28.75   | 3.90       | 3.90    | 0.87       | 1.19    | 4.28*   | 0.0001  |

the groups have innings a piece, and people restricted through number of overs, in which they have got unmarried innings each. The former, known as first-rate cricket, has duration of 3–5 days (there have been examples of “timeless” matches too); the latter, known as limited over cricket due to the fact each team bowls a limit of normally 50 or 20 over, has a deliberate length of someday most effective. Usually, innings fits have at least 6 h of gambling time every day. There are commonly formal intervals on each day for lunch and tea with short casual breaks for drinks. There is additionally a short c programming language between innings.

Cricket has emerge as has one of the most popular games in the international and of all the primary games in India, it is the simplest one which has been jealously preserved using all people who participant supported. Physical variables are the maximum critical contributing factors for better performance in all sports activities and video games so are in cricket. The game of cricket calls for a substantial quantity of physical fitness and mastery of competencies. A cricket participant needs to own particular velocity, strength, power, agility, flexibility, and staying power in abundance so as to learn and master the techniques of the game. The present day needs in someday competitions, particularly for schooling of fast bowlers, batsman, fielders, and wicket-keepers ok; emphasis is given for the improvement of physical traits. Consequently, the cutting-edge fashion in the subject of cricket is to evaluate the related components efficaciously as part of overall frame and size of every cricketer and interpret how ways every of those components are beneficial within the performance of a cricketer underneath in shape circumstance.

## METHODOLOGY

A complete 40 (N = 40) male subjects aged among 21–28 years had been selected for this study. The purposive sampling approach became used to reap the goals of this observe. All the topics, after having been knowledgeable approximately the goal and protocol of the look at, gave their consent and volunteered to take part in this study. They were similarly divided into organizations of 20 each (i.e., N<sub>1</sub> = 20; university and N<sub>2</sub> = 20; university).

## RESULTS AND DISCUSSION

Because the historical times, it is been believed that an appropriate frame is vital to acquire achievement specially sports activities. Judging the overall performance of the human frame through its size, shape, and form has been a subject of extremely good difficulty. Physical and physiological additives are essential factors that have contributed to the achievement of national and global competition in sports activities sports. Team cricket, such as numerous other ball video games, calls for now not best technical and tactical capabilities; however, additionally extraordinary deal of physical fitness.

The evaluation of facts pertaining to dating of bodily health variables with sports activities sports performance among cricketers observed out awesome huge courting in regards to the sub-variables; stomach energy patience, agility, explosive leg strength, tempo, and cardiovascular staying energy. However, insignificant relationship among sports activities



overall performance and motor fitness sub-variable; shoulder strength was observed. The nice significant relationship suggests that motor fitness variables are contributing difficulty in immoderate level cricket normal overall performance. An exquisite cricketer requires an excessive level of physical fitness further to different elements for generating excessive standard overall performance.

The final end result of examine might be due to the reality that the cricket performance is complex phenomena and direct bio-made from motor actions. Hence, the advanced diploma of belly strength patience, agility, explosive leg power, velocity, and cardiovascular staying power is vital to perform the cricketing abilities effectively with requisite grace, accuracy, and prolonged period. The insignificant affiliation among motor health issues; shoulder strength endurance and cricket overall performance become observed as the shoulder energy persistence is likewise an indispensable difficulty of cricket performance, mainly among pace bowlers; however, the gift takes a look at modified into performed on batsmen, all-rounders and spin bowlers which may have hindered the affiliation among those two variables. The findings of the existing are in step with the findings in truth explicated that motor health had super dating with the playing capability of the cricket game enthusiasts.

## CONCLUSION

On the concept of the findings, it could be concluded that university players are better in standard talent-associated physical fitness than their counterpart collegiate as they scored

better determined on expertise-associated fitness components, namely, reaction time, stability, power, speed, agility, and coordination.

It is far concluded that better physical fitness is related to better sports activities usual performance among cricketers. The physical components are bad factors that contribute closer to higher ordinary performance in cricket. therefore, it is miles advocated that coaches, sports running shoes, and gamers worried in the machine of sports activities sports education have to take utmost care of physical improvement of their sports activities humans because it has already been mounted with the useful resource of numerous researches that the variable in question is a vital element for advanced sports activities overall performance.

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## Research Article

# Relationship between sensory-motor perception and backhand short serve in badminton

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### ABSTRACT

The aim of this study was to find out the relationship between sensory-motor perception and backhand short serve in badminton. To achieve the purpose of the study, the investigator randomly selected 30 badminton players who participated at intercollegiate level badminton competitions in the age group of 18–22 years from different colleges in Andhra Pradesh. The selected subjects were assembled in a hall while they were in the coaching camp. Measurements on backhand short serve were determined by three experts while the subjects were at the competition. The experts evaluated each subject's backhand short serve ability for a maximum of 40 marks taking into consideration of grip and racket position, posture and foot position, holding the shuttlecock, hitting action, and effect. To measure the sensory-motor perception of the badminton players, the subjects were administered a distance perception jump test, pedestrian kinesthetic test (12" side step), pedestrian kinesthetic test of variable linear space, horizontal linear space test, and vertical linear space test and scores obtained. The results of this study proved that backhand short service in badminton was significantly related with the selected sensory-motor perception variables, namely, distance perception test ( $r: -0.534$ ), pedestrian kinesthetic test ( $r: -0.642$ ), pedestrian kinesthetic variables of linear space ( $r: -0.475$ ), horizontal linear space test ( $r: -0.317$ ), and vertical linear space test ( $r: -0.575$ ). It was concluded that sensory-motor perception variables were significantly related to the backhand short service skill of badminton players.

### INTRODUCTION

"The application of sports science to coaching has become the single most important factor behind the rapid advances made in international sports performances during the past 20 years. Biomechanics is the physics of human motion and the factors that cause this movement. It explains how sport technique may be analyzed and the resulting information used to improve athletic performance. More importantly, biomechanics explains the inter-relationships between the athlete's structure, physical capacity, and his/her unique technique. Incorporating the latest principles and practices of biomechanics will assist high-level coaches and sport scientists prepare their athletes for competition" (Ackland *et al.*, 2009). Biomechanics in badminton has been studied with relation to power strokes, forehand overhead jump smash, backhand overhead strokes, and forehand serves.

"Any mathematical movement requires a certain degree of muscular strength, a period of time, and extent. The interaction of these variables leads to saving effort, energy, and quality of motor performance. Therefore, the kinetic sense of strength means the athlete's ability to demonstrate the appropriate amount of muscle strength needed for specific motor performance. As for a kinesthetic, sense of time is the athlete's ability to determine the time of movement or effectiveness. Concerning a kinetic sense of distance, it is the athlete's ability to determine the distance covered during performance" (Ali, 1993). "What distinguishes a badminton game, is the convergence of mental abilities with physical abilities. The game depends on elements of strength and speed as well as other fitness elements. While badminton weight requires large strength in the forehand smash. It is performed through mental ability, big burden and participation of the muscles, balance nervous, and muscular systems, which in turn leads the player to mastery of the skill" (Al-Khalaf, 2001). "Perception of sensory-motor is important in the game of badminton through a sense of muscle effort, resistance, and speed of movement. For that, the player should possess a high ability to perceive numerous variables such as distance, time, strength, and direction. However, developing

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these variables will help identifying most of the stimuli that the player faces, and enable him/her to choose the appropriate response to the situation.” (Abdel *et al.*, 2015). Due to its frequent use, the importance of this study lies in raising the performance of offensive movements (forehand smash). Moreover, “it was noticed that there is a lack of interest and focus among various of teachers on sensory-motor perception within the curricula of skills education. Hence, a training program containing exercises with a characteristic repetition and continuity was suggested, which it enables the added strength to be utilized during the transition process between body parts. Adding to that, the possibility of employing it on demand and the ability to benefit from it in reducing excessive tensile movements help to involve large torso muscles, arms, and forearms. Which in turn, it provides the appropriate speed and strength for performing forehand smash” (Al-Haliq, 2020).

Hardan and Khalil (2013) conducted a study aimed at identifying the relationship between agility and the explosive ability of the two arms precisely, by the skill of the stroke smash of the badminton. It found that the agility and explosive power of the arms affect the accuracy of the smash with the feather.

Muhammad *et al.* (2012) identified the relationship between the sensory-motor perception with the accuracy of the performance of some offensive movements in the fencing sport, for students of physical education and revealed that there is a correlation between sensory abilities and offensive skills. Abdel *et al.* (2015) carried a study on the effect of The Diversity of Variable and Fixed Practice in Developing Sensory-Motor Perception Response Speed and Accuracy of The Forehand and Backhand Drop-in Badminton Skills of Players and found the sensory-motor perception exercises and rapid response helped in developing the accuracy of the forehand and the backhand drop-in badminton skills.

Having documented the importance of learning the application of sports science to coaching, the application of human motion, and the factors that cause this movement need to be scientifically studied. In detailing the human motion, researches found sensory-motor perception plays key role. In this study, the investigator was interested to find out whether selected sensory-motor perception tests have any relationship with the badminton backhand shot serve skill.

## METHODOLOGY

To achieve the purpose of the study, the investigator randomly selected 30 badminton players who participated at intercollegiate level badminton competitions in the age group of 18–22 years from different colleges in Andhra Pradesh. The selected subjects were assembled in a hall while they were in the coaching camp. Measurements on backhand short serve were determined by three experts while the subjects were at

the competition. The experts evaluated each subject’s backhand short serve ability for a maximum of 40 marks taking into consideration of grip and racket position, posture and foot position, holding the shuttlecock, hitting action, and effect. To measure the sensory-motor perception of the badminton players, the subjects were administered a distance perception jump test, pedestrian kinesthetic test (12” side step), pedestrian kinesthetic test of variable linear space, horizontal linear space test, and vertical linear space test and scores obtained.

### Data Collection and Statistical Analysis

#### *Distance perception jump test*

Two parallel lines of 24 inches apart were drawn on the floor. The subject was instructed to sense the distance without a practical trial. After blindfolding, the subject was asked to jump from behind one line toward the other line and try to land on the heels as close as possible to the line. The scores were in inches that were measured to the nearest inch between the heels and the target line.

#### *Pedestrian kinesthetic test (12” side steps)*

The subject was asked to stand erect heels touching the ground. After blindfolding or closing the eyes, the subject was asked to separate the heels so that the medial side of the heels was 12 inches apart. The deviation from the preferred distance was the score measured to the nearest inch.

#### *Pedestrian kinesthetic test of variable linear space*

A line was drawn on a wall 14 inches above the floor. After blindfolding, the subject was instructed to place the bottom edge of his leg on top and parallel to the line. The deviation from the line on the wall was measured with a yardstick to the nearest inches.

#### *Horizontal linear space test*

The yardstick was fixed horizontally on the wall in front of the seated subject at an approximate height of the eye level of the subject. The subject was helped to touch the 18-inch mark and sense its position without a practice trial. After blindfolding, the subject was instructed to point the mark indicated. The deviation from the desired mark was recorded to the nearest inches.

#### *Vertical linear space test*

The yardstick was fixed vertically on a wall in front of the seated subject at a height when the 16-inch mark was made above the eye level of the average tall subject. The subject was instructed to look at the 16-inch mark and sense its position without a practical trial. The subject was then blindfolded and instructed to point to the mark indicated. The deviation from the desired mark is recorded to the nearest inch.

Three trials were given and total of three trials was the score of the subject for each perception test. The obtained scores on sensory-motor perception were related with the scores of

**Table 1: Descriptive statistics showing backhand short serve and sensory motor perception variables**

| S. No. | Variables                                       | n  | Mean  | SD   | Range |       |
|--------|---|----|-------|------|-------|-------|
|        |   |    |       |      | Min   | Max   |
| 1      | Backhand short serve                            | 30 | 29.57 | 3.09 | 24.00 | 34.00 |
| 2      | Distance perception jump test                   | 30 | 13.16 | 1.87 | 8.50  | 16.50 |
| 3      | Pedestrian kinesthetic test (12" Side Steps)    | 30 | 9.18  | 2.16 | 5.50  | 14.00 |
| 4      | Pedestrian kinesthetic of variable linear space | 30 | 7.07  | 2.00 | 2.00  | 10.50 |
| 5      | Horizontal linear space test                    | 30 | 5.73  | 1.37 | 3.50  | 9.00  |
| 6      | Vertical linear space test                      | 30 | 4.48  | 0.97 | 3.00  | 6.50  |

**Table 2: The relationship between backhand short serve and selected sensory-motor perceptions**

| S. No. | Variables                                       | n  | Mean  | Obtained 'r' |
|--------|---|----|-------|--------------|
|        | Backhand short serve versus                     | 30 | 29.57 |              |
| 1      | Distance perception jump test                   | 30 | 13.16 | -0.534*      |
| 2      | Pedestrian kinesthetic test (12" Side Steps)    | 30 | 9.18  | -0.642*      |
| 3      | Pedestrian kinesthetic of variable linear space | 30 | 7.07  | -0.475*      |
| 4      | Horizontal linear space test                    | 30 | 5.73  | -0.317*      |
| 5      | Vertical linear space test                      | 30 | 4.48  | -0.565*      |

\*Significant at 0.05 level. Required "r" value df (1,29): 0.301

backhand short serve scores related using statistical application Pearson correlation coefficient.

## RESULTS

## DISCUSSION

The relationship between agility and the explosive ability of the two arms precisely, by the skill of the stroke smash of the badminton was done by Hardan and Khalil (2013) The researchers found that there was a statistically significant correlation between agility and the explosive ability of the arms, with the precision of the stroke smash of the badminton. The relationship between the sensory-motor perception with the accuracy of the performance of some offensive movements in the fencing sport, for students of physical education was studied by Muhammad *et al.* (2012) The researchers assumed a significant relationship between the study variables.

The findings of this study proved that backhand short service in badminton was significantly related with the selected sensory-motor perception variables, namely, distance perception test ( $r: -0.534$ ), pedestrian kinesthetic test ( $r: -0.642$ ), pedestrian kinesthetic variables of linear space ( $r: -0.475$ ), horizontal linear space test ( $r: -0.317$ ), and vertical linear space test ( $r: -0.575$ ). Thus, the findings of this study were in agreement with the researches done by Hardan and Khalil (2013) and Muhammad *et al.* (2012).

## CONCLUSION

Sensory-motor perception variables were significantly related to backhand short service skill of badminton players.

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## Research Article

# Effect of selected psychomotor drills on the performance of volleyball players in Visakhapatnam at Andhra Pradesh

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### ABSTRACT

This investigation was devoted to find out the effect of selected psychomotor drills on the performance of volleyball players. Forty men volleyball players, who represented their colleges in intercollegiate level matches in the age group of 19–25 years, were randomly selected from different colleges in Visakhapatnam at Andhra Pradesh. The subjects were randomly divided into two groups, experimental and control, consisting of 20 subjects in each group. Before the experimental treatment, volleyball performance of both groups was measured of their attacking ability and blocking abilities which formed initial scores. The experimental group underwent 12 weeks of psychomotor performance skills. The psychomotor performance of selected skill drills was taught to the subjects following principles of imitation, manipulation, precision, articulation, and naturalization. After the demonstrating and practicing sessions of the selected skill drills, the subjects in the experimental group were asked to undergo psychomotor drills for a period of 12 weeks. The pre- and post-test scores were analyzed through two-group analysis of covariance and it was found that selected psychomotor performance skills significantly contributed for the improvement of volleyball performance attacking ability and blocking ability of volleyball players. It was concluded that psychomotor skills significantly contributed for the improvement of volleyball performances attacking and blocking.

**Keywords:** Attacking, Blocking, Psychomotor drills, Volleyball performance

### INTRODUCTION

Traditional approaches to psychomotor training in sports focus on developing motor (production) skills first with recognition skills added later, often in the form of full-skill practice such as a football scrimmage. Newer theories of training psychomotor performance in sports favor decision training over behavioral training (Vickers, 2007). They advocate incorporating recognition skills earlier in the acquisition and practice of psychomotor skills, for instance having a quarterback practice reading defenses while practicing footwork drills. However, while whole-task practice is generally desirable, it can also be beneficial to separate production and recognition skills for the sake of targeted training activities that may be delivered in approximately the same time frame but that are optimized for either the psycho or the motor part. This approach to training psychomotor performance skills is based on the simple but profound notion that recognition and

production components can be decoupled for targeted training and then recoupled for transfer to performance. The approach to training psychomotor performance skills is based on sports science research showing that experts' performance advantage over skilled but less expert performers often lies in the area of recognition skills rather than production skills and, further, that recognition skills can be targeted for training that then leads to improved performance of the overall skill (Williams and Ward, 2003). The recognition training approach has far-reaching implications for training psychomotor performance skills beyond sports, especially those that are typically associated with simulator-based training such as aviation, surgery, and use-of-force in law enforcement and the military (Fadde, 2007).

Psychomotor performance skills involve decoupling the conjoined cognitive and motor domains for targeted training. Psychomotor performance skills typically include two types of component skills: Production of motor actions and recognition of environmental conditions that trigger actions. Production and recognition skills are often intertwined in a seamless cycle of adaptive action that appears effortless when observed in an

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expert performer – whether that is a surgeon performing an arthroscopic ligament repair, a head sawyer segmenting a log to maximize the lumber footage, or a linebacker in American football knifing into the backfield to make a tackle-for-loss. Despite the intertwined nature of the production and recognition components of psychomotor performance, there are benefits to keeping them artificially separated for the sake of targeted training. Actually, it is quite typical of psychomotor training approaches to isolate and target production skills for training, often using behavioral principles of chaining small, sequential steps or shaping a skill sequence from simple to complex.

Volleyball has developed into a highly competitive sport which requires a high level of physical, physiological, and psychological fitness. The game at a high level of competition requires quicker sudden movements and fast reaction. Volleyball matches have no time limit and matches can last for several hours, if the teams are evenly matched. Successful play in volleyball is not the outcome of power alone but it is the product of the combined display of power and tactical abilities. Modern game of volleyball is characterized by accuracy, concentration, and cleverness. (Sharma, 1986) There are periods of significant muscular activity in alternation with periods of relative relaxation intensity of work. During the time of play, the intensity of play oscillates from moderate to maximum. The time playing approaches 3 h during which intensity increases to a points where pulse rate reaches 200 beats/min and weight loss goes up to 2.5–3 kg. (Ktesher, 1986) In every tactical move in volleyball, one depends on teamwork and the individual skills, good passing, setting, spiking, jumping, controlling the ball, participation and speed to the ball, and keeping the eyes on the ball. Tactics will succeed only through individual fundamental skills and with players thinking as a team (Men's Volleyball Association, 1974).

The sports scientists and cognitive psychologists who are conducting recognition training programs are beginning to investigate instructional design questions that are of interest to teachers, trainers, and instructional designers – and serve as a model for instructional design research and practice. For example, studies have investigated the use of explicit or implicit instruction (Smeeton *et al.*, 2005) and internal or external focus of attention (Castaneda and Gray, 2007). Sports provide a natural context to draw from in designing training of psychomotor skills. It also provides a rich test bed for research and training in psychomotor learning and performance, in part because athletes and coaches have a “culture of practice” (MacMahon *et al.*, 2007) that other professions do not have and partly because performance is so much more clearly observable and measurable in sports. However, the implications of this line of research make it worth investigating as a training approach in a wide range of domains (Fadde, 2007). Hence, this investigation was devoted to find out the effect of selected psychomotor drills on the performance of volleyball players.

## METHODOLOGY

Forty men volleyball players, who represented their colleges in intercollegiate level matches in the age group of 19–25 years, were randomly selected from different colleges in Visakhapatnam at Andhra Pradesh. The subjects were randomly divided into two groups, experimental and control, consisting of 20 subjects in each group. Before the experimental treatment, volleyball performance of both groups was measured of their attacking ability and blocking abilities which formed initial scores. The experimental group underwent 12 weeks of psychomotor performance skills. The psychomotor performance of selected skill drills was taught to the subjects following principles of imitation, manipulation, precision, articulation, and naturalization as presented in Table 1. After the demonstrating and practicing sessions of the selected skill drills, the subjects in the experimental group were asked to undergo psychomotor drills for a period of 12 weeks.

Immediately after the experimental period both groups were measured of their performance in volleyball, namely, attacking and blocking abilities which formed the final scores. The difference between the initial and final scores on volleyball performance was considered the effect of psychomotor performance skills and the obtained data were subjected to statistical treatment using two group analysis of covariance. In all cases, 0.05 level was fixed to test the hypothesis.

## RESULTS

The pre, post, and adjusted means on volleyball performances attacking and blocking are presented through Figures 1 and 2 for better understanding of the results.

## DISCUSSION

Psychomotor fitness plays an important role in everyday life activities of human being. It depends on mental processes as well as on peripheral elements of the movement system. Psychomotor fitness plays a significant role in volleyball

**Table 1: Psychomotor drills schedule for experimental group**

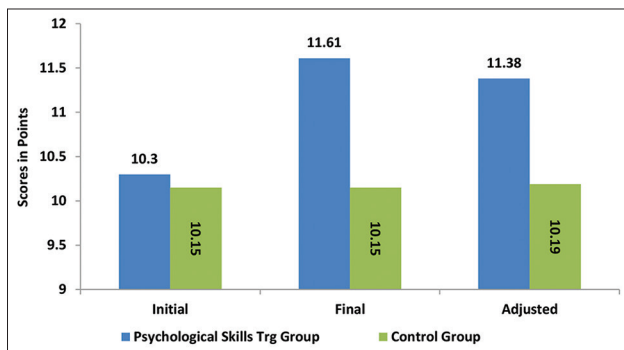
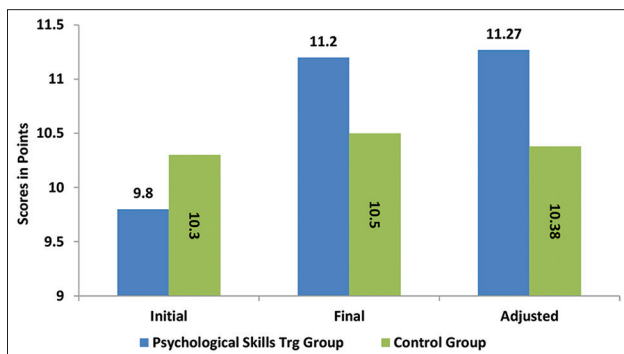
| Name of exercise      | Repetitions |              |              |
|-----------------------|-------------|--------------|--------------|
|                       | I–IV weeks  | V–VIII weeks | IX–XII weeks |
| Toss and pass         | 5 mts       | 6 mts        | 7 mts        |
| Wall hitting          | 5 mts       | 6 mts        | 7 mts        |
| Wall blocks           | 5 mts       | 6 mts        | 7 mts        |
| 1 to 1 setting drills | 5 mts       | 6 mts        | 7 mts        |
| Line passing          | 5 mts       | 6 mts        | 7 mts        |
| Progressive serving   | 5 mts       | 6 mts        | 7 mts        |

Rest of 1 min was given between one drill to another

**Table 2: Results on calculation of analysis of covariance on selected volleyball performance between experimental and control groups**

| Calculation of analysis of covariance on attacking ability |                    |               |                    |                |    |              |            |
|--|--------------------|---------------|--------------------|----------------|----|--------------|------------|
|  | Experimental group | Control group | Source of variance | Sum of squares | df | Mean squares | Obtained F |
| Pre-test mean  | 10.3               | 10.2          | Between            | 0.2            | 1  | 0.23         | 0.26       |
| SD   | 0.66               | 1.14          | Within             | 32.8           | 38 | 0.86         |            |
| Post-test mean   | 11.7               | 10.2          | Between            | 22.5           | 1  | 22.50        | 23.05*     |
| SD   | 0.99               | 0.99          | Within             | 37.1           | 38 | 0.98         |            |
| Adjusted post-test mean                                    | 10.19              | 11.61         | Between            | 20.3           | 1  | 20.26        | 25.31*     |
|  |                    |               | Within             | 29.6           | 37 | 0.80         |            |
| Mean diff  |                    |               |                    |                |    |              |            |
| Calculation of analysis of covariance on blocking ability  |                    |               |                    |                |    |              |            |
| Pre-test mean  | 9.8                | 10.3          | Between            | 2.5            | 1  | 2.50         | 1.329      |
| SD   | 0.9                | 1.7           | Within             | 71.5           | 38 | 1.88         |            |
| Post-test mean   | 11.2               | 10.5          | Between            | 5.6            | 1  | 5.63         | 6.26*      |
| SD   | 1.0                | 0.9           | Within             | 34.1           | 38 | 0.90         |            |
| Adjusted post-test mean                                    | 11.27              | 10.38         | Between            | 7.5            | 1  | 7.50         | 9.49*      |
|  |                    |               | Within             | 29.2           | 37 | 0.79         |            |
| Mean diff  | 1.45               | 0.20          |                    |                |    |              |            |

Required  $F_{(0.05, 1, 38)} = 4.08$ , \*Significant

**Figure 1:** Bar diagram on initial, final, and ordered adjusted means on attack**Figure 2:** Bar diagram on initial, final, and ordered adjusted means on block

since during the game great changes in workload occur as well as frequent changes in game situations (Tan, 2007). The results presented in Table 2 proved that 12 weeks of psychomotor performance skill significantly improved volleyball performance skill, attacking, as the obtained F value on adjusted means was 25.31, which was greater than the required F value 4.08 to be significant at 0.05 level.

Similarly, the results presented proved that there was a significant improvement in blocking performance of volleyball players due to 12 weeks of psychomotor performance skills as the obtained F value of 9.49 on adjusted means was greater than the required table F value of 4.08 to be significant at 0.05 level.

Hence, it was found that selected psychomotor performance skills significantly contributed for the improvement of volleyball performance attacking ability and blocking ability of volleyball players.

## CONCLUSION

Psychomotor skills significantly contributed for the improvement of volleyball performances attacking and blocking.

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## Research Article

# Effects of 12 weeks of combined circuit training with yogic practices, circuit training, and yogic practices on selected agility

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### ABSTRACT

To achieve this purpose, eighty high school level volleyball players ( $n = 80$ ) who were studying in school were selected randomly as subjects from High schools of Guntur District, Andhra Pradesh, India. Their age was between 13 and 17 years. The selected players ( $n = 80$ ) were divided into four equal groups of twenty each. Group I underwent combined circuit training with yogic practice group (YPG), Group II underwent circuit training group, Group III underwent YPG, for duration of 12 weeks with 3 days (Monday, Wednesday, and Thursday) per week in addition to the regular schedule of the school curriculum, and Group IV (CG) acted as control did not participate in any special training program apart from their regular activities as per their curriculum. The 0.05 level of confidence was fixed as the level of significance to test the F ratio obtained by the analysis of covariance, which was considered as appropriate.

**Keywords:** Agility, Circuit training, Handball, Yogic practices

### INTRODUCTION

Physical fitness as defined by the World Health Organization is “the ability to perform muscular work satisfactorily”. Physical fitness is the ability of an individual to live and lead a balanced life. It involves physical, mental, emotional, and spiritual factors and the capacity for their wholesome knowledge (Bucher, 1991).

Circuit training is a form of conditioning combining resistance training and high-intensity aerobics. It is designed to be easy to follow and target strength building as well as muscular endurance. An exercise “circuit” is one completion of all prescribed exercises in the program (Abdullah and Omar, 2002). Circuit training is a significant way to improve mobility, strength, and stamina. The circuit training comprises 6 to 10 strength exercises that are completed one exercise after another. Each exercise is performed for a specified number of repetitions or for a set

time before moving on to the next exercise. The exercises within each circuit are separated by a short rest period, and each circuit is separated by a longer rest period. The total number of circuits performed during a training session may vary from two to six depending on your training level (beginner, intermediate, or advanced), your period of training (preparation or competition), and your training objective (Ortega *et al.*, 2008; Alcaraz *et al.*, 2008).

The word Yoga is derived from Sanskrit root “yuj,” which means to bind and yoke (Iyengar, 1996). It is true union of our will with the will of God. Our ancient sages have suggested eight sages of yoga to secure purity of body, mind, soul, and final communion with God. These eight stages are known as Ashtanga Yoga.

Agility is a willingness to change; it is the ability to change and how quickly an organization adapts the change. The competitors and customers are changing very fast. The organizations that are dedicated to success in the competition assume the compulsion for agility (Heathfield, 2015). At present, organizations are facing faster degrees of change, insecurity, uncertainty, and complexity. Continuous innovation

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is essential to combat the challenges. The business environment needs to sense and respond to change with a fast, focused, and flexible stroke, which specifies agility (Moore, 2012). Agility encourages the organization to adopt a clear, definite goal, and agile people continuously learn and fine-tuned to the conditions which influence the attainment of the goal. Agility refers to owning creative thinking and the skill to handle any situation. Agile people develop multiple solutions to a problem and can respond creatively toward the attainment of the goal (Boston, 2014).

## ANALYSIS OF THE DATA AND RESULTS OF THE STUDY

The effects of 12 weeks of combined circuit training with yogic practices, circuit training, and yogic practices on selected muscular endurance variables were statistically analyzed and the results were presented below. The analysis of covariance on the information acquired for muscular strength of pre-test, post-test, and adjusted post-test of combined circuit training with yogic practices, circuit training, yogic practices, and control groups is presented in Table 1.

The statistical analysis from Table 1 shows that the pre-test means on agility of the combined circuit training with yogic practices group (CCTYPG), circuit training group (CTG), YPG, and control groups are 12.12, 12.35, 12.28, and 12.61 respectively. The obtained F ratio of 2.038 for pre-test was lesser than the required table value of 2.73. Thus, the pre-test was not significant at 0.05 level of confidence for the degrees of freedom of 3 and 76 on agility.

The post-test means of combined CCTYPG, CTG, YPG, and control groups are 11.37, 11.58, 11.46, and 12.58,

respectively. The obtained F ratio of 37.31 for post-test was greater than the table value of 2.73. Thus, the post-test was significant at 0.05 level of confidence for the degrees of freedom 3 and 76.

The adjusted post-test means on agility of combined CCTYPG, CTG, YPG, and control groups are 11.32, 11.55, 11.43, and 12.55, respectively. The F ratio obtained for adjusted post-test 35.05 was also greater than the table value of 2.73. Thus, the adjusted post-test was significant at 0.05 level of confidence for the degrees of freedom 3 and 75.

The study indicates that the significant difference exists among the adjusted post-test means of four groups, i.e. three experimental groups and a control group. Further, to determine the significant difference among the four paired means, the Scheffe's test was applied as *post hoc* test and the results are presented in Table 2.

Table XIII A shows that the adjusted post-test mean difference on agility of combined CCTYPG, CTG, YPG, and control groups is 0.23, 0.11, 1.23, 0.12, 1.0, and 1.12, respectively. The mean difference between CCTYPG and CG was 1.23, CTG and CG was 1.0, and YPG and CG was 1.12, which are higher than the confidence interval value of 0.44 on agility at 0.05 level of confidence, thus, significance exists of groups between I and IV, II and IV, and III and IV. Further, the difference between CCTYPG and CTG was 0.23, CCTYPG and YPG was 0.11, and CTG and YPG was 0.12, which are lesser than the confidence interval value of 0.44 on agility at 0.05 level of confidence, thus, the insignificance exists between Groups I and II, I and III, and II and III.

The pre-test, post-test, and adjusted post-test mean values combined circuit training with yogic practices, circuit training,

**Table 1: Analysis of covariance for the pre-test, post-test, and adjusted post-test data on agility of combined circuit training with yogic practices, circuit training, yogic practices, and control groups**

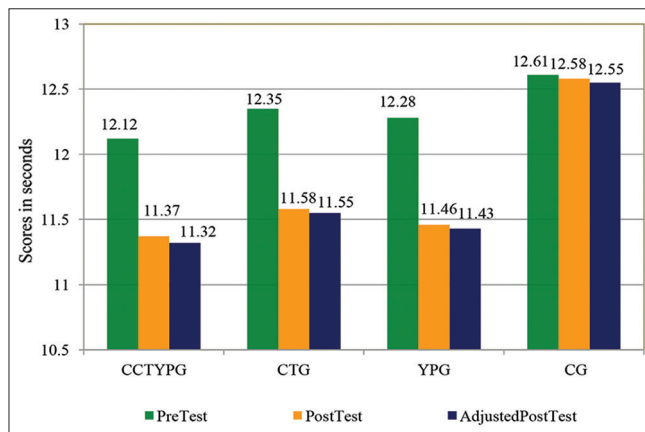
| Tests/Groups       | CCTYPG | CTG   | YPG   | C G   | SOV | Sum of Squares | df | Mean Squares | F ratio |
|--------------------|--------|-------|-------|-------|-----|----------------|----|--------------|---------|
| Pre-test           |        |       |       |       |     |                |    |              |         |
| $\bar{X}$          | 12.12  | 12.35 | 12.28 | 12.61 | B   | 2.554          | 3  | 0.851        | 2.038   |
| $\sigma$           | 0.357  | 0.564 | 0.572 | 0.588 | W   | 21.30          | 76 | 0.280        |         |
| Post-test          |        |       |       |       |     |                |    |              |         |
| $\bar{X}$          | 11.37  | 11.58 | 11.46 | 12.58 | B   | 19.45          | 3  | 6.48         | 37.31*  |
| $\sigma$           | 0.213  | 0.299 | 0.454 | 0.594 | W   | 13.21          | 76 | 0.174        |         |
| Adjusted post-test |        |       |       |       |     |                |    |              |         |
| $\bar{X}$          | 11.32  | 11.55 | 11.43 | 12.55 | B   | 13.11          | 3  | 4.37         | 35.05*  |
|                    |        |       |       |       | W   | 9.35           | 75 | 0.12         |         |

CCTYPG: Circuit training with yogic practices group, CTG: Circuit training group, Table F-ratio at 0.05 level of confidence for 3 and 76 (df)=2.73, 3 and 75 (df)=2.73. \*Significant

**Table 2: Scheffe's *post hoc* analysis for the differences between the adjusted post-test paired means on the agility of three experimental groups and control group**

| Adjusted post-test means |          |           |         | Mean difference | Required CI |
|--------------------------|----------|-----------|---------|-----------------|-------------|
| CCTYPG (I)               | CTG (II) | YPG (III) | CG (IV) |                 |             |
| 11.32                    | 11.55    |           |         | 0.23            | 0.44*       |
| 11.32                    |          | 11.43     |         | 0.11            |             |
| 11.32                    |          |           | 12.55   | 1.23*           |             |
|                          | 11.55    | 11.43     |         | 0.12            |             |
|                          | 11.55    |           | 12.55   | 1.0*            |             |
|                          |          | 11.43     | 12.55   | 1.12*           |             |

\*Significant at 0.05 level, CCTYPG: Circuit training with yogic practices group, CTG: Circuit training group



**Figure 1:** Bar diagram showing pre-test, post-test, and adjusted post-test means of combined circuit training with yogic practices, circuit training, yogic practices, and control groups on agility

yogic practices, and control groups on agility are graphically presented in Figure 1.

## CONCLUSION

1. It was concluded from the results of the study proved that the combined circuit training with yogic practices, circuit training, and yogic practices has produced significant improvement on selected physical fitness variables, i.e. agility, among school volleyball players when compared with other training groups and control group
2. Agility was also superior in YPG when compared with circuit training group. Agility was also superior in circuit group when compared with control group.

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## Research Article

# Effects of yogic asanas and physical exercises on endurance for school girls

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## ABSTRACT

The purpose of this study was to investigate the effects of physical exercises, yogic asanas, independently and also jointly on the endurance of school girls in between 13 and 17 years of age. The study was also delimited by certain yogic asanas; it includes specific asanas, for a period of 3 months. The study was further delimited to certain specially designed exercises program for the same period. It was delimited on endurance. Keeping in view, the objectives of the study following hypotheses were formulated. It was hypothesized that the selected yogic asanas would have more effect, compared to selected physical exercise program on endurance eighty (80) female students of Hyderabad Public school-Kadapa, Andhra Pradesh selected for this study by random sampling procedure. The average age of the students was 13–17 years as per the school records. The first three groups, namely “Y”, “P”, and CYP, were subjected to yogic asanas program, especially designed exercises program and combined (yoga and specially designed exercises) program. The fourth control group “CG” was not subjected to any experimental program. The experiment was conducted for a period of 12 weeks excluding the period taken for collecting the data. The data endurance of subjects was recorded prior and after the 12-week experimental period from June to September 2019. The whole training program for the experimental group “Y,” “P,” and CYP was carefully and systematically planned. The experimental groups “Y,” “P,” and CYP underwent the training program on yogic asanas, physical exercises, and the 137 combined practices (yoga and exercises), respectively, under the guidance of three assistants at the same place and time under careful supervision of the research scholar for a period of 12 weeks in the 5-day week in the morning. The objective reflected exactly what was expected of the subjects after going through the training program. The control group “CG” was not allowed to undergo the training program and to establish the effect of the yogic asanas, physical exercises on endurance. The data were examined by applying analysis of covariance test with regard to three experimental groups and one control group to find the intergroup variability to allow for the comparison between initial and final scores and to effect adjustments in final on terminal scores which allowed for difference in some initial variables. The level of significance was set at 0.05 level.

**Keywords:** Analysis of covariances, Endurance, Physical exercises, Yoga asanas

## INTRODUCTION

*“There is no chance of the welfare of the world unless the condition of women is improved. It is not possible for a bird to fly on only one wing.”*

-Swami Vivekananda.

We live in an amazing world. The greatest of all creations is man himself, the marvelous machine-precise and efficient. In simple

words, man is God’s superb creation. “The body must be vigorous to obey the soul: A good servant ought to be robust. The weaker the body, the more it commands, the stronger it is, the better it obeys - to think, we must exercise our limbs, senses, and organs, which are the instrument of intelligent. To derive all the advantages possible from these instruments, it is necessary that the body which furnishes them should be robust and sound.” Human being is an integration of the body and mind. Both components through their combinations make him more successful.

The mental process and the physical expression are beautifully interwoven in the mechanism of the whole man and his wholeness in no case should be made to suffer by separating mental and physical aspects (1988).

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The modern world people are moving fast for their survival, so they are not even getting time for doing physical activity or any recreation. This daily routine led to many diseases such as obesity and heart problem. To overcome this situation, people have to keep time for some cocurricular activities. Tremendous advancement has been achieved in the field of science and technology bringing about tireless changes in the social economical and political system causing distribution of human energies at all levels. Man's life is a continuous flow of activity. Every moment, he is doing something and his every activity is the result of the joint efforts of the body and the mind; more integrated efforts yield more success to the individual. Things in this world, outside ourselves, come through the body (some organs) into our mind and things in our mind reach the world outside through the body (1983).

## MATERIAL AND METHODS

*“Sports: A Powerful Strategy to Advance Women's Rights”*

*-Astrid Aafjes*

To find the differential effect of the treatment using the “*t*” test, analysis of variance (ANOVA), and analysis of covariance (ANCOVA), the level of significance was set at 0.05 level of confidence which was considered adequate and appropriate for the purpose of the study.

To find the significant difference, if any between the pre and post-experimental means for each of the chosen variables of the four groups, the data were subjected to “*t*” test, ANOVA, and ANCOVA.

## RESULTS

It was evident from Table 1 that significant differences exist between pre and post-experimental means of yoga, exercise, and combined group. However, significant differences are seen in the pre and post-experimental means of the control group. The *t*-value of Yoga was 2.5, Exercise was 3.48, and Combined Group was 2.89 and the tabulated *t*-value was 1.74. The founded *t*-value was more than the tabulated *t*-value. Hence, the significant difference was seen in all groups.

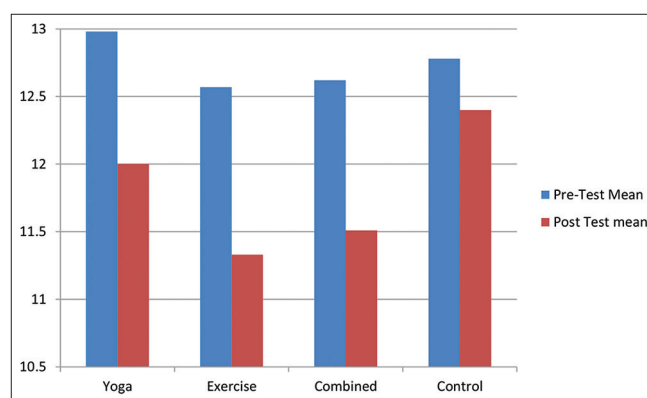
The data are further subjected to ANCOVA to find if there is any significant difference due to different treatment factors in the endurance of the four groups. The analyses of data through ANCOVA are presented in Table 2.

The ANCOVA of endurance indicated that the resultant F ratio of 0.45 was not significant in case of the pre-test means indicating that initial means difference among the groups were not significant. The post-test means of the entire four groups

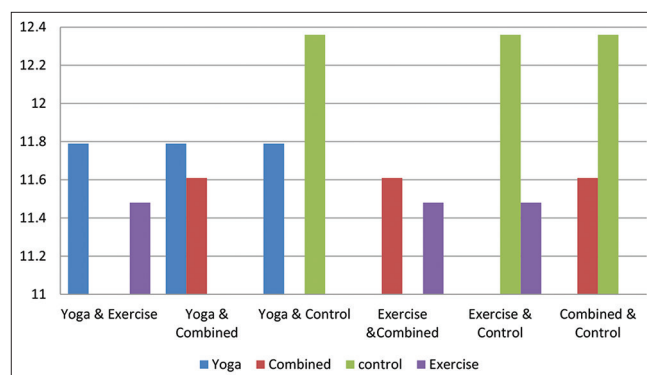
**Table 1: Significance of difference between pre-test and post-test means of experimental groups and the control group in endurance**

| Groups   | Pre-test mean | Post-test mean | Difference between means | <i>t</i> -value |
|----------|---------------|----------------|--------------------------|-----------------|
| Yoga     | 12.98         | 12.00          | 0.98                     | 2.5*            |
| Exercise | 12.57         | 11.33          | 1.24                     | 3.48*           |
| Combined | 12.62         | 11.51          | 1.11                     | 2.89*           |
| Control  | 12.78         | 12.40          | 0.38                     | 0.94            |

\*Significant at 0.05 level, (Tab. *t*=1.74)



**Graph 1:** Difference between means of pre-test and post-test for the three experimental groups and the control group in endurance



**Graph 2:** Comparison of paired adjusted final mean scores and difference between means for the three experimental groups and the control group in endurance

yielded an F ratio of 3.17 which was significant at 0.05 level. The difference between the adjusted final means of four groups was not significant as the obtained F ratio was 117 less than the tabulated F ratio being 2.74.

Since the difference between the adjusted final means of the four groups is found significant, the LSD test was applied to find which of the differences between the paired adjusted final means were most significant. Differences between the paired adjusted final means are shown in Table 3.

**Table 2: Analysis of covariance of the means of three experimental groups and the control group in endurance**

|                    | Groups |          |          |         | Sum of Square       | d.f     | Mean square     | f-ratio  |
|--------------------|--------|----------|----------|---------|---------------------|---------|-----------------|----------|
|                    | Yoga   | Exercise | Combined | Control |                     |         |                 |          |
| Pre-test           | 1298   | 12.57    | 12.62    | 12.78   | B 2.00<br>W 111.78  | 3<br>76 | 0.66<br>1.47    | 0.45 N/S |
| Post-test          | 12.00  | 11.33    | 11.51    | 12.40   | B 14.08<br>W 112.48 | 3<br>76 | 4.69<br>1.48    | 3.17 SIG |
| Adjusted post-test | 11.79  | 11.48    | 11.61    | 12.36   | B 33.31<br>W -0.7.  | 3<br>75 | 11.10<br>-0.009 | -117 N/S |

\*Significant at 0.05 level, (Tab.-F at [3, 76] = [0.05 level] 2.74), (Tab.-F at [3, 75] = [0.05 level] 2.74). W: Within the sets, B: Between the sets

**Table 3: Paired adjusted final means and differences between means for the three experimental groups and the control group in endurance**

| Yoga  | Exercise | Combined | Control | Difference between groups | Critical difference |
|-------|----------|----------|---------|---------------------------|---------------------|
| 11.79 | 11.48    |          |         | 0.31                      | 0.56                |
| 11.79 |          | 11.61    |         | 0.18                      | 0.56                |
| 11.79 |          |          | 12.36   | 0.57*                     | 0.56                |
|       | 11.48    | 11.61    |         | 0.13                      | 0.56                |
|       | 11.48    |          | 12.36   | 0.88*                     | 0.56                |
|       |          | 11.61    | 12.36   | 0.75*                     | 0.56                |

Regular t>pe C.d. at 0.05. \*Significant at 0.05 level

The above table reveals that the differences in the means of yoga and control, exercise and control, and combined and control groups were found to be significant. However, yoga and exercise, yoga and combined, and exercise and combined groups were not statistically significant 0.05 level of confidence. The exercise group proved to be more effective as compared to all the groups.

The combined group was the second more and least came the yoga group in significance. Thus, the hypotheses were accepted. All experimental groups proved to be more effective as compared to the control group in decreasing the Endurance.

It is evident that there is a significant difference in pre and post-test mean values of endurance, for yoga practice, especially designed exercises group, combined group and no significant differences were observed in the control group.

The ANCOVA of endurance indicated that the resultant F ratio of 0.45 was not significant in case of the pre-test means indicating that initial mean difference among the groups was not significant. The post-test means of the entire four groups yielded an F ratio of 3.17 which was significant at 0.05 level. The difference between the adjusted final means of four groups was not significant as the obtained F ratio was -117 less than the tabulated F ratio being 2.74.

## CONCLUSION

Based on the understanding after deliberate discussion with experts and the supervisor and also in light of the above understanding, following conclusions were finally drawn.

1. All experimental groups (yogic asanas, combined, exercise) have shown significant decrease in endurance and no significant change was observed in control group.
2. It is concluded that significant difference was found in the endurance.
3. Evidence also has been found that the mean gain achieved by physical exercise group was higher in endurance.

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