

# Association of Muscular and Cardiorespiratory Fitness with Health-Related Quality of Life Among College Students

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#### ABSTRACT

**Objective:** The capability of the respiratory and circulatory connections to accumulate O2 to the mitochondria of atrophied muscle during physical activity is referred to cardio-respiratory fitness. Muscular fitness refers is referred to the ability to lift bigger objects or to labour for longer periods of time before becoming exhausted. When a person engages in activities that build or maintain muscle strength or extend the time a person can use their muscle power, there muscular fitness improves endurance. The current observational study's goal was to look at the association between student's health linked life's quality and their muscular and cardio-respiratory fitness.

**Methods:** The subjects were selected according to the inclusion and the exclusion criteria. Students between the age of 17 to 25 years, both male and female were included, and the study excluded non-Cooperative students, known case of cardio-respiratory disease and physically disabled students. The informed consent forms were signed by all participants. The sample consists of 90 males and 90 females aged from17 to 25 years who participated in the cardiac wellbeing test. Cardiac wellbeing fitness was charged by cycle ergo meter and VO2 max test, and muscular fitness by muscular endurance test (push up test), and SF 36 health survey. Girls and boys were separated into two groups and the test was done.

**Results:** Boys were shown to be more physically and mentally fit than girls in test for cardio-respiratory fitness, stout fitness and health linked life's quality. Boy's muscular and cardio-respiratory fitness differed significantly from girls. The trait of life in conclusion of health also rises as physical fitness does.

**Conclusion:** The results suggest that physical fitness positively affects health-related quality of life and peak the significance of both muscular and cardio-respiratory fitness. More advanced levels of gross fitness may be required to improve health linked life's quality among university students.

Keywords: Health related quality of life, cardio-respiratory fitness, muscular fitness, college students, VO2 max.

# **INTRODUCTION:**

Cardiorespiratory fitness is the ability of blood vessels and respiration to deliver oxygen to the mitochondria of atrophied muscle during physical activity <sup>[1]</sup>. Some of the health-related elements of physical fitness may include well-being, muscular firmness and capacity, body balance and flaccidity, equivalence, cleverness,



response era and competency<sup>[2]</sup>. The intension of this study was to look at the correlation between objectively determined cardio-respiratory and muscular vigorous in inexperienced adults, the link was investigated from both a physical and mental standpoint<sup>[5]</sup>. A Better cardio-respiratory and muscular fitness were expected to be linked to better health<sup>[3]</sup>. Young women are concerned about their physique and body composition; thus it is believed that women who have poor muscle mass are more likely to eventually acquire sarcopenia. Most people in need of care and support are women<sup>[4]</sup>. 350 million citizens throughout the world experience depression, corresponding to the WHO. Additionally, depression is an acknowledged as main cause of suicide and contributes to 4.4 percent of the health burden. Finding effective depression preventive factors is therefore essential<sup>[5]</sup>. To our awareness, no research has looked into in case physical strength has a link to depression in college students and elucidating this link could lead to earlier and more effective antidepressant interventions <sup>[6]</sup>.It is hypothesized that knowledge learned in college regarding risk factors linked to poor degree of exercise fitness will have a beneficial impact on leading a healthy lifestyle for college students with a health-related emphasis <sup>[7]</sup>. The discovery is that a dominant anticipator of lower fatality in people. More so than assessments of physical activity level, cardio-respiratory fitness (maximum oxygen consumption, VO2max) predicts death [11].In Australia, for example only 6% of people aged 18 to 22 achieves daily physical activity standards. These concerns necessitate further investigation into the physical condition of college students in connection to cognitive control<sup>[14]</sup>. This type of investigation could reveal elements that guard against detrimental lifestyle issues <sup>[8]</sup>. Improved health promotion initiatives might result from a better knowledge of the connection between muscle fitness and the cardiorespiratory risk factor<sup>[10]</sup>. There is currently little knowledge about how assessments of muscle strength and fatness, both separately and in combination, affect the clustering of cardiorespiratory risk factors in young college students.<sup>[15]</sup>. Maintaining maximum health, preventing chronic illness, establishing an independent living all need healthy behaviour. Individual's behaviours to avoid or detect prospective illness, or to improve health and wellness, are referred to as healthy behaviour<sup>[10]</sup>.

According to scientific evidence, world red flag factors for the emergence of cardiac illness are associated with poor levels of cardio-respiratory and muscular fitness<sup>[3]</sup>. Belly fat build up, the onset of arterial hypertension, the development of abdominal fat and aortic stiffening all raise the chance of dving from coronary heart disease, reduced life's quality and psychological wellbeing due to heart related risks and skeletal health impairment <sup>[9]</sup> As a result, the main purpose of this research was to look at the examination of associations between muscle fatness, skeletal density and body vigour in female college students, as well as the association between muscle fatness, working out every day, or food habits that may affect the body <sup>[11]</sup>. The goal of this study was to look at the relationship between objectively determined cardio-respiratory and muscular fitness in young adults. The link was investigated from both a physical and mental health standpoint<sup>[1]</sup>. A Better cardio-respiratory and muscular fitness were expected to be linked to better health <sup>[4]</sup>. Cardiac fitness is extensively recognised as a vital component of one's present and future health status and as a strong predictor of healthy results in both children and adults <sup>[12]</sup>. Minimum altitude of physical wellbeing in teens and children are linked to a wide of negative body ramification, that includes an increased problem of obesity and cardiovascular illness <sup>[13]</sup>.Higher level of cardio-respiratory fitness has high level of health-linked life's quality in those with never ending illness. The association between young people's cardio-respiratory wellbeing and health-linked life's quality, seemingly well-built males was explored in this observational study <sup>[14]</sup>. Our findings imply a link between cardiorespiratory fitness and the health linked life's quality. To our awareness, this is the main research to look at the links together subjectively evaluated health-linked life's quality, muscular fitness, and cardio-respiratory fitness in healthy college students<sup>[15]</sup>.

#### MATERIALS AND METHODS:

The subjects were selected according to the inclusion and the exclusion criteria. Students between the age of 17 to 25 years, both male and female were included, and the study excluded non cooperative students, known case of cardio-respiratory disease and physically disabled students. The informed consent forms were signed by all participants. Student's demographic information was recorded. The study procedure was clearly explained to the college students.



The samples of totally 180 students were collected in Saveetha College of physiotherapy. The need for study is to find the muscular and cardio-respiratory fitness among college students. This study found muscular endurance by doing push up test for both male and female. Push up test normal for men aged from 17 to 25 years were good to excellent (47->56), above average (35-46), average to below average (34-16) and poor to very poor (10- < 4). Push up test normal for women aged from 17 to 25 years were good to excellent (27->36), above average (21-26), average to below average (11-20) and poor to very poor (10-0). Cardio-respiratory fitness (VO<sub>2</sub> max) was found by doing cycle ergometer for both male and female. Cycle ergometer test normal for men aged from 17 to 25 years were good to excellent (51.0->55.9), above average (45.2-50.9), average to below average (45.1-35.0) and poor to very poor (34.9- <25.0). Cycle ergometer test normal for women aged from 17 to 25 years were good to excellent (39.0->41.9), above average (35.0-38.9), average to below average (34.9-25.0) and poor to very poor (34.8-<25.0). Cardio-respiratory fitness is a critical marker of one's physical, mental, and academic well-being. College students' academic success, cardiovascular health, and mental wellbeing are all correlated with good cardio-respiratory fitness. Current standards of care such as subjective physical activity recall, anthropometric measurements, and cardiovascular disease risk factor testing may all benefit from lifestyle treatments if cardiorespiratory fitness could be precisely and consistently measured. The findings imply that physical fitness has a positive impact on psychological wellbeing and emphasise the prime factor of muscle and cardio-respiratory wellbeing in improving health linked life's quality.

#### **RESULTS:**

Girls and Boys were divided into 2 groups for both the team  $VO_2max$  test and muscular endurance test had been taken. The information gathered was compiled and analysed.

TABLE 1: Cardio-respiratory test (cycle ergo meter)

Comparison	of VO2 max	x values between	Girls and Boys
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Cardio-respiratory test	Mean	SD	SEM	p-value	Ν
Boys	45.917	5.970	0.629	< 0.0001	90
Girls	34.761	6.947	0.732		90

GRAPH 1: Cardio-respiratory test (cycle ergometer)





# TABLE 2: Muscular test (push up)

#### Comparison of muscular test values between Girls and Boys

Muscular test	Mean	SD	SEM	p value	n
Boys	40.97	13.76	1.45	< 0.0001	90
Girls	23.43	10.14	1.07		90





Health-related quality of life	Mean	SD	SEM	p value	n
Boys	54.18	13.06	1.38	<0.0001	90
Girls	28.78	12.39	1.31		90

 TABLE 3: Health related quality of life

# Comparison of health-related quality of life values between Girls and Boys



GRAPH 3 : Health related quality of life



TABLE 4:

Cardio-respiratory fitness, muscular fitness and health related quality of life among college students correlation by Pearson's correlation coefficient.

COMPONENTS	PEARSON'S	T STATISTIC	P VALUE
	COEFFICIENT		
	CORELATION		
	(r)		
CARDIORESPIRATORY			
FITNESS	0.634009702	10.93814819	< 0.0001
VS			
MUSCULAR FITNESS			
MUSCULAR FITNESS			
VS	-0.38659363	-5.59262826	< 0.0001
HEALTH RELATED			
QUALITY OF LIFE			
HEALTH RELATED			
QUALITY OF LIFE			
VS	-0.39869791	-5.80023563	< 0.0001
CARDIORESPIRATORY			
FITNESS			

This study includes over 180 subjects. There were 90 subjects (BOYS) and there were 90 subjects (GIRLS). The mean of Boys in cardio-respiratory fitness test (VO2 max) was 39.32 and muscular fitness was 35.46 and health linked quality of life is 65.5. Mean of Girls' cardio-respiratory fitness (VO2 max) was 34.28 and muscular fitness was 23.53 and health related quality of life was 35.5. Our statistical analysis shows that Boys are more prominent when compared to girls. correlation found between cardio-respiratory fitness and muscular fitness (r = 0.634009702) and p value is <0.0001. Muscular fitness and health linked life's quality were not discovered to be correlated; the correlation coefficient was (r = -0.38) and p value is <0.0001. Health related quality of life and cardio-respiratory fitness does not show any significant correlation; the correlation coefficient was(r = -0.39) and p value is < 0.0001 [Table 4]. Maximum grades of muscular health and wellbeing are required to improve college students in their life's quality. The cardio-respiratory fitness, well-built health and health related quality of life is higher in Boys than Girls.

# **DISCUSSION:**

In this study we tried to find out the link between the cardio-respiratory fitness and endurance(muscle) in health-related quality of life among teens. Participants have been assessed for muscular fitness using push ups and cardio-respiratory fitness will be tested on cycle ergometer and VO2 max will be analysed. SF 36 will be handled to appraise the health linked life's quality among university students. For cardio-respiratory fitness test that is cycle ergometer results has been calculated from both the groups. For muscular fitness max test push up is done by Boys and Girls. SF 36 questionnaire



has been conducted for health linked life's quality among teens. The questionnaire, which included demographic data as well as details on education, social standing, lifetime residence, and habits, was completed by all study participants (smoking, alcohol abuse and physical activities'). Physically operating, gross role, body agony, natural well being, cognitive functioning, hysterical role, and psychological factor and vital factors are the eight scales that the SF-36 measures.

Knowing your cardio-respiratory endurance level is essential since it can be a sign of good health or a warning that you need to work on your fitness. Physical fitness programmes enhanced physical fitness in this age group regardless of chronological age, maturation state, or sex, according to the authors. As previously stated, high cardiorespiratory fitness and levels of physical workouts were linked to improved achievement in their studies and a reduced risk of cardiorespiratory illness in the time ahead<sup>[11]</sup>. Increasing your cardio-respiratory endurance is beneficial to your overall health your lungs and heart are able to use oxygen more efficiently<sup>[5]</sup>. The causes of cardio-respiratory may be socioeconomic, with youth having the maximum rates of both poor diet and physical inactivity. The built environment's varying degrees of physical activity may operate as a mediator between environmental factors that affect lifestyle and cardio-respiratory. We will have low cardio-respiratory fitness as a result of the terrible environment<sup>[3]</sup>. A programme intended to increase youths' levels of fitness and gross movement may asset their cardio-respiratory fitness and, as a result, improve their perception of their health and welfare. This is because there is a strong and positive correlation between cardio-respiratory fitness and gross movement. Because of this, it is an important academic area and has a huge impact on public strength. One factor that has been connected to university students' stated health and wellbeing is body image <sup>[6]</sup>. Several factors influence the quality of life of the student population that is abatement, poor personal relationship, and low self-confidence for example: have serious consequences for student life, academic achievement, and conduct. Physical functioning, role constraints due to physical health, role restriction owing to emotional difficulties are all factors that go into the grading. Vigour/fatigue emotional well- being is a term used to describe how people feel about themselves. The ability to function socially pain, general health, and changes in one's health are all topics that come up frequently <sup>[10]</sup>. A count of zero illustrates the greatest degree of disability, while a count of 100 illustrates no disability. The lower the number, the less disability. Greater levels of cardio-respiratory fitness and approximate with lower odds of changing generalised concerns, panic attacks, and distressing manifestation, as well as less manifestation severity and high emotional well-being. This supports the approach that cardiovascular factors play a role in the aetiology of depression<sup>[5]</sup>. How long muscles can continue to work out is referred to as muscular endurance. Enhancing muscular ability can benefit overall fitness, health and enhancing muscle aerobic capability. Tests of muscular ability determine how many repetitions of a movement a person can perform before their muscles get too tired to continue. Strength can be increased by precise bursts of strain produced by moderate resistance training and precise relaxation periods in between<sup>[9]</sup>. Health linked life's quality is a combination of gross and emotional well being. It depends on how healthy lifestyle an individual withstand . It includes psychological factor, gross factors, abjection, environmental factors and so on. The outcome illustrate a constructive link between gross and mental strength and emphasise the implication both stout and cardio-respiratory fitness while boosting<sup>[14]</sup>.

#### **CONCLUSION:**

According to the factors of health linked life's quality, the current study demonstrated a correlation between maximum grades of muscular and cardio-respiratory health and higher health-related quality of life. The study points the importance of cardiovascular and built of the individual while boosting health-related quality of life and imply that physical fitness has a good impact on mental health. Even moderate levels of exercise were linked to greater health-related quality of life when it came to the physical aspect of wellbeing. Regarding the mental aspect of life quality related to health. Only the group with the highest levels of fitness noticed an impact. Therefore, it appears that minimum levels of exercise concludes that moderate workout would support aspect of quality of life related to health. Higher levels of physical fitness may be required to improve college students' health-related quality of life, based on the



findings about the mental component is about that quality of life. We now understand that boys have greater muscular stamina than girls.

#### **REFERENCE:**

1. Mase T, Ohara K, Momoi K, Nakamura H. Association between the recognition of muscle mass and exercise habits or eating behaviors in female college students. Scientific Reports. 2022 Jan 12;12(1):1-0.

2. Shigeta TT, Leahy AA, Smith JJ, Eather N, Lubans DR, Hillman CH. Cardiorespiratory and muscular fitness associations with older adolescent cognitive control. Journal of Sport and Health Science. 2021 Jan 1;10(1):82-90.

3. Cao J, Zhao F, Ren Z. Association between changes in muscle strength and risk of depressive symptoms Among Chinese female college students: a prospective cohort study. Frontiers in public health. 2021 Apr 8;9:249.

4. Ren Z, Cao J, Li Y, Cheng P, Cao B, Hao Z, Yao H, Shi D, Liu B, Chen C, Yang G. Association between muscle strength and depressive symptoms among Chinese female college freshmen: a cross-sectional study. BMC musculoskeletal disorders. 2020 Dec;21(1):1-7.

5. Appelqvist-Schmidlechner K, Vaara JP, Vasankari T, Hakkinen A, Mantysaari M, Kyrolainen H. Muscular and cardiorespiratory fitness are associated with health-related quality of life among young adult men. BMC Public Health. 2020 Dec;20(1):1-8.

6. Evaristo S, Moreira C, Lopes L, Oliveira A, Abreu S, Agostinis-Sobrinho C, Oliveira-Santos J, Povoas S, Santos R, Mota J. Muscular fitness and cardiorespiratory fitness are associated with health-related quality of life: Results from labmed physical activity study. Journal of Exercise Science & Fitness. 2019 May 20;17(2):55-61.

7. Kujala UM, Vaara JP, Kainulainen H, Vasankari T, Vaara E, Kyrolainen H. Associations of aerobic fitness and maximal muscular strength with metabolites in young men. JAMA network open. 2019 Aug 2;2(8):e198265-.

8. Mesquita CA, Turi-Lynch BC, Bergoc RD, Maia RL, Amaral SL, Monteiro HL. Health-related physical fitness among undergraduate students in physical education. Journal of Physical Education. 2018 May 24;29.

9. Correa-Rodríguez M, Ramirez-Velez R, CorreaBautista JE, Castellanos Vega RD, Arias-Coronel F, Gonzalez-Ruiz K, Alejandro Carrillo H, Schmidt-RioValle J, Gonzalez-Jimenez E. Association of muscular fitness and body fatness with cardiometabolic risk factors: The FUPRECOL study. Nutrients. 2018 Nov;10(11):1742.

10. Klainin-Yobas P, He HG, Lau Y. Physical fitness, health behaviour and health among nursing students: A descriptive correlational study. Nurse Education Today. 2015 Dec 1;35(12):1199-205.

11. Karvinen S, Waller K, Silvennoinen M, Koch LG, Britton SL, Kaprio J, Kainulainen H, Kujala UM. Physical activity in adulthood: genes and mortality. Scientific reports. 2015 Dec 15;5(1):1-9.

12. Woodward M, Webster R, Murakami Y, Barzi F, Lam TH, Fang X, Suh I, Batty GD, Huxley R, Rodgers A. The association between resting heart rate, cardiovascular disease and mortality: evidence from 112,680 men and women in 12 cohorts. European journal of preventive cardiology. 2014 Jun 1;21(6):719-26.

13. Katzmarzyk PT, Mason C. The physical activity transition. Journal of Physical activity and Health. 2009 May 1;6(3):269-80.

14. Sloan RA, Sawada SS, Martin CK, Church T, Blair SN. Associations between cardiorespiratory fitness and health-related quality of life. Health and Quality of Life Outcomes. 2009 Dec;7(1):1-5.

15. Katzmarzyk PT, Church TS, Blair SN. Cardiorespiratory fitness attenuates the effects of the metabolic syndrome on all cause and cardiovascular disease mortality in men. Archives of internal medicine. 2004 May 24;164(10):1092-7.