Status of health-related fitness components among junior secondary school learners in Kakamega County, Kenya

Celestine Nakhumicha Omar[1]
Elizabeth Msee[2]
Issah Kweyu[3]

[1]clstnomar@gmail.com (0728649862)
[2]emsee@mmust.ac.ke
[3]ikweyu@mmust.ac.ke

[1,2,3] Masinde Muliro University of Science and Technology, Kenya

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ABSTRACT

Physical fitness is a primary requirement for children growth because of its contribution to health promotion. This has been highlighted by the competency based education [CBE] in Kenya where sports and arts has been recognized as one of the three learning pathways beside science, Technology and Mathematics and Social Science under CBEs. It is on this premise that the study sought to establish the status of health related fitness among junior school learners in Kakamega County Kenya was developed guided by the health belief theory. This study, under a cross sectional analytical research design targeted grade 9 learners (boys and girls) in Kakamega County Kenya with the five health related components of physical fitness (cardio-respiratory endurance, muscular endurance, muscular strength, flexibility and body composition) as study variables. Based on available Ministry of Education data, 450 learners were sampled for the study through Fischer's formulae. Prerequisite administrative and ethical clearance were met as per ethical protocols. Data were collected using Canadian Assessment of Physical Literacy (CAPL) protocol and analyzed using statistical package for social sciences version 25. Descriptive and parametric statistics - gender based Analysis of Variance (ANOVA) - were obtained. Examination of health related components of physical fitness had higher scores for muscular strength with flexibility and body composition showing average scores and normal performance respectively. However, cardio-respiratory and muscular endurance reported low scores. There was significant difference between boys and girls on cardio - respiratory endurance. (N=450, p=**000**); muscular strength (N=450, p= and muscular endurance (N=450, p=**000,**) with boys having higher scores than girls. No significant difference was observed on flexibility (N=450, p= **.081**) and body composition (N=450, p= **.358**). It was concluded that performance of learners on health related components of physical fitness was within acceptable scores despite statistically significant gender differences on some variables. The study recommended for emphasis by school administrators to adhere to during PE because of its implications to health and positive lifestyle. Also a similar study could be replicated at different locations and target population for comparative learning and setting national norms.

Keywords: Health Related Physical Fitness Components, Health Belief Model, Junior School Learner, Physical Activity, Physical Education

I. INTRODUCTION

Physical fitness is a combination of health- or skill-related qualities that determines ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies" (Kliziene et al 2021; World Health Organization (WHO), 2020). Related to this is physical activity, defined as any bodily movement produced by skeletal muscles that results to energy expenditure (Piggin, 2020) measured in kilocalories. Physical activity in daily life can be categorized into professional, leisure, domestic, or other activities (Thivel et al, 2018). Exercise is a subset of physical activity defined as planned, structured, and repetitive. Its final or intermediate objective is improvement or maintenance of physical fitness. In Kenya, exercise and physical fitness is promoted through school sports and programmed physical education lessons as emphasized by the goals of education. This manifesto by the Ministry of Education lays the basis for understanding how physical activity participation helps to achieve the desired health and psycho-social benefits among younger learners. Competency Based Education (CBE) in the current curricular in Kenya is founded upon Kenya National Goals of Education where sports and physical activity plays a key role in its attainment. More critical among these goals is promotion of positive attitude towards good health and environmental protection. Additionally, these fundamental principles of physical activity have been recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) through its 1978 charter that endears sports as a primary element in promotion of education, health and culture (UNESCO, 2015).

Physical fitness has been broadly divided into two components or categories, health and skill-related (Wachira et al, 2013; WHO, 2020). The health-related components of physical fitness entail the interaction and interrelation of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. Skill related components focuses on performance; they include speed, agility, balance, power, reaction time and coordination. The current study focused on health-related components since they form the foundation of fitness and health and are a pre-requisite for skill acquisition in sports.

Cardio-respiratory Endurance or cardio-respiratory fitness is considered the core of fitness as it relates to the ability of large muscles to perform dynamic, moderate to high intensity exercise for elongated periods (Toriola & Monyeki, 2012). Performance depends upon the functional state of the respiratory, cardiovascular, and musculo-skeletal systems. Studies have shown that physical fitness training involves large muscles and promotes cardio-respiratory endurance (Wachira et al, 2013; Odindo, 2016). Cardio-respiratory endurance is a key factor in health-related fitness since it is the basis of circulatory and respiratory systems of the human body. Many non-communicable diseases are linked to these systems leading to respiratory and cardiological conditions. Therefore, emphasis on cardio-respiratory endurance among children, youth, adults and the aged is necessary for health promotion.

Muscular strength and muscular endurance are two associated components of health-related fitness (Trembley et al., 2018). Muscular strength is the muscle's ability to exert force at high intensities over short periods. It is critical among children for injury prevention (Trainor & Trainor, 2004) and performance of heavier activities, (Arokoski *et al*, 2001). Muscular endurance is the ability of a muscle group to execute repeated contractions sufficient to cause muscle fatigue. This component promotes occupational activities where one has to perform a particular skill repeatedly over a long time.

Body composition is the relative percentage of body mass that is fat and fat-free tissue (Tremblay *et al*, 2010). There have been inconclusive studies on relationship between body compositions, obesity and non-communicable diseases among children. The study sought to find out its status among Junior School (JS) learners since it is an indicator of underlying health challenges across all ages due to its proximity to obesity. Flexibility, another key health - related component of physical fitness is the ability to move a joint through its complete range of motion (Ingraham, 2003). It is crucial in carrying out daily functional tasks and athletic performance. Studies have indicated gender differences on flexibility at a younger age where girls are more flexible than boys (Monyeki *et al.*, 2005; Travill, 2007; Toriola & Monyeki, 2012, 2018). The study sought to establish the status and relationship between boys and girls on flexibility and the general performance of children on this components because of its link to health and skill development. Further it will act as measurable of the arts and sports pathway under the Competency Based Education (CBE)

1.1 Statement of the Problem

The importance of sports and physical education as a health promotion medium has greatly been justified through extensive research over time (Ngahu, 2021). In most of these studies, physical activity has broadly been found to promote good health and prevention of lifestyle diseases. Active children have also been observed to have better psycho - social development both in and out of school with less exposure to childhood obesity and non-communicable diseases like type II diabetes, hypertension, and cancer (Piovini et al., 2022). Similar results have been observed among older populations. Despite these positive contributions of sports to the society, there have been changing trends in regard to lifestyle that have affected levels of physical fitness leading to possible non-communicable diseases. Modernity has resulted into increased mechanized transport and consumption of processed foods leading to reduced active lifestyle across all ages. These factors undermine the desire to promote health through engagement in PA (Ndunda et al., 2026). To overcome these challenges, practitioners and scholars in PA and health have sought for intervention though scientific investigations. It is on this premise that the study on Status of health-related fitness components among junior secondary school learners in Kakamega County, Kenya was designed.

1.2 Research Objective

The objective of the study was to establish health-related fitness among Junior School learners in Kakamega County, Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Health Belef Model

The study was guided by Health Belief Model (HBM) (Becker, 1974) as a theoretical foundation. The Health Belief Model (HBM) is a psychological concept that attempts to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals (Becker, 1974). The model was developed in the 1950s by a group of social psychologists, including Irwin Rosenstock, Godfrey Hochbaum, and Stephen Kegeles. It was initially used to understand

the widespread failure of people to participate in programs to prevent or detect disease. It is developed on six key components, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy.

The interaction of these components direct individuals behaviour towards participation in sports. The model helps explain cognitive understanding of individuals towards decisions on sports participation (Oloo, *et al*, 2019). Exercise is a significant factor in health promotion hence the choice of HBM to explain learners' status towards health related components of physical fitness. The linkage of these gives guidance on how learners perceive and uptake sports as a health promotion medium. Figure 1 shows details of the HBM and its linkage to the present study on Junior School learners in Kakamega County, Kenya.

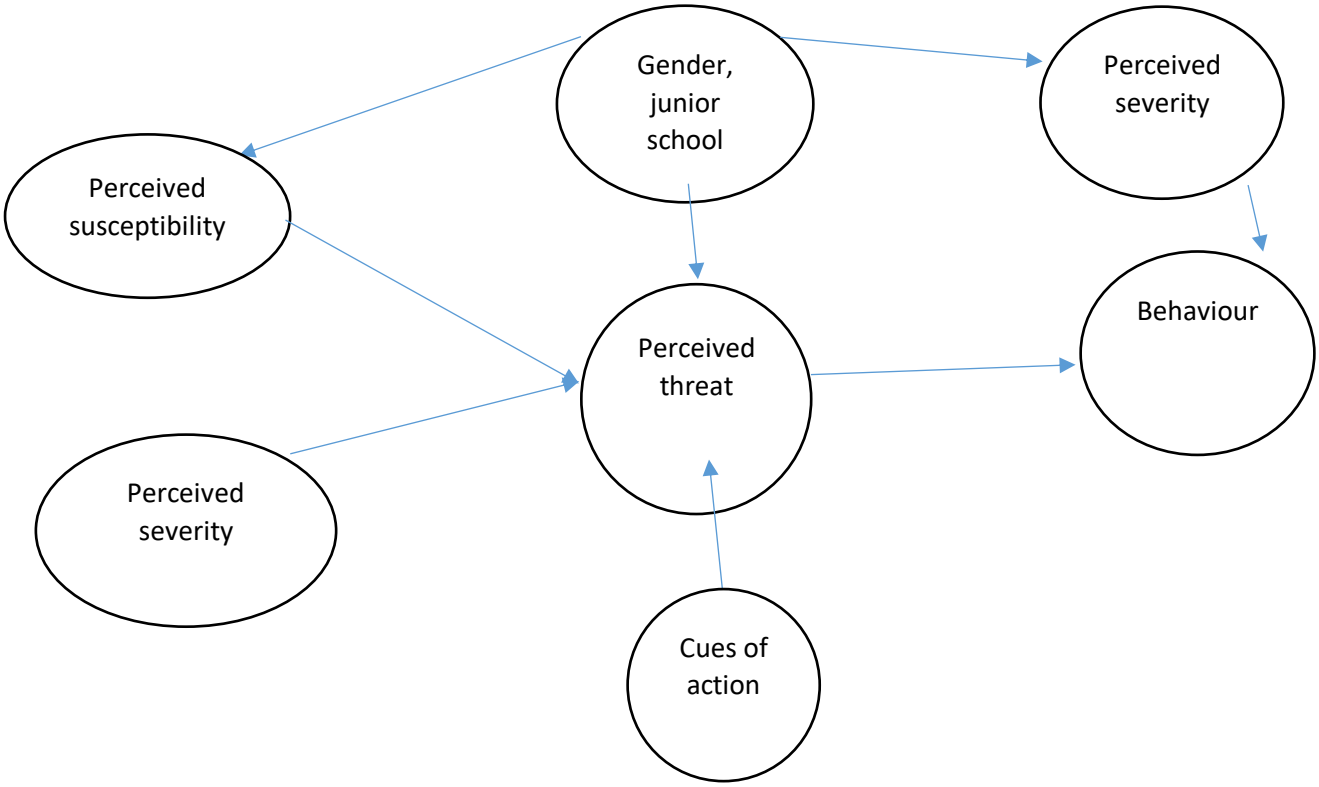

Figure 1: The variables in the Health Belief Model. (Adapted from Rosenstock. Strecher and Becker. 1988)

2.2 Empirical Review

Inactivity among children has been on the increase in the recent times mainly due to use of energy saving equipment and change in diet. (Onywera et al., 2010). This challenge has affected both developed and developing countries with intervention measures sought through increase in levels of activity for youth and children. The problem is not isolated to children only, but also adults and the aged are equally affected. The main problem that result from sedentary lifestyle is increase in non-communicable diseases like cardio-respiratory diseases, cancer, diabetes and chronic respiratory diseases (WHO, 2010). The projection of WHO (2010) is that in Africa and most developing countries, Non Communicable Diseases (NCDs) are rising rapidly, projected to exceed communicable, maternal, perinatal, and nutritional diseases as the most common causes of death by 2030. These concerns are what makes physical fitness and health a concern among health and sports science practitioners to offer precautionary measures to forestall these dangers.

Physical activity has been found to be critical in adolescents' health for management of lifestyle diseases. This was evidenced in a study by Park et *al* (2021) on Association between Health-Related Physical Fitness and Respiratory Diseases in Adolescents. The study utilized the FITNESSGRAM and EURO FIT test batteries to measure Health Related Physical Fitness (HRPF). Results exhibited that most of the population observed required health related physical fitness (HRPF) as a critical element in adolescent's health in relation to lifestyle diseases. The findings recommended

healthcare providers to include HRPF in curbing respiratory infections. As a follow up study to Park *et al.* (2021), the study will use CAPL manual to measure health related fitness, a good alternative for comparative research.

According to Grant (2014) correlation between the health-related fitness of healthy participants measured at home as opposed to fitness measured by sport scientists in a laboratory established that sufficient health is determined by exercise participation and proper nutrition. It highlighted various conservative methods that are used to determine fitness and the need to include methods that are all inclusive and not detrimental to assess health related fitness. The study aimed to establish differences between self-assessed methods and laboratory one of VO2max. It used 169 participants ranging from age 18-55 years not on medical directions nor using medical enhancements. The results revealed that there was correlation between self-administered and laboratory test results. It concluded that self-administration when adhered to can determine fitness ability and change physical fitness reducing costs. While the study used the five health related components and one skill component (balance) the current study relied on the five health related components of physical fitness to assess health related physical fitness status of JS learners as an indicator of proceeding with sports pathway at senior school.

A comprehensive Kenyan study on health related fitness was carried out by Kinuthia et al. (2025) among 1,131 children aged 11.07 ± 0.9 years in Nairobi as urban county and Kitui as rural county. The sample for the study, picked through stratified cluster random sampling assessed Cardio Respiratory Fitness (CRF), Body Mass Index (BMI), strength, flexibility, speed, agility, and coordination. Results showed that in urban areas, 16.6% of children were overweight and 2.8% obese, compared to 4% and 0.6% in rural areas ($p < 0.001$) respectively. Also, 44.5% of children in rural schools were underweight against 13.7% in urban schools ($p < 0.001$). Multivariable regression revealed that rural children demonstrated superior CRF ($\beta = -4.68$ laps, $p < 0.001$) and lower back flexibility ($\beta = -2.77$ cm, $p < 0.001$), while urban children excelled in speed and coordination ($\beta = 3.68$ bounces, $p < 0.001$) and grip strength ($\beta = 2.16$ kg, $p < 0.001$). The study noted that urban - rural comparisons show how children settings influence fitness levels. Furthermore, sports and physical fitness programmes in schools and the available facilities and equipment contribute to differences in performance. Regardless, both settings showed advantage in one component against the other. On gender based comparison, boys outperformed girls in explosive leg power ($\beta = -6.75$ cm, $p < 0.001$) and CRF ($\beta = -6.92$ laps, $p < 0.001$). These differences may be due to physiological composition of girls against boys and the social setting which gives one gender advantage over the other in specific components of fitness. Collectively, these findings highlight fitness inequities among Kenyan children, emphasizing the need for equitable, targeted, and inclusive physical activity opportunities. The current study on related variables in Kakamega County will offer a good comparative measure as a contributor to children fitness and health promotion in Kenya.

Another health related study by Odindo (2016) assessed health-related physical fitness components and motor skill ability among 9-11-year-old school children in Nairobi County where a sample of 199 (106 females and 93 male) school children were tested. The study examined height and weight, low back flexibility, muscular strength, static abdominal muscular endurance, aerobic fitness and motor skill ability since they influence physical fitness among cross section of populations. Boys showed significant aerobic capacity than girls ($p=0.004$ [$\chi 2 = 13.396$]) while girls had significant better performance on flexibility than boys, $p<0.0001$ ($\chi 2 = 25.33$). Children with good motor skill ability had higher physical fitness levels compared to their counterparts. The prevalence of overweight and obesity was 24.2%. Generally, boys showed better motor performance than females. This study showed differences between boys and girls on several fitness skills. Additionally, it shows the significant of fitness on motor skills, hence giving health related fitness a basis for building skill related fitness. Comparatively, the age under study is higher in the current study, hence an opportunity for age comparison. The location of the present study being away from Odindo (2016) gave good comparative research with interest on performance of boys and girls on different health related fitness components.

Good information from the field of physical activity, sports and physical education indicate that childhood play and school sports contribute to countering non-communicable diseases and hypokinetic diseases (Odindo, 2016; Onywera et al, 2010). Other health related benefits are also derived from fitness programmes among children like enhanced bone health (MacKelvie et al., 2003), accelerated development of motor skills and increased self-esteem. Such reassuring reports restore hope in developing healthy lifestyle among youth and young adults hence the study targeting Junior School learners as a yardstick to health promotion.

III. METHODOLOGY

3.1 Research Design

The study was guided by cross sectional analytical research design where data were collected in numerical format and analyzed to establish interaction of the health-related fitness variable under study (Ruel *et al.*, 2016). The design was found applicable for the study since it is most suitable in realizing the study objective and permits generality of the outcomes to the population (Mugenda & Mugenda, 2003).

3.2 Study Area

The location for the study was Kakamega County, Kenya. According to the records of Kenya National Bureau of Statistics (KNBS) of 2020, the county measures 3,033km^2 and is located in the Western region of Kenya. It borders Vihiga, Siaya, Bungoma, Uasin Gishu, Nandi and Trans- Nzoia Counties with a population of approximately 1,867,579 people. It is 380 km from Nairobi, the Kenyan capital city. Kenya Meteorological Services population statistics, charts, map location, weather and web information of February 2024 reports that the county receives tropical high rainfall of between 1.972- 2,000mm and average temperature of 20.4 degrees. It lies along on altitude of about 1,535m (5,036ft) above sea level. Kakamega County was purposely chosen for the study to be a comparative survey with similar studies carried out mainly in Nairobi county (Ngahu, 2021). Furthermore, the county was picked for the study since there have been no study targeting Junior Secondary Schools in this locality, thus it will be a pioneer study/baseline study in this discipline

3.3 Target Population

Grade 9 Junior School learners' boys and girls and the five Health Related Physical Fitness components (cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition) drew the variables of the study. All participants had to fill an informed consent/assent form to take part in the study with voluntary drop out allowed at any stage during data collection.

3.4 Sampling and Sample Size

The sample for the study consisted 426 Junior School learners in Kakamega County, Kenya. Stratified random sampling was utilized to ensure stratification of Junior schools and sub counties, while simple random sampling was used for grade 9 learners in each school. Permission was obtained from school administrators for data collection. The study targeted grade 9 learners in sampled schools since they have gone through the entire JS curriculum and are to join senior secondary school in the subsequent academic year. Twelve schools, from a third/ four sub counties participated in the study. The number of learners sampled per school/ sub county was determined on pro-rata basis depending on the overall population of grade 9 learners in the sub county against the county population. The sample size was calculated using Fisher formula as indicated to obtain sample size. This is among the most appropriate formula in obtaining sample size in social science research and for collecting data in significance of association. The table below shows the sample determination table by (Mugenda & Mugenda 2003).

Table 1

Showing Sampling Details for Each Sub-County (CDE, 2025)

NO	SUB-COUNTY	NUMBER OF SCHOOLS	TOTAL NUMBER OF GRADE 9 PUPILS	ACTUAL SAMPLE SIZE	15% NON RESPONDENTS
1	LURAMBI	72	5899	40	46
2	SHINYALU	96	4718	32	38
3	MUMIAS EAST	49	5319	36	42
4	MUMIAS WEST	56	4322	29	34
5	MALAVA	38	2298	16	20
6	KWISERO	61	3098	21	24
7	LIKUYANI	62	5153	35	40
8	LUGARI	54	3955	27	34
9	BUTERE	74	4835	33	40
10	MATUNGU	67	8172	55	60
11	IKOLOMANI	78	3629	25	32
12	NAVAKHOLO	70	5302	36	40
	TOTAL	**777**	**56,700**	**385**	**450**

3.5 Data Collection Instruments

The study used a demographic questionnaire to obtain details of sampled learners and adapted Canadian Assessment of Physical Literacy (CAPL) (2013) test battery for data collection on Health-Related Physical Fitness components of sampled pupil (cardio-respiratory endurance using the bleep test, muscle strength using hand grip dynamometer, muscle endurance using plank test, flexibility using sitt and reach and body composition through BMI for age scale). A pre-test was carried out in (Amalemba comprehensive School) one Junior School in the target location to ensure data collection tools, procedures and appropriateness in preparation for the actual study. Physical Education (PE) teachers and research assistants (sought from person with knowledge in sports science) were trained during pretest to be equipped with the procedure of the study. The results provided data to determine reliability index. The reliability index of 0.78 was obtained through split half test, hence acceptable for the study. (Sürücü et al, 2020). The school used

in pretesting did not take part in the main study to avoid contamination. Data collection involved an introductory session to teachers and learners sampled for the study and physical fitness tests as per CAPL test battery for health-related components of fitness were carried out. Physical Education lessons and games periods were used or permission was sought from the school administrator when to carry out these tests for data collection. Learners were gathered by Physical Education teachers, the researcher with the help of research assistants and given instructions about the health-related fitness tests. Demonstrations were conducted, participants assessed and information recorded. Detailed procedures of each measurement were tabulated.

3.6 Data Analysis

Data was cleaned, coded and entered on the computer using excel, imported to SPSS version 25 and analyzed using descriptive and inferential statistics and qualitative analysis based on the study objective. Descriptive statistics included percentages, means and standard deviations for health-related physical fitness components (cardio respiratory endurance, muscular endurance, muscular strength, flexibility and body composition). Inferential statistics included analysis of variance (ANOVA) where gender based analysis on components of CAPL were carried out. Results were presented in tables to facilitate interpretation and discussions.

3.7 Logistical and Ethical Considerations

The researcher sought ethical approval to conduct the study from Masinde Muliro University of Science and Technology - Institutional Science and Ethical Review Committee (ISERC). The approval provided for the application of research permit from the National Commission for Science, Technology and Innovation (NACOSTI) license No. NACOSTI/P/25/4180351. Permission was also sought from the Ministry of Education, Kakamega County Director of Education Office. This enabled the researcher to acquire consent from the sub-county Director of Education Office and respective sampled schools to carry out the study.

All the sampled participants with informed consent and assent were included in the study. The principle of voluntary participation was addressed from the start. Participants were allowed to drop out during any stage of participation. They were however informed of the principle of benefiance. This was awareness of the direct benefit acquired from participation in determining and improving their physical fitness through the report generated from feedback report by the researcher

The principle of integrity was adhered throughout the study. Confidentiality of the data collected was maintained. The data was exclusively entered and coded then secured in computer database under the care of the researcher. Also, data was protected to uphold the validity and reliability of the research findings. Further, non-maleficence assurance was given. The sampled pupils were notified of the study's commitment to no harm but of the minimum discomfort they may experience during the physical fitness test and lack of rewards from participating in the study.

IV. FINDINGS & DISCUSSION

4.1 Demographic Information

The study obtained basic information on learners' sub-county, gender and school. Where 450 respondents from 12 schools in four sub-counties were involved. There were 208 boys (46.2%) and 242 (53.8%) girls, hence girls were more than boys in the study. Table 2 shows details of gender distribution among the respondents.

Table 2

Gender of respondents

Gender of respondents	Frequency	Percent	Cumulative percent
Male	208	46.2	**46.2**
Female	242	53.8	**100**
Total	**450**	**100**	

4.1.1 Health-Related Components of Physical Fitness Descriptive Information

The respondents gave information on health-related components of physical fitness comprising body composition (mean $\bar{x}$ =1.9756; SD = 0.81294), cardio-respiratory endurance ($\bar{x}$ = 2.2511; SD 1.24380), muscular strength($\bar{x}$ =2.0511; SD = 0.96466), muscular endurance($\bar{x}$ = 2.3067; SD 070896) and flexibility ($\bar{x}$ =2.7422; SD 1.04902). Flexibility had a higher mean compared to the other four health related component of fitness. Table 3 shows details of mean and standard deviation of the study.

Table 3

Health Related Components of Fitness Descriptive Information

Gender	Statistic	Body Composition	Cardio respiratory Endurance	Muscular Endurance	Flexibility	Muscular Strength
Male	Mean	1.9375	2.5337	2.2308	2.6490	2.4519
	N	208	208	208	208	208
	Std Deviation	.81705	1.28116	98030	1.02947	.63520
Female	Mean	2.0083	2.0083	1.8967	2.8223	2.1818
	N	242	242	242	242	242
	Std Deviation	.80965	1.15945	.92547	1.06112	.74567
Total	Mean	1.9756	2.2511	2.0511	2.7422	2.3067
	N	450	450	450	450	450
	Std Deviation	.81294	1.24380	.96466	1.04902	.70896

4.1.2 Health-Related Components of Physical Fitness

This section gives details of the five components of health related physical fitness namely cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. Cardio-respiratory Endurance: Respondents gave details of cardio-respiratory endurance and gender of junior school learners in four categories of beginning, progressing, achieving and excelling with beginners having a higher percentage (n= 186; 41.33%) as shown on table 4.

Table 4

Cardiorespiratory Endurance among Junior School learners

Cardiorespiratory Endurance						
Category		**Beginning**	**Progressing**	**Achieving**	**Excelling**	**Total**
Gender	**Gender**	70(15.5%%)	31(6.88)	33(7.33%)	74(16.44)	**208(46.22%)**
	Female	116(25.77%)	53(11.77%)	28(6.22)	45(10%)	**242(53.78)**
Total		**186 (41.33%)**	**84 (18.66%)**	**61 (13.55%)**	**119 (26.44%)**	**450 (100.00%)**

Muscular Strength: Respondents gave details of muscular strength and gender of junior secondary school learners in three categories of weak, normal and strong with strong having a higher percentage (n= 201; 44.67 %) as shown on table 5.

Table 5

Muscular Strength among Junior School learners.

Muscular Strength					
Category		**Weak**	**Normal**	**Strong**	**Total**
Gender	**Male**	15(3.33)	85(18.89%)	108(24%)	**208(46.22%)**
	Female	49(10.89%)	100(22.22%)	93(20.67%)	**242(53.78%)**
Total		**64(14.22%)**	**185(41.11%)**	**201 (44.67%)**	**450(100%)**

Muscular Endurance: Respondents gave details of muscular endurance and gender of junior secondary school learners in four categories of beginning, progressing, achieving and excelling with beginners having a higher percentage (n= 159; 35.33%) as shown on table 6.

Table 6

Muscular Endurance among Junior School learners

Muscular Endurance						
Category		**Beginning**	**Progressing**	**Achieving**	**Excellence**	**Total**
Gender	**Male**	56(12.44%)	73(16.22%)	54(12%)	25(5.56%)	**208(46.22%)**
	Female	103(22.89%)	75(16.67%0	50(11.11%)	14(3.11%)	**242(53.78%)**
Total		**(35.33%)**	**148(32.89%)**	**104(23.11%)**	**39(8.67%)**	**450(100%)**

Flexibility: Respondents gave details of flexibility and gender of junior school learners in five categories of poor, below average, average, good and excellent with average having a higher percentage (n= 153; 34.00 %) as shown on table 7.

Table 7

Flexibility among Junior School learners

Flexibility							
Category		**Poor**	**Below Average**	**Average**	**Good**	**Exellent**	**Total**
Gender	Male	23(5.11%)	79(17.56%)	65(14.44%)	30(6.67%)	11(2.44%)	**208(46.22%)**
	Female	24(5.33%)	71(15.78)	88(19.56%)	43(9.56%)	16(3.56%)	**242(53.78%)**
Total		**47(10.44%)**	**150(33.34%)**	**153 (34.00%)**	**73(16.22%)**	**27(6%)**	**450 (100.00%)**

Body Composition: Respondents gave details of body composition and gender of junior school learners in four categories of underweight, normal, overweight and obese with normal having a higher percentage (n= 228; 57.33.00 %) as shown on table 8.

Table 8

Body Composition among junior secondary school learners

Body Composition						
Category		**Underweight**	**Normal**	**Overweight**	**Obese**	**Total**
Gender	**Male**	61(13.55%)	114 (25.33%)	18 (4.0%)	15 (3.33%)	**208 (46.22%)**
	Female	58(12.88%)	144 (32.00%)	20 (4.44%)	20 (4.44%)	**242 (53.77%)**
Total		**119 (26.44%)**	**228 (57.33%)**	**38 (8.44%)**	**35 (7.77%)**	**450 100.00%)**

4.1.3 Health Related Components of Physical Fitness among Junior School Learners

Analysis showed ANOVA results for health related components of physical fitness on gender with a significant difference between boys and girls on cardio - respiratory endurance (SS=30.877, df =1;MS=30.877, F=20.840, p =0.000), muscular strength(SS=8.161, df =1;MS=8.161, F=16.808, p =0.000) and muscular endurance(SS=12.484, df =1;MS=12.484, F=13.798, p =0.000). No significant difference was observed on flexibility and body composition. Details of the analysis are shown on table 9.

Table 9

ANOVA analysis of Health Related Components of Physical Fitness among junior school learners

ANOVA TABLE						
Health Related Components of Fitness	Analysis	Sum of Squares	df	Mean Square	F	Sig.
Body Composition * Gender	Between Groups	.560	1	.560	.847	.358
	Within Groups	296.171	448	.661		
	Total	296.731	449			
Cardiorespiratory Endurance * Gender	Between Groups	30.877	1	30.877	20.840	.000*
	Within Groups	663.748	448	1.482		
	Total	694.624	449			
Muscular Endurance *Gender	Between Groups	12.484	1	12.484	13.798	.000*
	Within Groups	405.340	448	.905		
	Total	417.824	449			
Flexibility * Gender	Between Groups	3.358	1	3.358	3.066	.081
	Within Groups	490.739	448	1.095		
	Total	494.098	449			
Muscular Strength * Gender	Between Groups	8.161	1	8.161	16.808	.000*
	Within Groups	217.519	448	.486		
	Total	225.680	449			

N=450, p=0.05, * - Signifiant différence

4.2 Discussion

Gender based analysis showed a significant difference between boys and girls on cardiorespiratory endurance, muscular endurance and muscular strength. Therefore, boys had a higher mean on the three components indicating that their fitness levels are higher than girls. These findings may be in regards to boys' engagements to more physically demanding activities than girls boosting their fitness levels (Armstrong & Welsman, 2006). Apart from sporting activities at school, the social roles of boys are more physically demanding than for girls (Gorzi et al., 2026). Majority of sports activities for boys called for higher intensity and duration of play compared to girls. Boys have increased muscle mass and testosterone levels during puberty contributing to improved strength and muscular endurance (Hunter& Senefeld, 2024). This explains the reason boys had higher cardiorespiratory endurance, muscular endurance and muscular strength scores.

The male respondents had higher scores on cardiorespiratory endurance and muscular strength. This was further amplified where there were more boys in the excelling category against girls who had higher scores in beginning category on the cardiorespiratory endurance. On the variable of muscular strength, boys had higher scores on strong compared to girls higher score on normal giving more highlight on their performance (Nuzzo, 2025). Research on choice and intensity of physical activities (Zhu et al., 2025) has shown that boys engage more in activities that promote cardiorespiratory endurance and muscular strength hence the higher scores.

Muscular endurance indicated that women scored higher in beginning and progressing while boys scored higher in achieving and excelling. This is an indication that boys engaged more in activities that build their muscular endurance than girls (Martín-Rodríguez et al., 2026.) These finding may show duration and consistency of play/sporting activities of boys are longer than girls. Furthermore, recent studies suggested that handgrip strength tests provided useful information on muscle, nerve, bone, or joint disorders and may predict mortality and adolescent's independence in adults (Ashraf et al., 2025; Jebeile et al., 2024). Therefore, measures of strength through handgrip is a good mode of determining health among various age groups in the population.

Findings of the study showed flexibility had the highest mean among the five components of health related fitness hence fitness imbalance. Further learners in this age group engage involuntarily to activities that entails stretching bending and walking. It should be noted that Junior Secondary School Learners ranged between 12-14years old. The findings are similar to Ojiambo et al., 2012 that at this age, children are more flexible hence, the higher mean compared to other four health related fitness components. Further, Studies have shown that flexibility diminishes with age (Zhang et al., 2026). Girls' had higher flexibility compared to boys; detailed gender based findings showed that girls had higher scores in excellent, good and average compared to boys, a finding that has been supported by other scholars (Delfa-De-La-Morena et al., 2022; Martín-Rodríguez et al., 2026).

Majority of respondents had normal body composition, suggesting that engagement in physical activities was associated with healthy body composition (Ružbarská et al., 2025). Meanwhile it could be due to existence in same locality, consuming similar food, engagement in similar socio-economic activities and engaging in similar school competitionsThese contrasts with previous studies indicating that majority of children in urban areas are obese. The study findings were also contrary to a study by NCD Risk Factor Collaboration (2025) showed that the prevalence of underweight children and teens (5-19 years) dropped from 13% in 2000 to 9.2%, while obesity tripled from 3% to 9.4% in the same period. Body composition is highly determined by the location of the study. Different jurisdictions consume diverse food types, with African and rural populations taking more whole meal foods unlike urban and western populations. The current study was carried out in a peri- urban population in Kenya, unlike the study by NCD whose respondents were western population and in urban location, thus the discrepancy. Urban settings normally have prevalence of mechanized transport and fast food, which easily lead to increased weight, hence determine scores on body composition. Since Kenyan population is becoming more mechanized, with increased consumption of processed foods, it is necessary for stakeholders to adhere to set standards of fitness and nutrition as a measure to curb obesity from early age (Andisi *et al.*, 2025).

V.CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The current study sought to determine the status of health-related fitness among Junior Secondary School learners in Kakamega County, Kenya. From the foregoing, it has been established that the status of JSS learners in Kakamega County on the five health related components showed evident gender disparity. Performance in status of learners on cardio respiratory endurance had higher scores for beginners, while muscular strength has majority of respondents as strong. Furthermore, majority of respondents on muscular endurance showed beginners. On flexibility, majority (Girls) of the respondents were average, while body composition showed normal. Gender comparison were equally varied with boys and girls showing different responses on the health related components of fitness. Three components, cardio respiratory endurance, muscular endurance and muscular strength showed gender based significance difference.

5.2 Recommendations

The study recommended specified and health related fitness component for improvement of PA for learners at Junior School since it has a direct impact on health promotion among young people. Also, the study advocates for targeted physical activities interventions across the genders for a balanced individual in all the health related components. This could be achieved through school management adherence to timeline of allocated lessons for PE and school sports. Further, the school management can monitored outcome measures of health related fitness components in sports and arts pathway under CBE curriculum for its successful implementation. The study also recommended replication of a similar study under different location, longitudinal research design and population for comparative purpose.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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