

Determinants of Secondary School Students' Engagement in Sports Activities

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Abstract: In this cross-sectional study determinants of secondary school students' sports activities are evaluated using a stratified sample of 172 boys and 123 girls from Nakuru County, Kenya. Logistic regression analysis found time to be a major determinant of students' engagement in sports. Students' sports practice time per week ranged from 0 - 14 hours, with a mean of 2.7 hours, far below the WHO (2010) target of at least 7 hours a week for people aged 5 – 17 years. Positive social influence raises students' sports activity four times (OR = 4.1) while acquisition of a games kit doubled the likelihood of engaging in sports (OR = 2.1). Wald statistics for these variables were significant at $p < 0.05$. Engagement in sports was independent of gender and physical facilities (OR ≈ 1 each). Except playing fields, t - tests for the correlation coefficients were at $p < 0.05$ all significant. 57.6% of the students were actively engaged in sports. To enhance student sports the statutory 2 hours a day designated for games in schools should be adhered to. Subsidy on the cost of the games kits so that many may acquire them.

Key Words: Students' sports, cross-sectional survey, logistics regression analysis.

1. INTRODUCTION:

Sports entail all forms of physical activity which, through casual or organized participation, aim at expressing or improving physical fitness and mental well – being, socializing or obtaining results in competition at all levels (Council of Europe, 2001).

Engaging in physical exercise and sports is linked to considerable reduction in the risk of developing and dying prematurely from non-communicable diseases: hypertension, type II diabetes and depression (World Health Organization [WHO], 2010). In the United States, it is estimated that \$1 spent on physical activities cuts medical costs by \$3.2 while in the United Kingdom; a 10% increase in adult activity prevents around 6,000 premature deaths (WHO, 2003). Movement of muscles during sports and physical activities sends chemical signals to the brain that trigger the production of brain – derived neurotrophic factor (BDNF) which makes the brain's nerve cells to branch out, join together and communicate with each other in new ways. This is the fundamental physiological process underlying all learning (WHO, 2010).

Table 1: Global recommendation on physical activity

Age group	Duration (minutes/hours)	Physical Activity
5-17years	7 hours per week or (60 minutes or more daily)	High intensity aerobics: ballgames, running, rope jumping and step exercises
18-64 years	150minutes or more a week (30minutes for at least 5 days)	Moderate intensity aerobics: cycling, walking, swimming, rowing, using and elliptical trainer
65 years and above	150 minutes or more a week (30 minutes for at least 5 days)	Moderate intensity PA: brisk walking, tread milling and light jogging

Source: WHO (2010)

According to Fejgin (1994) four theoretical perspectives characterize students' sports participation literature: Developmental theory that concerns the exposure of students to social relations and other achievement – oriented groups that may generate or reinforce academic pursuits. Functionalist theory advocates the integrative effects of school sports through virtues of team work and fair play. The zero – sum theory posits that students allocate time and energy from a finite reserve thus spending it on sports diminishes that which is available for studies leading to low academic achievement. Conflict theory is about sports dominated by small groups within the school leading to the feeling of isolation by the majority that is left. In Kenya, these perspectives narrow down to two divergent views. However, sports remain important in educational institutions as they support academic objectives (Ogong'a et al., 2010).

Vermillion (2007), Hartman (2008) and Rintaugu (2012) in separate but related studies found significant positive correlations between students' sports and health, school attachment, retention, academic achievement and self – esteem . Engagement in sports is also known to raise the visibility and popularity of the participating student which in turn positively influence their educational inspirations and life skills (Department for Media, Culture and Sports

[DCMS], 2002). Empirical evidence of the relation between sports and indices of body fatness among adolescents in Kenya shows sedentary activity is a risk factor for adolescent obesity (Mang'eni et al., 2013).

Using self – determination theory (SDT) on a sample of 492 adolescent soccer players in Spain, Tomas et al. (2010) explained persistence and dropout in sports by examining the three basic psychological needs of human beings; autonomy, relatedness and competence as espoused by Deci and Ryan (2008). They found the desire to belong to a social group (relatedness), autonomy and self – drive (internal locus of control) as critical determinants of sport commencement and persistence. Similar findings were obtained in separate studies by Foley et al. (2008) and Stantage et al. (2012).

In California, Brown et al. (2008) studied the link between adolescents' sports and access to playing fields using five sets of stratified logistic regression analysis. They found access to a safe playing field or park greatly determined sports and physical exercise among adolescents in urban but not in rural areas. In terms of gender, Allison et al. (2007) compared sports activity among adolescents in a pooled sample of 9th and 12th graders from the US and Canada where they observed a dominant and steady linear decline in vigorous physical activity between the ages 14 and 18 years (typically form 1 to 4 Kenyan Schools). This age bracket typifies secondary school students in form 1 to 4 in Kenya. The analysis showed that the decline in sports activity during adolescence may be normative, when they develop new interests and pursuits.

The Kenyan school program is considerably tight; except the weekends, heavy academic work runs from 8am up to 4pm. Games time; typically 4pm – 6pm should be a welcome break to let off steam in an approved manner. Furthermore, the Long Term Athlete Development model (Istvan & Hamilton, 2004), visualizes the school as the focal point and foundation for training to compete and reap from sports. But as observed by Ogong'a et al. (2010), this is often not the case for there are two conflicting perspectives amongst education stakeholders about the role and place of sports in schools. Proponents of sports respect the complementary role of co – curricular activities while critics as noted by Ogochi and Thinguri (2013) dwell on the finitude of student time as espoused under the zero – sum theory Fejgin (1994). They content that sports deplete junior time that should be dedicated to fundamentals of academic preparations. However, exemplary performance by Kenyan athletes in global sports has been a great source of national pride.

Sport is so important to optimal child growth and development that it has been recognized by the UNHCR as a right of every child. The UN declaration of 2005 as the year of sport underscores this. Despite this, Ginsburg (2007) noted many children were being raised in an increasingly hurried style that limits the protective benefits they would gain from play. The consequences have been adverse; learner fatigue, student unrest, unfavorable body mass indices and increased prevalence of cardiovascular risk factors (Trudeau et al., 2012; Allison et al., 2007). According to Krotee and Bucher (2007) the challenge as we move into the future is for the society to construct a more sound multi-dimensional (Knowledge, skills, attitude) path to a lifetime health and fitness. In this context, the study sought to evaluate determinants of students' sports activities as a fundamental aspect of the school curriculum.

2. RESEARCH HYPOTHESES:

- Gender difference, physical facilities, gender kits, time and socialization do not determine the level of sports activities among secondary school students
 $H_0: \beta_j = 0$ vs $H_1: \beta_j \neq 0$, $j = 1, 2, 3, 4$ and 5
- Social influence and the availability of games kits have no effect on the amount of time students spent on sports activities
 $H_0: R\beta_j = q$ vs $H_1: R\beta_j \neq q$, $j = 3, 4$ and 5
- There is no correlation between students' sports activity and; the availability of playing fields/courts, sportswear, time and social influence.
 $H_0: \rho_j = 0$ vs $H_1: \rho_j \neq 0$, $j = 1, 2, 3, 4$ and 5

2.1. Sampling Design

The study was a cross – sectional survey. A stratified sample of 295 (172 boys and 123 girls) was drawn from a population of 13747 students in 28 schools. Sample size estimation for finite populations was obtained as described by Cochran (1977) and Kothari (2005).

Table 2: Proportional allocation of participants across strata.

School Category	Number	Population	Proportion	Sub-sample (n_i)
Mixed schools	25	10518	0.76511	226 (boys = 151, girls =75)
Boys' schools	1	986	0.07172	21
Girls' schools	2	2243	0.16316	48
Total	28	13747	0.99999	295 (boys = 172, girls = 123)

A structured questionnaire was administered to the students in different schools to get potential determinants of student engagement in sports. Questions concerning gender, playing fields, sports kids, time and social influence were asked.

2.2 Model

Since the dependent variable y_i is binary, the logistic regression model;

$\log it(\hat{\pi}_i) = \sum_{i=1}^k \beta_i x_i$, $i = 1, 2, \dots, 6$ became the model of choice, where x_i is the variable thought to determine student engagement in sport. The logistic transform of the response y_i ensures the results are plausible. Thus the predicted probability ($\hat{\pi}_i$) of a student engaging actively in sports should be between 0 and 1.

3. DATA ANALYSIS:

Responses were loaded into R i386 3.0.1 for analysis. R codes based on the generalized linear model (glm) were constructed and the data was run to produce pertinent descriptive and inferential statistics. Stepwise regression was applied to obtain optimum models.

4. RESULTS AND DISCUSSION:

The outputs from R i386 3.0.1 are presented in tables 3 through 9.

Table 3. Playing fields and duration of play

Independent variable	Mean	Standard deviation	Coefficient of Variation
Playing fields/courts	4.268	1.447	0.339
Time (spent in sport per week)	2.728	2.789	1.022

In Table 3, the average number of playing fields per school was 4. Relative variation in the number of fields across schools was low (0.339). The average play time per week was 2.7 hours.

Table 4: Frequency counts and percentages of study variables

	Sportswear				Social Influence				Sporting Activity			
	Male		Female		Male		Female		Male		Female	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Frequency	90	82	79	44	133	39	78	45	99	73	71	62
Percentage	52.3	47.7	64.2	35.8	77.3	22.7	63.4	36.6	57.6	42.4	57.7	42.3

In Table 4, more girl subjects (64.2%) had sportswear than boys' subjects (52.3%) but more boys (77.3%) seem socially inspired into sports than girls (63.4%). Though the prevalence of sports in the schools was low (57.7%) there was gender parity.

Table 5: Main effects of the study variables

Variable	Coefficient	Standard Error	Z – value	Pr(> Z)
Intercept	-1.0294	0.6385	-1.6120	0.1069
Fields/Courts (x_1)	0.0066	0.1108	0.0600	0.9524
Games kit (x_2)	0.7855	0.3705	2.1200	0.03402*
Games time (x_3)	1.4802	0.5015	2.9520	0.00316**
Social support (x_4)	1.4199	0.4871	2.9150	0.00356**
Games kit \times time (x_5)	-0.3815	0.2868	-1.3300	0.1834
Social influence \times time (x_6)	-0.7246	0.4967	-1.4590	0.1146

*indicates that the variable had a significant effect as $p < 0.05$, and ** significant at $p < 0.01$

In table 5, games kits, time and social influence have p – values less than 0.05 meaning they are significant determinants of students' engagement in sports. Consequently, the null hypothesis $H_0: \beta_j = 0$, $j = 1, 2, 3, 4$ and 5 is rejected.

Table 6: The correlation matrix of study variables

	y				
Sports Activity (y)	1.000	x_1			
Fields/Courts (X_1)	0.056	1.000	x_2		
Sportswear (X_2)	0.267	0.077	1.000	x_3	

Games time (X_3)	0.621	0.070	0.212	1.000	x_4		
Social influence (X_4)	0.336	-0.008	0.251	0.275	1.000	x_2, x_3	
Games kit - time (X_2, X_3)	0.393	0.018	-0.061	0.684	0.108	1.000	x_2, x_4
Influence - time (X_2, X_4)	0.442	0.009	0.102	0.749	-0.057	0.643	1.000

From table 6, fairly strong linear associations exist between the possession of a games kit, positive social influence and time: $r = +0.684$ and $+0.749$ respectively.

Table 7: t-tests for the correlation between sports and study variables

Variable	x_1	x_2	x_3	x_4	x_2, x_3	x_3, x_4
Correlation (r)	0.057	0.267	0.621	0.336	0.393	0.442
Empirical t - value	0.955	4.748	13.55	6.104	7.325	8.442

Table 8: The odds ratio and the 97.5% confidence interval.

	Odds ratio	97.5 % Confidence Interval	
Intercept	0.3572	0.1317	1.2051
Gender (Boy)	1.0030	0.6225	1.3835
Gender (Girl)	0.9961	0.5723	1.4224
Fields/ Courts	1.0066	0.8114	1.2549
Games Kit	2.1935	1.0905	4.7569
Games Time	4.3940	1.9698	13.1208
Social Influence	4.1365	1.6983	11.4112
Games kit \times time	0.6828	0.3246	1.0277
Social influence \times time	0.4845	0.1647	1.0100

From table 8, gender, fields and courts have odds ratios close to one meaning student engagement in sports in Nakuru is independent of those variables. However, possession of a games kit doubles the likelihood of a student engaging in sports (OR = 2.19). Availability of time and positive social influence enhances the likelihood of a student engaging in sports more than four times (OR = 4.39 and OR = 4.14) respectively. Confidence intervals for each of these variables do not contain 1. We therefore reject the null hypothesis that games kits, time and social influence do not determine students' engagement in sports.

Table 9: Wald statistics of the study variables

Coefficient	A.S.E	Wald Statistics
$\beta_1 = 0.0066$	0.1108	0.0035
$\beta_2 = 0.7855$	0.3705	4.4949
$\beta_3 = 1.4802$	0.5015	9.2343
$\beta_4 = 1.4200$	0.4871	8.4985
$\beta_5 = -0.3815$	0.2868	1.7694
$\beta_6 = -0.7246$	0.4967	2.1282

5. CONCLUSIONS AND RECOMMENDATIONS:

From the results three major determinants of engagement in sports by students emerged, namely; the availability of time ($\beta_3 = 1.4802$, $P = 0.00316$). The average time students spent practicing sports per week stood at 2.7 hours. This was far below the WHO (2010) target of at least 7 hours a week for people aged 5 -17 years. Social influence ($\beta_4 = 1.420$, $P = 0.00356$) follows closely. 70.4% of the students in sports had positive peer and parental influence. This finding is consistent with what Foley et al. (2008) call significant others while Tomas et al (2010) characterizes it as perceived relatedness with others in the community of involvement. Acquisition of games kits also propelled students to sports ($\beta_3 = 0.7855$, $P = 0.0340$. It more than doubled students' propensity for sports (OR = 2.19). In Kenyan secondary schools, game time (4pm to 6pm thrice a week) and Physical Education time (40 minutes a week) are well defined in school programs but are seldom adhered to. To meet the WHO (2010) threshold of 7 hours a week games and Physical Education both of which are statutory requirements of the curriculum need protection from encroachment by academics. Monitoring their enforcement in schools would ensure that academics and sports coexist. Considering that only about 58.3% of the students have personal games kits, it is considerable that major lack of games kits is a major deterrent to students' sport engagement. Using regular school uniform for sports is not only unhygienic but predisposes athletes to injury. Important duty on sportswear should be waived so that prices are affordable to students from all social academic backgrounds.

REFERENCES:

1. Agresti, A. (1996). *Introduction to Categorical Data Analysis*. John Wiley, Inc., New York.
2. Allison, R. K., Adlaf, M. E., Dwyer, M. J., Lysy, C. D. and Irving, M. H. (2007). The Decline of Physical Activity among Adolescent Students. *Journal of Public Health*, 2, 97-100.
3. Brown, R. F., Yu, H., Hastert, A. T. and Babey, H. S. (2008). Physical Activity Among Adolescence: When Do Parks Matter? *Journal of Preventive Medicine*, 34, 345-348
4. Chen, L., Haase, M. A., and Fox, R. K. (2007). Physical Activity among Adolescents in Taiwan. *Journal of Clinical Nutrition*, 16, 354-371
5. Cochran, G. W. (1997). *Sampling Techniques*. John Wiley and Sons Inc., New York
6. Coleman, J. (1961). Adolescent Society: the Social life of teenagers and its impact on Education. *Free Press*, 29 (4): 40-43
7. Council of Europe (2001). *The European Sports Chapter*. Author, Brussels.
8. Cox, D. R. and Snell, E. J. (1989). *Analysis of Binary Data*. Chapman and Hall, London.
9. Deci, L. E. and Ryan, M.R. (2008). Self-Determination Theory: A Macro-theory of Human Motivation, Development and Health. *Canadian Psychology*, 49(3): 182-185
10. Department for Media, Culture and Sports. (2002). *Game Plan: a strategy for delivering Government's sports and physical activity objectives* (a joint DCMS/ strategy unit report). Government Printing Office, London.
11. Erkut, S. and Tracy, A. (2002). Predicting Adolescent Self- Esteem from Participating in School Sports among Latino Subgroups. *Journal of Behavior Science*, 24 (4): 409-429.
12. Fejgin, N. (1994). Participation in High School Competitive Sports: A subversion of School Mission or Contribution to Academic Goals? *Sociology of Sports Journal*, 3, 211-230
13. Foley, L. Prapavessis, H., Maddison, R., Burke, S., McGowan, E. and Gillanders, L. (2008). Predicting Physical Activity Intention and Behaviour in School – Age Children. *Pediatric Exercise Science*, 20, 342-356.
14. Ginsburg, K. R. (2007). The importance of Play in Promoting Health Child Development and Maintaining Strong Parent-Child Bonds. *American Academy of Pediatrics*, 199 (1): 182-191.
15. Gratton, C. and Taylor, P. (1992). *Sports and Recreation: An Economic Analysis*. Chapman and Hall, London.
16. Hamilton, C.L. (1992). *Regression with Graphics. A Second Course in Applied Statistics*. Duxbury Press, California.
17. Hartman, D. (2008). *High School Sports Participation and Educational Attainment: Recognizing, Assessing and Utilizing the Relationship*. Report to the LA84 Foundation, Los Angeles, California, November, 2008.
18. Istvan, B. and Hamilton, A. (2004). *Long-Term Athlete Development: Trainability in Childhood and Adolescence Windows of Opportunity, Optimal Trainability*. Paper presented at the Scottish Strength and Conditioning Seminar, Largs, Scotland, May, 2003.
19. Kanters, A. M., Bocarro, N. J., Edwards, B. M., Casper, M. J. and Floyd, F. M. (2012). Schools Sports Participation under Two School Policies: Comparison by Race/Ethnicity, Gender and Socioeconomic Status. *The Society of Behavioral Medicine*, 45, 113-121.
20. Koivusilta, L., Nupponen, H. and Rimpela, H. A. (2011). Adolescent Physical Activity Predicts High Educational and Socio-Economic Position in Adulthood. *European Journal of Public Health*, 22(2): 203-209.
21. Kothari, C. R. (2005). *Research Methodology: Methods and Techniques*. Wiley Eastern Ltd, New Delhi.
22. Krotee, M. L. and Butcher, C. A. (2007). *Management of Physical Education and Sport*. McGrawhill, Boston.
23. Lindsey, J. K. (2004). *An Introduction to Applied Statistics: A Modelling Approach*. Oxford University Press, New York.
24. McCullagh, P. and Nelder, J. A. (1989). *Generalized Linear Models*. Chapman and Hall, London.
25. Mangeni, O.R., Magutah, K., Thairu, K., Takahashi, R. and Wilunda, C. (2013). The Relationship between Physical Activity and Indicators of Body Fatness in Kenyan Adolescents. *Journal of Applied Medical Research*, 2(1): 43-59.
26. Miller, M.D. and Russell, E. R. (1971). *Sport: A Contemporary View*. Lea and Febiger, Philadelphia.
27. Ogochi, G. and Thinguri, R. (2013). Evaluation of Effectiveness of Co-Curricular Policy in Developing Talent among the Youth in Secondary Schools in Trans-Mara west sub-county, Kenya. *Journal of Education and Practice*, 4 (26) 77-80
28. Ongong'a O. J., Okwara, O. M., and Okello, M. T. (2010). Sports and Secondary School Education in Kenya. *International Research Journals*, 11, 609-617.
29. Powers, D. A. and Xie, Y. (2008). *Statistical Methods for Categorical Data Analysis*. Emerald, London.
30. Rintagu, E. G. (2012). The Effects of Participation in Competitive Sports on Academic Performance of Secondary School Students in Nairobi. *Journal of Health Science*. 4 (2). 34-40
31. Standage, M., Gillison, B. F., Ntoumanis, N. and Treasure, C. D. (2012). Predicting Students' Physical activity and Health- Related Well-Being: A prospective Cross- Domain investigation of motivation across School physical settings. *Journal of Sport and Exercise Psychology*. 34, 37-60.

32. Tomas, G., Eduardo, C., Ruth, J., Damian, I. and Juan, A. (2010). Using Self-Determination Theory to Explain Sport Persistence and Dropout in Adolescent Athletes. *Spanish Journal of Psychology*, 13 (2) 677-684.
33. Trudeau, F., Shephard, J. R., Laurencelle, L. and Larouche, R. (2012). Life Transitions in the Waning of Physical Activity from Childhood to Adulthood in the Trois-Revie's Study. *Journal of Physical Activity and Health*. 9, 516-524.
34. Vermillion, M. (2007). Sports Participation and Adolescent Deviance: A logistic Analysis. *Social Thought and Research*. 28, 228-258.
35. Webber, J. D. and Mearman, A. (2001). Student Participation in Sporting Activities. *Taylor and Francis Journals*, 41(9) 1183-1190.
36. World Health Organization (2003). *Sports as a Tool for Development and Peace: Towards Achieving Millennium Development Goals*. Author, Geneva.
37. World Health Organization (2010). *Global Recommendations on Physical Activity for Health*. Author, Geneva.