AN INVESTIGATION OF THE RELATIONSHIP BETWEEN FITNESS LEVELS, SELF-EFFICACY, AND LOCUS OF CONTROL ON ACADEMIC ACHIEVEMENT OF MIDDLE SCHOOL STUDENTS

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Abstract

This study investigated the effect fitness level, self-efficacy and locus of control have on the academic achievement of eighth grade students (n=115) studying in a Mid-Atlantic region middle school (2011-2012 school year). It was hypothesized that the students who had high fitness scores, high level of self-efficacy and high internal locus of control would also have high academic achievement scores in math and reading. The quantitative research design involved the single-stage sampling method. Data were analyzed using multiple regression analysis. The study has revealed significant relationship between academic achievement, locus of control and self-efficacy.

Keywords: Fitness, Self-efficacy, Locus of Control, Academic Achievement, Middle School

Introduction

To date, limited research is available regarding fitness abilities of children and academic achievement. It is postulated that further research is required to gain a better understanding of children's motivational processes and achievement behaviors, with the goal of encouraging children to be more physically active and adopt a healthy lifestyle (Gao, et al 2008).

Barlow et al. (2002) report how several practical therapeutic approaches for helping individuals increase their motivation or readiness to change eating and physical activity behaviors show promise. Bandura and Schunk (1981) posit that much of human behavior is directed and sustained over long periods, even though the external inducements for it may be few and far between.

The lack of fitness abilities in children is directly linked to obesity. A study by Crow and Golan (2004) found that "treating obesity is one of the most difficult challenges that multidisciplinary pediatric health care providers face. Coping with obesity requires lifelong attention to healthy eating and an active lifestyle". The Centers for Disease Control and Prevention provide evidence that "school children do not engage in sufficient levels of physical activity. This leads to a dramatic increase in the prevalence of obesity and diabetes among this population and causes health problems in their future" (Gao et al., 2008).

According to Becker et al. (1986) "…the concept of self-efficacy expectations is of particular relevance to health education". D'Amico & Cardaci (2003); Lent et al. (1984); Mone et al. (1995) have determined that high self-efficacy is a strong predictor for students who strive for academic excellence (as cited in Fortman, 2006). Moreover, Cohen et al. (1978) believe that the locus of control is a variable that is strongly correlated with motivation and learning. For this reason, investigating self-efficacy and locus of control along with fitness abilities of children and academic achievement necessitated further exploration. Camp Golden Treasures (CGT) is an example of a study regarding fitness abilities of young people. The US Department of Health and Human Services has found that adolescents who are overweight have a 70% chance of being overweight or obese as adults (as cited in Ballard et al., 2009). According to Ballard et al. (2009), the primary goal of the six-week long CGT camp was to support campers to lose weight, raise self-esteem, and to develop the tools necessary to lead a health-filled lifestyle.

Cohen et al. (1978) believe locus of control is a variable that is strongly correlated with motivation and learning. For this reason, investigating locus of control along with fitness abilities of children and academic achievement necessitated further exploration. The lack of fitness abilities in children is directly linked to obesity. A study by Crow and Golan (2004) found that "treating obesity is one of the most difficult challenges that multidisciplinary pediatric health care providers face. Coping with obesity requires lifelong attention to healthy eating and an active lifestyle". The Centers for Disease Control and Prevention provide evidence that "school children do not engage in sufficient levels of physical activity. This leads to a dramatic increase in the prevalence of obesity and diabetes among this population and causes health problems in their future" (Gao et al., 2008). In addition, a review of locus of control shows that these variables have been disregarded when considering academic achievement scores of children.

Regarding locus of control, empirical studies show how "The manner in which individuals view themselves can affect their level of achievement motivation and their willingness to keep trying to achieve success in the face

of failure"(Ciccarelli and Meyer, 2006). Ciccarelli and Meyer further assert that one of two belief systems affects an individual's level of motivation regarding achievement. One type of person may hold to the notion that intelligence is permanent or unchanged and independent of anything that can be done to alter their level of intelligence. On the other hand, another type of person may believe that intellectual abilities are unpredictable and can be molded by life experiences in small increments.

Ravens-Sieberer and Bullinger (1998), found that locus of control plays a pivotal role in the health and welfare of children. The researchers found that quality of life in children is a relevant end-point for evaluating the use of medical intervention in terms of prevention, treatment, and rehabilitation for this special patient group. Eveland-Sayers et al. (2009) reported that the children who have low physical activity levels have poorer academic achievement scores and inferior cognitive performance as compared to physically fit children.

Method and Procedure

For the purposes of this study, 276 students met the criteria but only 115 students (42 males and 73 females) actually participated. 33% of participants were African-American, 63.5% were Caucasian, and 3.5% represented other populations. These particular 276 students were selected based on FITNESSGRAM scores which are targeted and evaluated by this North Eastern State. A single-stage sampling process was utilized because the researchers greatly benefited by gaining direct access to the students. The subjects were appraised in an effort to establish the extent of the relationship between fitness abilities, self-efficacy, locus of control and performance on the State Comprehensive System. The subjects completed the FitnessGram (Cooper Institute, 1999) at the beginning of the school. The subjects also completed the Children's Nowicki-Strickland Internal/External Locus of Control Scale (Nowicki and Strickland, 1971). This instrument has been noted to outline specific levels regarding locus of control in students. The New General Self-Efficacy Scale - NGSES (Chen, 1982) was administered to evaluate self-efficacy of the students.

The data for this research study was statistically analyzed and alpha was set at .05 to verify statistical significance for all tests. The researcher used regression analysis to cultivate an unambiguous model and viable fit within the premise of the data. Stepwise multiple regression was applied. The stepwise multiple regression analysis allowed this examiner to consider the impact of fitness levels, self-efficacy and locus of control, and demographic variables on academic achievement. In addition to identifying the relationships between the variables, stepwise multiple regression analysis provided the researchers with the ability to explain and predict outcome

variables. Hence, a composite score from the FITNESSGRAM data as well as a composite score for math and reading the Comprehensive System Scores results were determined for use in the ANOVA procedure. Pearson's Product Moment Correlations were administered in an effort to denote the extent of the relationship between the variables.

Hypotheses and Research Questions

It was hypothesized that eighth grade children who met (or exceeded) the state standard on the comprehensive assessment (math and reading) would also possess high scores (Healthy Fitness Zone) on the FITNESSGRAM assessment. It was also hypothesized that high fitness scores, self-efficacy beliefs and locus of control would yield high levels of academic achievement

Results and Discussion

The results in Table -1 and Table – 2 display the data compiled from all segments of the FitnessGram. Mean scores were calculated for the purpose of data analysis.

Table-1: Frequency Counts for FITNESSSGRAM

	FITNESSGRAM							
	Pacer Frequency	Curl Up Frequency	Trunk Lift	Push Up Frequency	Flexed arm hang Frequency	Pull Ups Frequency	BS Left Frequency	BS Right Frequency
N	115	115	115	115	115	115	115	115
Missing	0	0	0	0	0	0	0	0
Mean	2.56	2.26	11.45	2.54	1.77	1.36	2.88	2.87
Std. Error of Mean	0.103	0.077	0.201	0.105	0.108	0.07	0.041	0.042
Std. Deviation	1.11	0.828	2.153	1.126	1.163	0.752	0.442	0.45
Range	3	2	12	3	4	4	2	2
Minimum	1	1	0	1	1	1	1	1
Maximum	4	3	12	4	5	5	3	3

Table-2: Frequency Counts for Healthy Fitness Zone (HFZ)

Variable	*Category*	*N*	*%*
Healthy Fitness Zone (HFZ)	No	69	60.0
	Yes	46	40.0

As is evident from the results in Table-2, only 46 participants out of total 115 i.e. merely 40% participating children fell in the Healthy Fitness Zone. These results are in line with the latest statistics projected by the Centers for Disease Control and Prevention which has reported an increased

rate of prevalence of obesity in the state of Delaware for the baseline year 2013.

Figure-1: Bar Graph for Academic Achievement

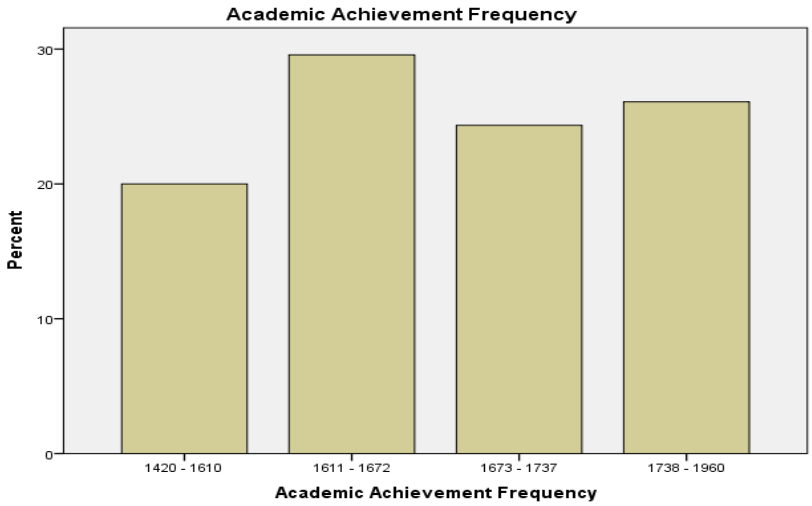

Figure 1 shows that majority of the students in this study had academic achievement scores in math and reading that ranged from 1611-1672. The State Assessment math and reading scores can range from 1420 – 1960. It was calculated that the mean math score as 838.85. The mean reading score was calculated as 841.90. Hence, a composite (math + reading) score was used for analyzing the academic achievement data because the aforementioned scores were analogous.

The results with regard to the Pearson product-moment correlations for selected Demographic Variables with Math and Reading employed for the present study have been presented in Table-3.

Table-3: Correlations for Selected Demographic Variables with Math and Reading Scales

Variable	Math		Reading		
Healthy Fitness Zone (HFZ)[a]	.08		.11		
Self-Efficacy	.32	****	.25	**	
External Locus of Control	-.19	*	-.27	***	
* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$. [a] Zone: 0 = No 1 = Yes					

The correlation was not significant between fitness levels and math scores (r = .08, p = .40) or fitness levels with reading (r = .11, p = .24). Thus, the null hypothesis must be retained for Research Hypothesis One.

With regard to hypothesis two, Table-4 presents the Pearson product-moment correlations of self-efficacy with the composite score for academic achievement, Self-efficacy and Locus of control. There were positive, significant correlations between the mean self-efficacy score and the composite academic achievement score (p = .000). Hence, the alternative hypothesis was supported.

Table-4: Correlations for Academic Achievement, Self-efficacy and the Locus of control

		Academic Achievement Score	Self Efficacy Mean	Locus of Control Score	Fitness Score
Pearson Correlation	Academic Achievement Score	1.000	.375	.245	.215
	Self Efficacy Mean	.375	1.000	.183	.222
	Locus of Control Score	.245	.183	1.000	.168
	Fitness Score	.215	.222	.168	1.000
Sig. (1-tailed)	Academic Achievement Score	.	.000	.004	.010
	Self Efficacy Mean	.000***	.	.025	.008
	Locus of Control Score	.004**	.025*	.	.037
	Fitness Score	.010*	.008**	.037*	.
N	Academic Achievement Score	115	115	115	115
	Self Efficacy Mean	115	115	115	115
	Locus of Control Score	115	115	115	115
	Fitness Score	115	115	115	115

Note: *p < .05, **p < .01, and ***p < .001.

Table 4 also reveals the Pearson product-moment correlations of locus of control with academic achievement (composite reading and math scores) employed to test the hypothesis 3.

Internal locus of control was found related to higher math scores and to higher reading scores (p = .004). Thus, Hypothesis Three was supported.

To test hypothesis 4, multiple regression models were calculated to predict a student's score in math or reading, as shown in Table 5

Table-5: Prediction of Math Score Based on Selected Variables

Variable	*B*	*SE*	β	*p*
Intercept	683.26	52.03		.001
Gender [a]	1.43	10.27	.01	.89
External Locus of Control	-0.74	0.37	-.16	.05
Self-Efficacy	1.14	0.49	.20	.02
Race/Ethnicity [b]	49.04	10.20	.41	.001
Weight (lbs.)	0.36	0.18	.19	.05
Healthy Fitness Zone[c]	17.45	10.99	.15	.12

Note: Full Model: F (6, 108) = 7.80, p = .001. R^2 = .302.
[a] Gender: 0 = M*ale*, 1 = Fem*ale*.
[b] Race/Ethnicity: 1 =African-Americans, 2 = *Others*, 3 = *Caucasian*.
[c] Zone: 0 = *No* 1 = *Yes*.

In Table 5, the six variable model was significant (p = .001) and accounted for 30.2% of the variance in the student's math score. Inspection of the beta weights found the student's math score was higher when the student: a) did not have an external locus of control (β = -.16, p = .05), b) had higher self-efficacy (β = .20, p = .02), c) was Caucasian (β = .41, p = *.001,* and d) weighed more (β = .19, p = .05). However, the student's math score was not related to their gender (β = .01, p = .89) or whether they met the Healthy Fitness Zone standard (β = .15, p = .12).

In Table 6, the six variable model was significant (p = .001) and accounted for 25.2% of the variance in the student's Reading score. Inspection of the beta weights found the student's Reading score was higher when the student: a) did not have an external locus of control (β = -.27, p = .002); and b) was Caucasian (β = .36, p = .001). Reading scores *tended* to be higher for girls (β = -.15, p = .10). However, the student's Reading score was not related to: a) their self-efficacy score (β = .12, p = .17); b) their weight (β = .07, p = .50); or c) whether they met the Healthy Fitness Zone standard (β = .09, p = .35). This combination of findings provided support for Hypothesis Four.

Table-6: Prediction of Reading Score Based on Selected Variables

Variable	*B*	*SE*	β	*p*
Intercept	801.55	54.62		.001
Gender [a]	-17.98	10.78	-.15	.10
External Locus of Control	-1.24	0.39	-.27	.002
Self-Efficacy	0.71	0.52	.12	.17
Race/Ethnicity [b]	44.16	10.71	.36	.001
Weight (lbs.)	0.13	0.19	.07	.50
Healthy Fitness Zone[c]	10.76	11.53	.09	.35

Note: Full Model: F (6, 108) = 6.06, p = .001. R^2 = .252.
[a] Gender: 0 = *Male* , 1 = *Female*
[b] Race/Ethnicity: 1 = African-American, 2 = *Others*, 3 = *Caucasian*
[c] Zone: 0 = *No* 1 = *Yes*

Table 7 demonstrates the Pearson product-moment correlations for gender, ethnicity and weight with the two academic scores (reading and math scores). No significant correlations were found between gender and math (r = .11, p = .23) or gender and reading (r = -.07, p = .47). Caucasian students had higher scores for math (r = .45, p = .001) and for reading (r = .37, p = .001). No significant correlations were found between weight and math (r = *.06, p = .49*) or weight and reading (r = -.06, p = .51).

Table-7: Correlations for Selected Demographic Variables with Math and Reading Scales

Variable	Math		Reading	
Gender*	.11		-.07	
Race/Ethnicity**	.45	****	.37	****
Weight (in pounds)	.06		-.06	

*Gender: 0 = Male, 1= Female
**Race/Ethnicity: 1 = African-American, 2 = Others, 3 = Caucasian

Findings and Conclusion

Significant findings were established concerning academic achievement for female, Caucasian, eighth grade students who possessed high levels of self-efficacy and a high internal locus of control.

As a result of this study, it was found that there was no significant correlation between fitness levels and academic achievement. A review of

the literature had provided differing results, which could be due to the different methods of research performed.

Datar et al. (2004) realized the importance of a child's physical fitness levels in relation to academic achievement. The researchers noted that the overweight status in the children they studied was detrimental to their academic performance. It stands to reason that children as young as five years old should be carefully monitored to ensure that they become physically fit and capable of facing academic challenges. Brown et al. (2008) found that increased physical activity in children would influence them academically in a positive manner. Grissom's (2005) study highlighted the importance of physical fitness and educational success, and identified resources that are required in order to maintain a connection between fitness and academic achievement. Coe et al. (2006) determined that the students who met or exceeded the academic standard were the individuals who strived to be the most physically fit. Blizzard et al. (2001) found that a child's academic performance is augmented with increased physical fitness. Chalmers and Martin (2007) argue that the health-related issues of our nation's youth should induce educational leaders to devise a plan of action that entails fitness and academics for the betterment of society. Inman et al. (2000) also found that physical fitness abilities impact self-esteem as well as academic achievement. The aforementioned studies that support extra physical activity for children lend credence to the fact that fitness may impact academic achievement in ways educational leaders should be apprised of.

The research question relating to locus of control yielded affirmative results. A significant positive relationship has been noticed for levels of high internal locus of control, and academic achievement which suggest that high levels of internal locus of control are associated with academic achievement because of their positive influences on children (Cohen et al.,1978; Hanson & Schunk, 1985; Sharma, 2006; Batty et al., 2008). It stands to reason that students who hold high efficacious beliefs and who also have a high internal locus of control embody principles which enhance their ability to function at higher academic levels. These students are also more apt to perform well in the school setting because their self-worth is intact.

The results concerning gender, weight, and race/ethnicity yielded various outcomes. It was found that Caucasian females with high self-efficacy and a high internal locus of control tended to have higher reading levels. According to Davis et al. (2005), racial disparities play an important role in the manner in which children are educated in this society. One way to remedy the problem is to create strategies for ethnic groups that will enable children of all cultures to develop strong characters.

It needs to be noted that race/ethnicity appears to be a variable that has an impact on academic achievement in middle school children. There are often discussions in educational arenas about closing the achievement gap between African-American students and other cultural groups. If children in middle school are already experiencing academic drawbacks, perhaps educational leaders should review their practices to include children at much younger ages (i.e., elementary school or pre-school) in an effort to close the achievement gap.

Based upon the findings of this study, the investigators suggest that a longitudinal investigation in a study of this nature in an effort to obtain more comprehensive results exploring the relationship between physical fitness and academic achievement. As children grow and develop, they experience many physical changes. A study that monitors the growth and development of children in one school district over an extended period of time may render fascinating data.

References:

Ballard, S., Collier, D., Crawford, Y., Gross, K., Harris, N., & Lamson, A. (2009). Collaboration in action. *Families, Systems and Health, 27*(1), 116-124.

Barlow, S., Holt, K., Neumark-Stzainer, D., Sherwood, N., Sofka, D., Story, M., & Trowbridge, F. (2002). Management of child and adolescent obesity: Attitudes, barriers, skills and training needs among health care professionals. *Journal of the American Academy of Pediatrics, 110*, 210-214.

Batty, D., Deary, I. J., & Gale, C. (2008). Locus of control at age 10 years and health outcomes and behaviors at age 30 years: The 1970 British cohort study. *Psychosomatic Medicine, 70,* 397-403.

Becker, M., DeVellis, B., Rosenstock, I., & Strecher, V. (1986). The role of self-efficacy in achieving health behavior change. *Health Education Quarterly, 13*(1), 73-91.

Blizzard, L., Dean, K., Dwyer, T., Lazarus, R., & Sallis, J. (2001). Relation of academic performance to physical activity and fitness in children. *Pediatric Exercise Science, 13,* 225-237.

Brown, D., Carlson, S., Dietz, W., Fulton, J., Kohl, H., Lee, S., & Maynard, M. (2008). Physical education and academic achievement in elementary school: Data from the early childhood longitudinal study. *American Journal of Public Health, 98*(4), 721-727.

Chalmers, G., & Martin, L. (2007). The relationship between academic achievement and physical fitness. *Physical Educator,* 64(4), 214-221.

Chen, G. (1982). The New General Self-Efficacy Scale. Retrieved from www.NGSEScale.doc

Ciccarelli, S., & Meyer, G. (2006). *Psychology.* Upper Saddle River, NJ: Pearson Prentice Hall.
Coe, D., Malina, R., Pivarnik, J., Reeves, M., & Womack, C. (2006). The effect of physical education and activity levels on academic achievement in children. *Medicine and Science in Sports and Exercise, 38*(8), 1515-1519.
Cohen, S., Gajar, A., Hallahan, D., & Tarver, S. (1978). Selective attention and locus of control in learning disabled and normal children. *Journal of Learning Disabilities, 11*(4), 47-52.
Cooper Institute for Aerobics Research. (1999). Fitnessgram: Test administration manual. Champaign, IL: Human Kinetics.
Crow, S., & Golan, M. (2004). Targeting parents exclusively in the treatment of childhood obesity: Long term results. *Obesity Research, 12*(2), 357-361.
D'Amico, A., & Cardaci, M. (2003). Relations among perceived self-efficacy, self-esteem, and school achievement. *Psychological Reports, 92*, 745-754.
Datar, A., Magnabosco, J., & Sturm, R. (2004). Childhood overweight and academic performance: National study of kindergartners and first graders. *Obesity Research, 12*(1), 58-68.
Davis, L., Jonson-Reid, M., Williams, J., & Williams, T. (2005). Academic self-efficacy among African-American youths: Implications for school social work practice. *Children and Schools, 27*(1) 5-14.
Delaware Comprehensive Assessment System (2011). General information. Retrieved from https://login.doe.K12.de.us/SSO/Home/Hom
Delaware Department of Education (2007). *Maternal and child health services Title V block grant, state narrative for Delaware, application for 2013, annual report for 2011.* Retrieved from www.udel.edu/delawaredata/pages/level03htm.
Delaware Department of Education (2012). Race/ethnicity data. Retrieved from http://www.doe.K12.de.us/reports-data/default.
Delaware Growth Charts. Retrieved from http://www.halls.md/on/girls-weight-b.htm.
Fortman, T. (2006). *The effects of body image on self-efficacy, self esteem, and academic achievement.* A Senior Honors Thesis, Psychology, Ohio State University.
Gao, Z., Harrison, L., & Lee, A. (2008). Understanding students' motivation in sports and physical education: From the expectancy-value model and self-efficacy theory perspectives. *National Association for Kinesiology and Physical Education in Higher Education, 60,* 236-254.
Grissom, J. (2005). Physical fitness and academic achievement. *Journal of Exercise Physiology, 8 (1*), 11-25.
Hanson, R., Schunk, D., (1985). Peer models: Influence on children's self-efficacy and achievement. *Journal of Educational Psychology, 77*, 313-322.

Inman, W. J., Tremblay, M. S., & Willms, D. J. (2000). The relationship between physical activity, self-esteem, and academic achievement in 12 year old children. *Pediatric Exercise Science, 12*, 312-323.

Lent,R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *Journal of Counseling Psychology, 31*, 356-362.

Mone, M. A., Baker, D. D., & Jeffries, F. (1995). Predictive validity and time dependency of self-efficacy, self-esteem, personal goals and academic performance. *Educational and Psychological Measurement, 55*, 716-727.

Sharma, M. (2006). School-based interventions for childhood and adolescent obesity. *Obesity Reviews, 7*, 261-269.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. Journal of Personality and Social Psychology, 41, 586-598.

Ravens-Sieberer, U., and Bullinger, M. (1998) Assessing health-related quality of life in chronically ill children with the German KINDL: first psychometric and content analytic results. *Qual Life Res* 7:399–407.

Eveland-Sayers, B. M., Farley, R. S., Fuller, D. K., Morgan, D. W., & Caputo, J. L. (2009). Physical fitness and academic achievement in elementary school children. *J Phys Act Health*, 6:99–104