Using *Five for Life®* to Promote Health-Related Fitness Knowledge: Elementary-Analysis

OLD DOMINION UNIVERSITY
Darden College of Education

Justin A. Haegele, PhD & Xihe Zhu, PhD

Department of Human Movement Sciences, Old Dominion University, Norfolk, Virginia, USA

OLD DOMINION UNIVERSITY
Darden College of Education

ABSTRACT

The purposes of this study were to (a) examine elementary school students' health-related fitness knowledge growth under one curriculum condition, and (b) examine the impacts of socio-demographic variables on health-related fitness knowledge and its growth rate. This study used an observational, longitudinal repeated-measures design, and conducted analyses on an existing dataset. Participants were 7,479 third, fourth, and fifth graders (Mage =10.58 ± .90 years; 48.9% girls) from 152 elementary schools. We conducted hierarchical linear models on student level (test scores and sex) and school level data (socioeconomic status, academic performance, and student faculty ratio). Fitness knowledge growth was found to form a quadratic curve from third through fifth grades. School level academic performance was positively associated with fitness knowledge. Sex was not associated with fitness knowledge or knowledge growth rate in these grade levels. These findings contribute to the understanding of improving health-related fitness knowledge among elementary school-aged students.

METHODS

Study Design

- Observational, longitudinal repeated measure design.
- Utilized an existing data set (collected 2012-2016)

Participants

- 7,479 3rd, 4th, & 5th graders from 152 elementary schools in a mid-Atlantic state.

Variables

- Participant level data:
  - Grade, Sex, health-related fitness
- School level data:
  - % free & reduced lunch, student-faculty ratio in PE, school academic performance

Procedure

- School level data were collected through school report from the state department of education.
- Student level data were collected using the online platform, Welnet®

DATA ANALYSIS

Because participant as well as school level data are encompassed in the study, we used hierarchical linear modeling (HLM) for data analysis (Raudenbush & Bryk, 2002). Since health-related fitness knowledge was measured at student level for multiple times, a three-level HLM is proper to model student knowledge change across the years in relation to individual and school level factors. Specifically, level 1 with an individual fitness knowledge growth model at time *t* of participant *i* in school *j* is specified:

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}\,(\text{Year})_{tij} + \pi_{2ij}\,(\text{Year})_{tij}^{2} + e_{tij} \quad [1]$$

At level two, we specified:

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(\text{Sex})_{ij} + r_{0ij} \quad [2a]$$
$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(\text{Sex})_{ij} + r_{1ij} \quad [2b]$$
$$\pi_{2ij} = \beta_{20j} + \beta_{21j}(\text{Sex})_{ij} + r_{2ij} \quad [2c]$$

At level three, we specified:

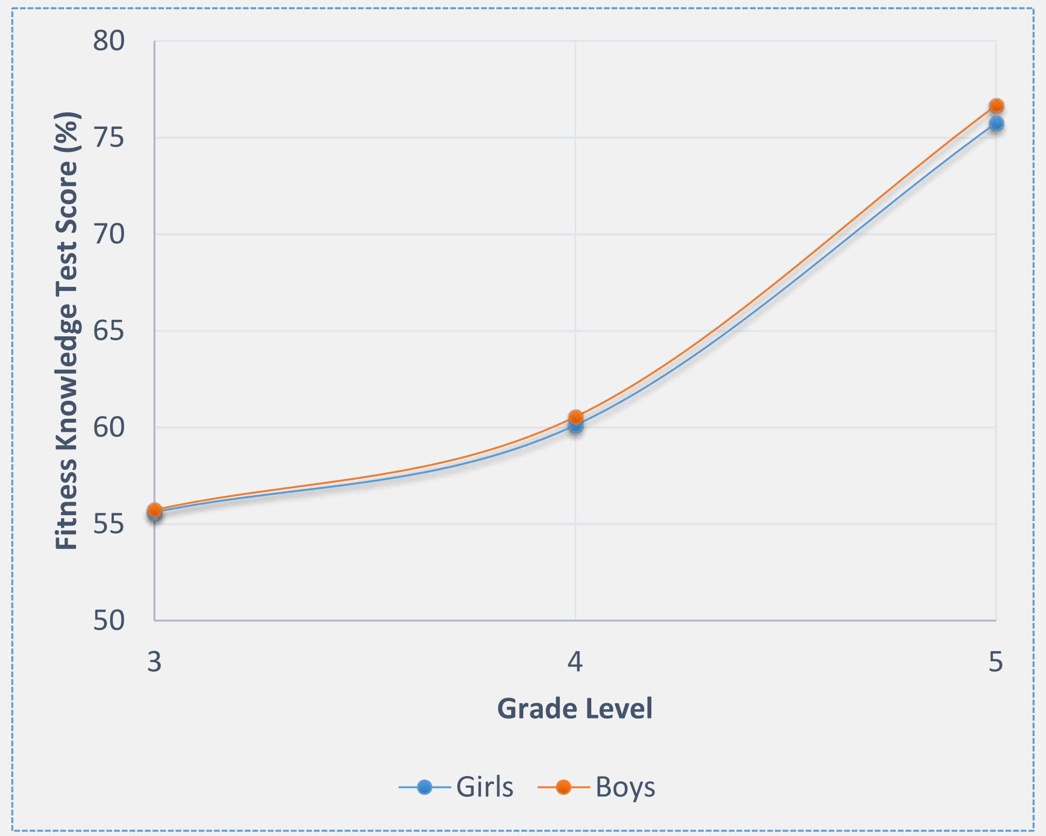
$$\beta_{00j} = \gamma_{000} + \gamma_{001}(\text{FARM})_{j} + \gamma_{002}(\text{SF-PE})_{j} + \gamma_{003}(\text{SAP})_{j} + u_{00j} \quad [3a]$$
$$\beta_{01j} = \gamma_{010} \quad [3b]$$
$$\beta_{10j} = \gamma_{100} \quad [3c]$$
$$\beta_{11j} = \gamma_{110} \quad [3d]$$
$$\beta_{20j} = \gamma_{200} \quad [3e]$$
$$\beta_{21j} = \gamma_{210} \quad [3f]$$

where Y_{tij} is the health-related fitness test score at time t for participant i in school j; $(\text{Year})_{tij}$ is 0 for grade 3, 1 for grade 4, and 2 for grade 5. π_{0ij} is the initial health-related fitness knowledge test score for child ij at grade 3. π_{1ij} is the growth rate for participant ij during the academic year; and e_{tij} , r_{0ij}, r_{1ij}, and $r_{2ij,}$ u_{00j} are the random effects at the level 1, level 2, and level 3, respectively.

RESULTS

The school level grand mean for health-related fitness knowledge percentage score is 66.18 ± 9.69% across three grade levels. The final model showed that the predicted average girls' health-related fitness knowledge score at third grade was 55.61 ± 1.62%, holding other factors constant. The school level predictors FARM and S/F-PE were negatively associated with the average health-related fitness knowledge score; however, they were not statistically significant ($p > .05$).

SAP was a significant positive school level predictor for average school health-related fitness knowledge, one standard deviation increase in SAP was associated with an average of 2.53% increase in health-related fitness knowledge in schools. On average, boys tended to score .12% higher than girls, but the difference was not statistically significant ($p > .05$). Additionally, as shown in Table 1, sex was not significantly associated with either the first order or the second order growth rate ($p > .05$). While the first order growth rate was not statistically significant, the second order knowledge growth rate was, holding other factors constant. As illustrated in Figure 1, the predicted students' average health-related fitness knowledge growth formed a second order polynomial, concaving up from third to fifth grade levels. As noted earlier and shown in Figure 1, there was no significant difference in the average knowledge test score or the knowledge growth rate in these grade levels.



RESULTS

Table 3. Student health-related fitness knowledge growth in 3rd – 5th grade.

Fixed Effect	Coefficient	*se*	*t* ratio	*df*	*p*
Model for test score, π_{0ij}					
Predicting, β_{00j}					
Intercept, γ_{000}	55.61	1.68	33.08	148	.00
FARM, γ_{001}	-2.37	1.27	-1.84	148	.07
S/F-PE, γ_{002}	-.95	.68	-1.39	148	.17
SAP, γ_{003}	2.53	1.21	2.09	148	.04
Predicting β_{01j}					
Intercept sex, γ_{010}	.12	.73	.17	6566	.86
Model for growth rate (1st order), π_{1ij}					
Predicting, β_{10j}					
Intercept, γ_{100}	-1.07	3.01	-.35	7470	.72
Predicting β_{11j}					
Intercept sex, γ_{110}	.24	1.85	.13	7470	.90
Model for growth rate (2nd order), π_{2ij}					
Predicting, β_{20j}					
Intercept, γ_{200}	5.57	1.30	4.27	7470	.00
Predicting β_{21j}					
Intercept sex, γ_{210}	.08	.91	.08	7470	.93

DISCUSSION

- Elementary school students using *Five for Life - Basic* curriculum were able to significantly increase their health-related fitness knowledge from third to fifth grades, notably boys and girls scored similarly and shared similar second order growth.
- The three-level growth model yielded a global pseudo-r^2 = .23, explaining about 22.56% of variance in student health-related fitness knowledge test score.
- Among school level variables, only SAP was significantly associated with children's health-related fitness knowledge test score, whereas FARM and S/F-PE were negatively but not significantly associated with the test scores.
- Our findings suggest that the *Five for Life-Basic* curriculum is promising in promoting health-related fitness knowledge, and should be considered by school personnel and administrators when deciding to implement physical education curricula.

The authors wish to thank the school districts and Focused Fitness® for sharing the invaluable data. Poster Prepared for 2018 SHAPE American Convention.