

**2017 Spring**

**Kentucky Association of Health, Physical Education,  
Recreation and Dance**



Hea

nce

**[KAHPERD JOURNAL]**

Volume 54, Issue Number 2

ISSN: 2333-7419 (Online Version)

ISSN: 1071-2577 (Printed Copy)



**KAHPERD Journal**  
**Volume 54, Issue 2, 2017 (Spring Issue)**  
**ISSN: 2333-7419 (Online Version)**  
**ISSN: 1071-2577 (Printed Copy)**

---

**TABLE OF CONTENTS**  
 (Peer Reviewed Articles)

A Comparison of Optical Heart Rate Monitoring and Electrical Heart Rate Monitoring During Low, Medium, and High Intensity Interval Exercise.....7  
*(Mortara & Dalessio)*

Games as a Force for Good: Strategies for Incorporating Pokémon Go in the Classroom ...18  
*(Fetrow & Ross)*

A Pre-Test Post-Test Pilot Assessment of Environmental Education on Youth's Knowledge and Intended Behavior Changes ..... 24  
*(Bradley, Sharp, Bradley & Reily)*

Parental Views on Sexual Education in Public Schools in a Rural Kentucky County Eastern Kentucky University ..... 32  
*(Howard, Larkin, Ballard, McKinney & Gore)*

Franchise Relocation and Expansion of North American Professional Sports ..... 44  
*(Osborn & Chen)*

(Peer Reviewed Abstracts)

Connecting Kentucky Farms to Kentucky Classrooms ..... 55

Farm to School: Closing the Food Literacy Gap to Address Healthy Eating Habits ..... 56

SNACS: Recommendations for Improving the Quality of Foods/Beverages Provided to Kids during Community-Sponsored Sporting Events ..... 57

The Community Engagement Academy: A Community-Campus Partnership Project to Improve Community Health and Academic Use of a Local Park ..... 58

High School Cross-Country Coaches' Perception of Junior High School Athletes Competing at the Varsity Level ..... 59

Dietary Supplement Attitudes and Behaviors in the Personal Training Profession..... 60

The Effects of Feedback on Mastery of a New Motor Skill: A Pilot Test ..... 61

## 2017 KAHPERD Board and Officers

President – Deborah Campbell [Deborah.campbell@madison.kyschools.us](mailto:Deborah.campbell@madison.kyschools.us)

President-Elect, Candace Young [Candace.young@danville.kyschools.us](mailto:Candace.young@danville.kyschools.us)

President-Past, Jamie Sparks [Jamie.sparks@education.ky.gov](mailto:Jamie.sparks@education.ky.gov)

Executive Director, Jenny Dearden [j.dearden@moreheadstate.edu](mailto:j.dearden@moreheadstate.edu)

VP of Health—Kim Riggs [kimberlyriggs@madison.kyschools.us](mailto:kimberlyriggs@madison.kyschools.us)

VP of Physical Education- Daniel Hill [Daniel.hill@fayette.kyschools.us](mailto:Daniel.hill@fayette.kyschools.us)

VP General – Kim Demling [kimdemling31@gmail.com](mailto:kimdemling31@gmail.com)

VP Dance- Rachel Barnes [Rachel.barnes@trimble.kyschools.us](mailto:Rachel.barnes@trimble.kyschools.us)

VP of Sport and Leisure- Bob VanBruggen [Rachel.barnes@trimble.kyschools.us](mailto:Rachel.barnes@trimble.kyschools.us)

Board Members At-Large East –Trina Goodrich

[katrina.goodrich@montgomery.kyschools.us](mailto:katrina.goodrich@montgomery.kyschools.us)

Billie Stone [Billie.stone@jefferson.kyschools.us](mailto:Billie.stone@jefferson.kyschools.us)

Board Members At-Large West – Amy Oliver [Amy.oliver@warren.kyschools.us](mailto:Amy.oliver@warren.kyschools.us)

AJ Mortara [Anthony.mortara@bera.edu](mailto:Anthony.mortara@bera.edu)

Student Chairs- Sarah Rucker [sara\\_rucker6@mymail.eku.edu](mailto:sara_rucker6@mymail.eku.edu)

Jared Abell [jared.abell968@topper.wku.edu](mailto:jared.abell968@topper.wku.edu)

Convention Managers- Jamie Johnston [Jamie.johnston@henderson.kyschools.us](mailto:Jamie.johnston@henderson.kyschools.us)

Meg Mabry [meg.mabry@henderson.kyschools.us](mailto:meg.mabry@henderson.kyschools.us)

Bob VanBruggen [Bob.vanbruggen@sciencehill.kyschools.us](mailto:Bob.vanbruggen@sciencehill.kyschools.us)

Exhibits Manager- Billie Stone [Billie.stone@jefferson.kyschools.us](mailto:Billie.stone@jefferson.kyschools.us)

Awards: Audra Deli-Hoofnagle [audra.deli-hoofnagle@education.ky.gov](mailto:audra.deli-hoofnagle@education.ky.gov)

Necrology: John Ferguson [John.ferguson@eku.edu](mailto:John.ferguson@eku.edu)

KAHPERD Journal Editors- Gina Gonzalez [g.gonzalez@moreheadstate.edu](mailto:g.gonzalez@moreheadstate.edu)

Steve Chen [s.chen@moreheadstate.edu](mailto:s.chen@moreheadstate.edu)

KAHPERD Newsletter Editor- Angela Stark [Angela.stark@fayette.kyschools.us](mailto:Angela.stark@fayette.kyschools.us)

KAHPERD Website- Jenny Dearden [j.dearden@moreheadstate.edu](mailto:j.dearden@moreheadstate.edu)

Jump Rope for Heart Coordinator- Joy Heines [Joy.heines@jefferson.kyschools.us](mailto:Joy.heines@jefferson.kyschools.us)

American Heart Association Representative- Erika Furlong [Erika.furlong@heart.org](mailto:Erika.furlong@heart.org)

Let's Move Active Schools Coordinator – Dartagnan Coots [Dartagnan.coots@ashland.kyschools.us](mailto:Dartagnan.coots@ashland.kyschools.us)

## A Message from the KAHPERD President

Greetings, I hope everyone is enjoying 2017 so far! I would like to give a special thank you to Dr. Steve Chen and Dr. Gina Blunt-Gonzalez for serving as our Journal co-editors, their time and commitment to this publication is a valuable asset to all KAHPERD members and beyond. Also, thank you to our writers for your professional contributions to this edition.

Many great things are happening with our state and the Every Student Succeeds Act. It is encouraging to hear the conversations about the educational paradigm shift related to school priorities and accountability. Like Past President Sparks said, "Schools have to be at the heart of efforts to improve health literacy and physical literacy for all students."

KAHPERD is continuing to "develop the well-rounded child" by providing updated information via twitter, email and the website. We also have the summer workshop in June and the Fall Convention to look forward to. If you presented last year, thank you very much for your willingness to share your knowledge. If interested in presenting again, please go to the website and submit a proposal.

Thank you!

Sincerely,

Deborah Campbell  
KAHPERD President 2017

## Acknowledgement

As the Editors of the KAHPERD Journal, we would like to show our appreciation to the following guest reviewers for their assistance in reviewing this current issue.

Dr. Jennifer Dearden, Morehead State University, Ms Jessica Gibb, University of Louisville, Ms. Jessica Lawrence, Cairn Guidance, Dr .Monica Magner, Morehead State University, Dr. Carol O'Neal, University of Louisville, Dr. Manuel Probst, Morehead State University, Dr. Paula Upright, Western Kentucky University, Dr. Gavin Washington, Kentucky State University,

Sincerely,

Gina Blunt Gonzalez, KAHPERD Journal Co-Editor  
Steve Chen, KAHPERD Journal Co-Editor

## KAHPERD Journal Submission Guideline

### SUBMISSION OF A PAPER

The KAHPERD Journal is published twice yearly (spring and fall) by the Kentucky Association for Health, Physical Education, Recreation, and Dance. The journal welcomes the submission of empirical research papers, articles/commentaries, best practices/strategies, interviews, research abstracts (spring Issue only) and book reviews from academics and practitioners. Please read the information below about the aims and scope of the journal, the format and style for submitted material and the submissions protocol. Your work will more likely to be published, if you follow the following guidelines thoroughly.

Articles are accepted via an electronic attachment (must be in Microsoft Word format, doc or docx) through e-mail to the editor before the deadline dates. Submissions should be sent to either one of the co-editors, Gina Gonzalez: [g.gonzalez@moreheadstate.edu](mailto:g.gonzalez@moreheadstate.edu) or Steve Chen: [s.chen@moreheadstate.edu](mailto:s.chen@moreheadstate.edu)

Deadlines: Spring issue—March 1 & fall issue—September 1

### AIMS AND SCOPE

The main mission is to bring together academics and practitioners to further the knowledge and understanding of issues and topics related to health, physical education, sport administration and marketing, exercise science, sport coaching, dance, and recreation, etc. We encourage submissions relating to these topics from a variety of perspectives.

### CONTENT

All articles should be written primarily to inform senior practitioners and academics involved in areas of health, physical education, recreation and dance.

Research articles should be well grounded conceptually and theoretically, and be methodologically sound. Qualitative and quantitative pieces of research are equally appropriate. A good format to follow would be: Introduction, Literature Review, Methodology, Results, & Discussion, Conclusion, and Implication. Articles may include an abstract of approximately 150 words including the rationale for the study, methods used, key findings and conclusions. Article should not exceed 10 single-spaced pages (not including references, tables, and figures).

Reviews of books and/or reports are welcome (around 1000-2000 words). Information concerning the book/report must be sent to the editor.

Interviews (it would be nice to discuss with the editor beforehand) and best practice/strategy papers of 1,500-3,000 words should be objective and informative rather than promotional and should follow the following format: Objective/Background/Discussion and Practical Implication.

Research abstracts (300 words or less) are welcome and limited to the spring issue only. The submitted abstracts should have been presented (either an oral or a poster presentation) in the KAHPERD annual conference in the previous year.

\*The editor is keen to discuss and advise on proposed research projects, but this is no guarantee of publication.

### FORMAT AND STYLE

Manuscripts should follow the form of the guidelines for publications outlined in the 6<sup>th</sup> edition of the Publication Manual of the American Psychological Association.

Tables, charts, pictures, diagrams, drawings and figures should be in black and white, placed on separate pages at the end of the manuscript. They must be submitted photo ready and reproduced to fit into a standard print column of 3.5 inches. Only one copy of each illustration is required, and captions and proper citations should be typed on the bottom of the table and diagrams. Jargon should be reduced to a minimum, with technical language and acronyms clearly defined. The accuracy of any citations is the responsibility of the author(s).

For more specific style questions, please consult a recent edition of the journal.

### **SUBMISSIONS PROTOCOL**

Submission of a paper to the publication implies agreement of the author(s) that copyright rests with KAHPERD Journal when the paper is published.

KAHPERD Journal will not accept any submissions that are under review with other publications. All manuscripts submitted will be peer reviewed by 3 members of the editorial board. To be accepted for publication in the journal, the article must be approved by no less than 2 of the 3 reviewers. Authors will normally receive a decision regarding publication within six to 12 weeks. Rejected manuscripts will not be returned.



**(Peer Reviewed Article)****A Comparison of Optical Heart Rate Monitoring and Electrical Heart Rate Monitoring During Low, Medium, and High Intensity Interval Exercise**

*Anthony John "AJ" Mortara, Berea College*

*Michael Anthony Dalessio, Berea College*

**Abstract**

The purpose of this project was to compare the accuracy and fidelity of a commercially available optical heart rate monitor and an electrical heart rate monitor. Thirty subjects completed a graded exercise test and three intervals at 65%, 75% and 90% of  $VO_2$  max while wearing both monitors. The intervals involved a 3:1, 2:1, and 1:1 work to rest ratio respectively. The data indicates that optical heart rate monitors are accurate within one beat per minute for low and moderate interval exercise .44 and .58 bpm for the 65% and 75% interval respectively. However, at the 90% interval and during the graded exercise test, larger error ranges were observed (6.63 bpm and 12.56 respectively). Strong correlations were observed for all three intervals  $r=.83$ ,  $r=.91$ , and  $r=.78$  ( $p<.05$ ). The data supports the use of electrical heart rate monitors at all three interval intensities, but not at maximal levels.

Keywords: cardiovascular, fitbit, tracker, activity, running, watch

**Introduction**

The minimization of modern health monitoring technology has given rise to an industry of portable, digital health and activity trackers available to consumers worldwide. The popularity of these devices has steadily risen as they become smaller, more comfortable, and no longer require a chest strap to monitor heart rate. These activity trackers provide wearers with a multitude of exercise and activity data such as steps taken, calories burned, resting metabolic rate, exercise metabolic rate, heart rate, and others. Perhaps the most significant advancement has been in wrist mounted heart rate monitoring technology through optical measurement. Given the sedentary nature of American society these heart rate monitors could provide useful feedback to wearers about their activity habits.

To monitor heart rate these devices utilize infrared optical heart rate monitoring technology (OHM). Rays of infrared light are beamed through the blood vessels of a limb (typically worn on the wrist) to a photoreceptor on the opposite side of the limb. If the blood vessels are perfused, little or no light is detected by the photoreceptor. On the other hand, if the vessels are empty nearly all light passes through the limb and is detected by the photoreceptor. This process is repeated for varying sampling times and heart rate is then calculated (7).

Traditional heart rate monitoring has been achieved through measurement of the electrical activity of the heart. A sensor strapped to the subjects' chest detects the depolarization of the ventricles during a cardiac cycle and relays this information to a (typically) wrist mounted watch unit which translates the raw data into beats per minute for the user. Electrical heart rate monitors (EHM) are highly accurate and have been used since the 80's to help exercisers regulate intensity.

The gold standard of heart rate monitoring is the electrocardiogram (ECG). However, numerous studies have shown that electrical heart rate monitors are nearly as accurate as ECG. Engström, Ottosson, Wohlfart, Grundström, & Wisèn (2012) found correlation coefficients of .97 – 1.0 when they compared polar heart rate monitors to ECG at various intensities (3). Other studies have concluded similarly that electrical heart rate monitoring is nearly as good as ECG; a study by Flanagan et al., (2014) found that an electrical heart rate monitor was usually within one beat of the ECG monitor (4). Therefore, their accuracy, portability, and ease of use make electrical heart rate monitors an acceptable field substitute for ECG measurement.

On the other hand, little research has been conducted on the accuracy of optical heart rate monitors (OHM). Evidence suggests that OHMs are accurate at lower intensities but quickly become less accurate at higher intensities (2). However, moderate and high intensity exercise is known to elicit numerous health benefits and has been prescribed as part of an individual's weekly exercise routine by the American College of Sports Medicine (1,6). Therefore, validating optical heart rate monitors not only at low intensities but at moderate and high intensities is necessary.

Furthermore, little research exists on the accuracy of OHMs during interval exercise. Interval exercise is characterized by periods of work followed by periods of rest, which occur in fixed intervals, such as one to one, one to two, one to three, etc... During the rest period metabolic rate and local muscle exertion fall, usually resulting in a decrease in heart rate. The rate and extent to which heart rate falls, is related to the fitness of the exerciser. Extremely fit individuals will exhibit a rapid and steep decrease in heart rate (4). This presents a challenge to heart rate monitors because of the constantly varying heart rate response. Even if the exerciser is in the rest phase of the interval heart rate may remain elevated, or fall at the end of the rest phase only to rise shortly after the next work interval begins.

Since the market for these devices is increasing quickly, and users are relying upon them to deliver accurate information, the need for their independent validation is high. Therefore, the purpose of this project was to evaluate the accuracy of a commercially available optical heart rate monitor compared to an electrical heart rate monitor at various exercise intensities during interval exercise. We hypothesized that an optical heart rate monitor will be most accurate at low intensity steady state exercise and conversely will become increasingly inaccurate as intensity rises and exercise transitions to an interval format.

## **Methods**

### *Participants*

A convenience sample of healthy participants, ages 19 – 45 years, with no significant orthopedic history involving the back (upper, middle, or lower) hips, or lower extremities were recruited for participation. Participants were asked to complete a PAR-Q and health history questionnaire prior to participation. The PAR-Q or Physical Activity Readiness Questionnaire is a seven-item questionnaire which is used to determine the safety of physical activity for respondents. Results from the PAR-Q and health history questionnaire were used to stratify participants' risk according to ACSM guidelines (ACSM 2013). Any participants with a risk stratification higher than level one were barred from participation. All

participants signed a written consent form approved by the Office of Institutional Research and Assessment prior to volunteering for the study.

### *Pre-testing Procedures*

Participants were asked to avoid eating large meals four hrs. prior to testing, and avoid exercising the same day as testing. Basic demographical data, i.e. age, self-reported ethnicity, etc. were collected prior to testing. Anthropometric and physiological measurements were also taken, these include the following: body mass (to the nearest .1 KG), body height (to the nearest .5 centimeter), blood pressure, and body fat percentage via bio-electrical impedance.

### *Experimental Procedures*

Participants were asked to attend two separate testing sessions at the performance laboratory separated by a minimum of 24 hours but not more than seven days. After completing pre-testing procedures participants were given time to familiarize themselves with the treadmill and metabolic cart. The OHM was fitted to the participant's dominant wrist as snugly as "comfortable" according to manufacturer guidelines.

A modified Balke maximal protocol was used to determine participants'  $\text{VO}_2$  max. After a five-minute warm-up period participants were asked to select a running speed which they felt they could maintain comfortably for 12 – 15 minutes. Initial incline was set at 0% and steadily increased by 2% every two minutes until volitional fatigue was attained. After reaching volitional fatigue incline was reset to 0% and speed steadily decreased until a heart rate measurement between 120 and 130 BPM was attained for a period of five minutes.

During the second testing session participants completed a series of intervals, the intensity of which was based upon their results from the first testing session. After a five minute warm up participants performed three intervals at 65% of  $\text{VO}_2$  max. The work to rest ratio for this interval was 3:1 minutes. During the rest phase participants were instructed to stand on the sides of the treadmill. This rest method was selected to maximize heart rate recovery, thereby testing the heart rate monitors through a greater range. Upon completion of the final interval participants performed a cool down at 50% of  $\text{VO}_2$  max until their heart rate fell to between 120 and 130 BPM for two minutes before beginning the next round of intervals. The second round of intervals were performed at 75% of  $\text{VO}_2$  max with a work to rest ratio of 2:1 minutes. Cool down procedures were identical to the previous interval. The final round of intervals were the most intense; participants ran at 90% of  $\text{VO}_2$  max with a work to rest ratio of 1:1 minutes. Upon completion of the final interval subjects were asked to walk on the treadmill at a steadily declining pace until heart rate was between 120 and 130 BPM for five minutes.

Breath by breath analysis was conducted via a Cosmed Quark CPET unit (Cosmed, USA). During the tests  $\text{VO}_2$ ,  $\text{VCO}_2$ , VE, and respiratory exchange ratio (RER) were measured continuously, via the CPET. In addition, an electrical heart rate monitor reported heart rate data to the Quark unit, to be stored and analyzed. Rate of perceived exertion was measured via subjective report from the participant and documented at the end of each stage. Heart rate data from the OHM was collected at the end of every stage and every minutes during cool down.

### *Statistical Analysis*

Paired t-tests were used to analyze differences between the electrical heart rate monitor and the OHM. Pearson R correlation coefficients and coefficients of determination were calculated to investigate the strength of the relationship between the two monitors and various descriptive statistics were used to describe the subjects. The level of significance for this project was  $p < .05$ . The IBM Statistical Package for the Social Sciences (SPSS) (IBM, Chicago, IL.) and Microsoft Excel (Microsoft, Redmond, WA.) were used to perform these calculations.

## Results

Thirty-three participants responded to recruitment methods and were suitable for testing. Of those 33, 30 met three out of the four criteria for a valid  $VO_2$  max test (8 female, 22 male). Table one is a summary of descriptive statistics of the participants. During testing there were several instances where the OHM appeared to lose signal and heart rate values would plummet then rise sharply as soon as heart rate was reacquired. These were labeled “signal drops” and tabulated for each test. In any instance where heart rate data was lost for more than 5 seconds the measurement was eliminated; we classified these instances as “outliers”. A comparison of the heart rate data from both the OHM and EHM reveals a moderate to strong relationship for the 3:1, 2:1, and 1:1 intervals ( $r = .83$ ;  $r = .91$ ;  $r = .78$ ). Average differences were .44, .58, and 6.63 bpm respectively. (Please see Table 1, Figure 1 and Table 2).

Results from the graded exercise test (GXT) shown in figure one and table two above, show that the OHM is least accurate at maximal level work, especially when it is not steady state. The GXT had the highest average difference between the two devices (12.56 bpm) with mean values of 178.48 for the OHM and 191.04 bpm for the EHM. The data indicate that the OHM underestimated the EHM by roughly 12 beats per minute; the raw data suggest that the OHM chronically underestimates heart rate at maximum levels. Furthermore, the OHM had the highest number of signal drops and data outliers per total observations (six and three respectively) during this test. This could explain the OHMs underestimation of heart rate. These results indicate that an OHM has significant difficulty tracking heart rate at maximal or near maximal levels. (Please see Figure 2 and Table 3.)

Results from the low intensity (65% of  $VO_2$  max) three to one protocol, shown in figure two and table three above, indicate that the OHM and EHM are nearly identical in heart rate reporting. The average difference between the OHM and EHM was .44 beats per minute with averages of 118.31 and 117.87 respectively. There were few signal drops and outliers (11 and 3 respectively). These results indicate that the OHM had little difficulty acquiring and accurately tracking heart rate at a low intensity level. (Please see Figure 3 and Table 4.)

Results from the two to one moderate (75%  $VO_2$  max) interval protocol, shown in figure three and table four above, have the highest correlation between the OHM and the EHM. The average difference between the OHM and EHM is .58 beats per minute, with averages of 134.52 bpm and 135.11 bpm respectively. This further supports the data for interval one, that the OHM can accurately track (with little signal loss) heart rate at a low and moderate intensity level. (Please see Figure 4 and Table 5.)

The one minute to one minute interval (90%  $VO_2$  max) showed the weakest correlation of the intervals between the OHM and the EHM. Data from figure four and table five above show

that the OHM had the highest number of signal drops and outliers (38 and 4 respectively). The average difference was also the highest, with a 6.63 bpm difference. These results indicate that the OHM was least accurate and had difficulty maintaining signal monitoring during intense interval activity.

## Discussion

The results indicate that we can confirm the following hypothesis: first there were statistically significant differences between the OHM and EHM at all three intervals and during the graded exercise test; and second the OHM appears to be most accurate during low and moderate intensities, but was least accurate during the highest intensity interval and during the graded exercise test. However, while these differences were *statistically* significant, whether or not they are *practically* significant may be an individualized question.

The primary function of the GXT was to accurately calculate the various intensities for the interval protocol. However, it also provided a means to assess the accuracy and fidelity of the OHM at maximal exertion. The data indicates that the OHM has difficulty maintaining signal fidelity and accuracy at maximal levels. This could be for a variety of reasons. At high heart rates the rate at which vessels perfuse and drain is high, it is possible that the photoreceptor and infrared emitter are not able to accurately differentiate between beats at this rate. Furthermore, the processing power of the unit may not be sufficient to adequately process data when heart rate is high. This would cause lag in the processing of data, thereby causing error in heart rate calculation.

The low and moderate intensity intervals are largely supportive of the OHM, demonstrating a high degree of signal acquisition and heart rate accuracy. The data indicate that at that 65% and 75% of  $VO_2$  max the OHM was very accurate, with less than 1 bpm average difference. This makes it a viable alternative to EHM. If our explanation for the OHM's inaccuracy at high heart rate is correct, then it stands to reason that the OHM's accuracy at lower intensity is at least in part due to the slower perfusion rates at lower exercise intensities. Furthermore, both the light and moderate intervals had prolonged periods of exercise (three and two minutes respectively) this allowed the cardiovascular system to reach steady state *before* the end of each work interval (the raw data support this). We believe that the OHM is most accurate under steady state conditions; it is possible that the first two interval protocols were of sufficient length to reach a steady state heart rate, facilitating the OHM's accuracy.

The third and most intense interval is less supportive of the OHM, with a high number of signal drops (38) and four outliers. The data indicates that at 90% of  $VO_2$  max the OHM struggled to provide accurate real time heart rate data; however, even in this case, the average difference was only 6.63 beats per minute. We believe that the largest issue at this intensity was the lack of signal fidelity for OHM, this may be due to a variety of physiological factors (already discussed above) and also some environmental factors. Subjects were sweating significantly during these intervals causing the OHM to shift position on their wrists during testing. This could cause the emitter and receptor to lose line of sight and trigger signal drops and outliers. In addition, the water and mineral content of sweat could refract the emitting beam also disrupting line of sight. Lastly, all subjects wore the OHM according to the manufacturer's guidelines; however, some guidelines are vaguer than others. This allowed for a certain degree of error or inconsistency in the OHM. For example, how tightly subjects wore the OHM was not uniform. Manufacturer's guidelines indicate the OHM should be "snug" or "comfortably tight". However, this is not a quantifiable description. This is

significant since an overtight OHM could partially occlude circulation affecting heart rate tracking. On the other hand, if the OHM is too loose it will shift disrupting line of sight. It is likely that all of these factors play a role in the inaccuracy of OHM devices; other potential factors which were not examined include: skin pigment, skin temperature, and hairiness of the limb. Future projects should examine these factors and determine what, if any, impact they have on OHM accuracy.

### **Practical Implications**

The purpose of this study was to evaluate the accuracy of an optical heart rate monitor during interval exercise to determine its applicability for the average consumer. We have learned that these monitors tend to be highly accurate (within one beat per minute) at 65% and 75% of maximal exertion. Furthermore, they are accurate within 6.63 beats per minute when intensity is high (95% of maximal exertion). Even at maximal levels, such as those observed during the graded exercise test, the OHM was accurate to within 12.56 beats per minute. For many individuals, a 12.56 bpm difference would mean that heart rate is in a different training zone. This is a practical difference between target and actual heart rate and therefore not acceptable to *some*, but not necessarily *all* users.

Most exercisers work at the in the light and moderate zone *most* of the time, where the OHM is most accurate. In their case, the OHM is just as good as the EHM and may be preferable since it does not require a chest strap. Furthermore, on the occasions where exercisers increase their intensity the OHM will be mostly accurate, with the possibility of approximately a 12 beat per minute range. We do not feel that an OHM will be practically useful at maximal levels as there is nearly a 24 beat per minute error estimate. In conclusion we believe that the OHM's accuracy will be acceptable for most fitness enthusiasts, who are content to choose comfort over precision.

**Tables and Figures**

*Table 1. Subject Characteristics*

Age	mean ± st. dev	21.9 ± 3.84
	range	19 – 36
Ht. (cm)	mean ± st. dev	173.55 ± 8.67
	range	157 – 185
Wt. (kg)	mean ± st. dev	76.02 ± 15.69
	range	49.83 – 106.81
BMI (kg/m <sup>2</sup> )	mean ± st. dev	25.07 ± 4.12
	range	18.81 – 34.49
Body Fat %	mean ± st. dev	18 ± 7.5
	range	6.60 – 38.20

(n=30) (8 females, 22 males)

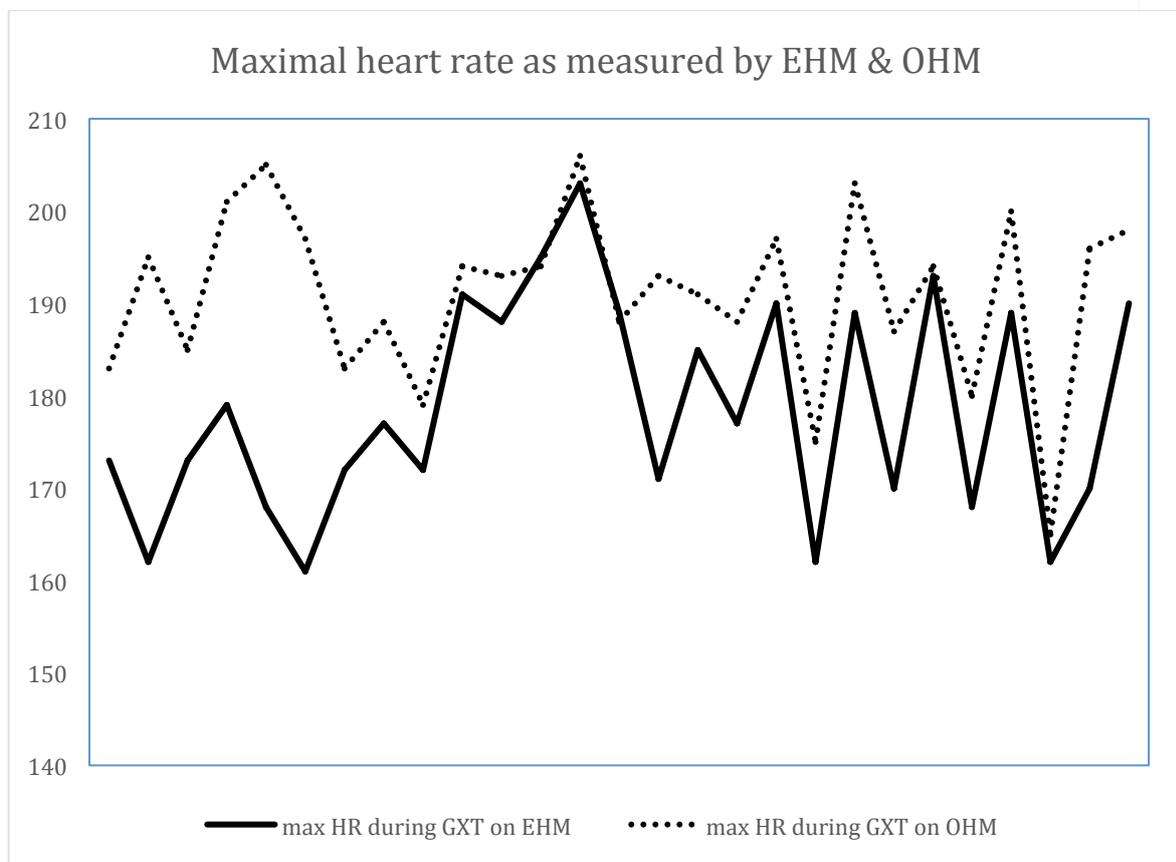


Figure 1. Maximal heart rate as measured by EHM & OHM

*Table 2. Summary of analysis of heart rate data during graded exercise test*

Total Observations		27
# of Signal Drops		6
# of Outliers Eliminated		3
Mean	OHM: 178.48	EHM: 191.04
Pearson Correlation		0.53
Coefficient of Determination		0.2809
T Stat		-6.15
T Critical Value		2.05
Average Difference		12.56

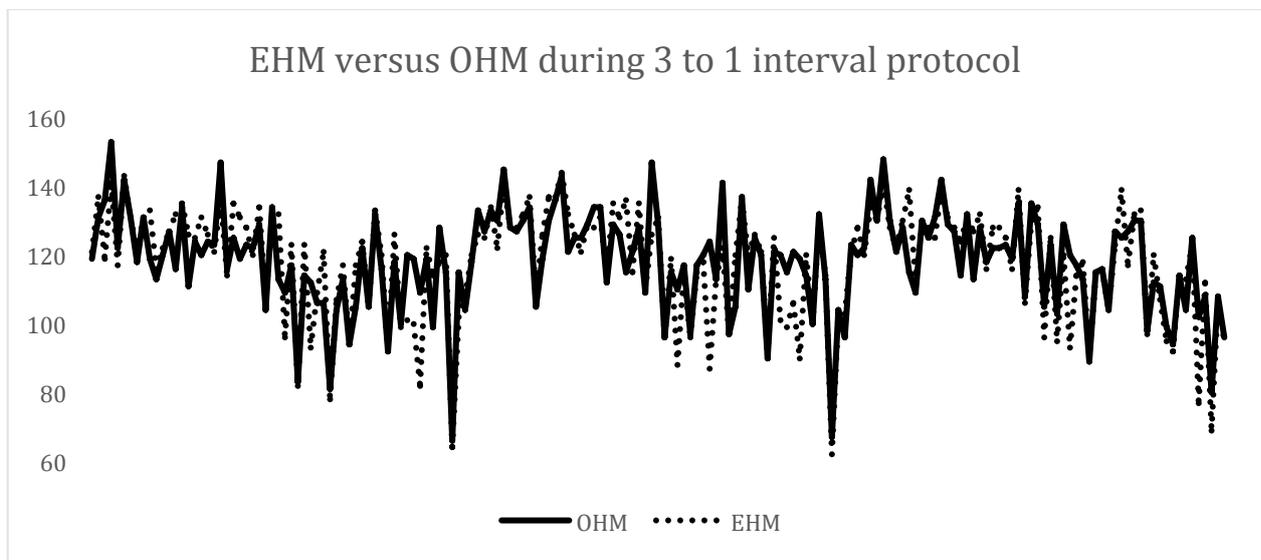


Figure 2. EHM vs. OHM during 3 to 1 interval protocol

*Table 3. Summary of analysis of heart rate data during 3 to 1 interval protocol*

Total Observations		177
# of Signal Drops		11
# of Outliers removed		3
Mean	OHM: 118.31	EHM: 117.87
Pearson Correlation		0.83
Coefficient of Determination		0.69
T stat		0.63
T critical Value		1.97
Average difference		0.44

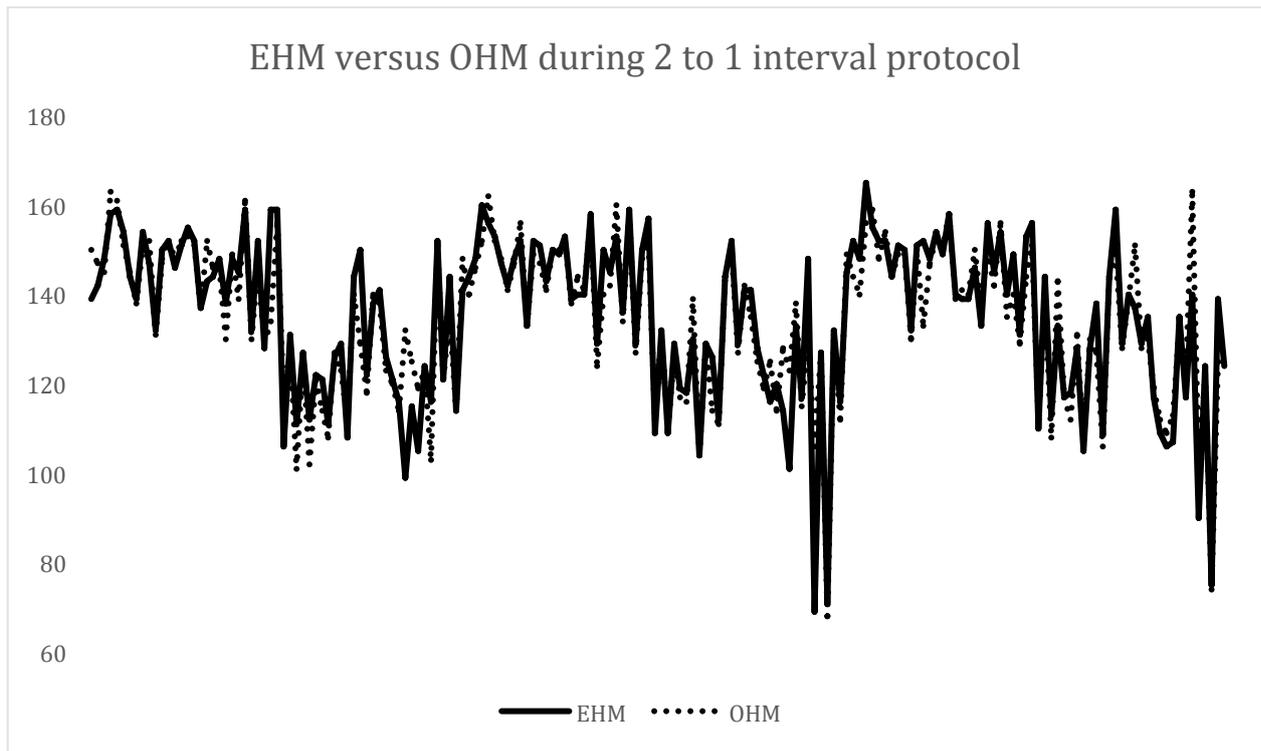


Figure 3. EHM vs. OHM during 2 to 1 interval protocol

Table 4. Summary of analysis of heart rate data during 2 to 1 interval protocol

Total Observations	178
# of Signal Drops	8
# of Outliers Removed	2
Mean	OHM: 134.52 EHM: 135.11
Pearson Correlation	0.91
Coefficient of Determination	0.83
T Stat	1.066
T Critical Value	1.97
Average Difference	0.58

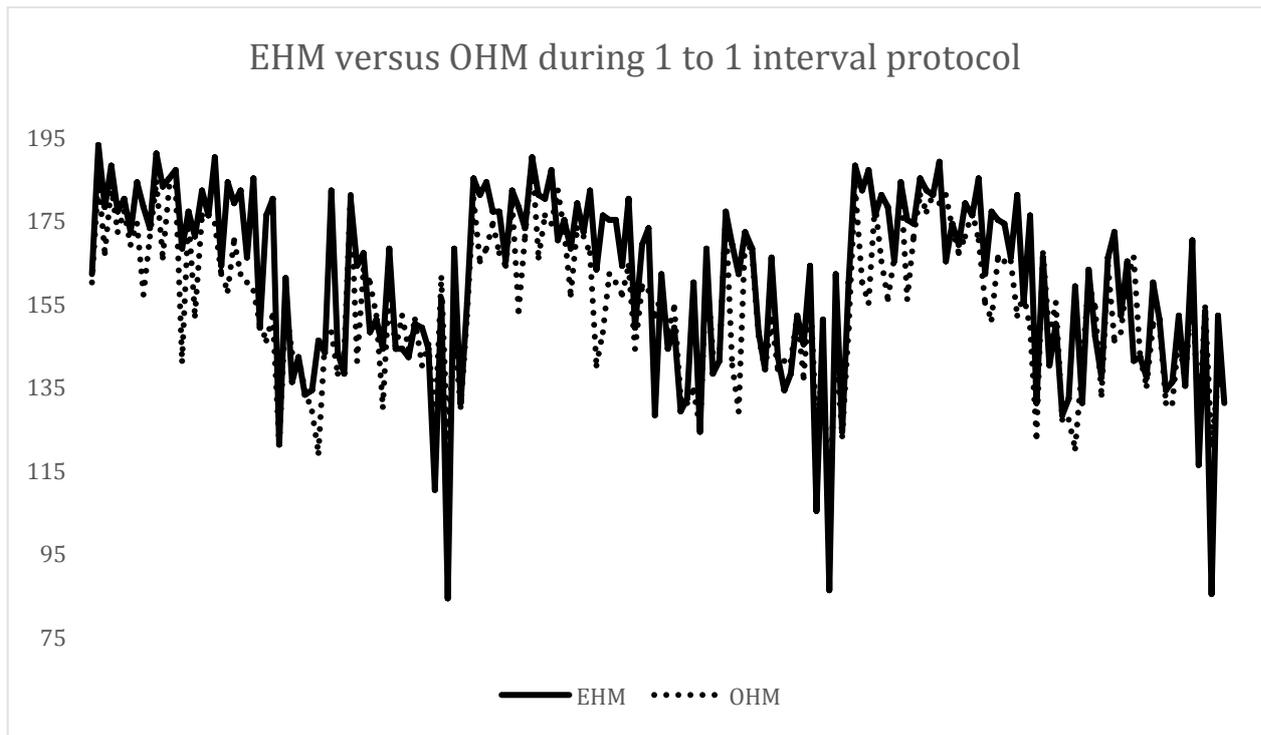


Figure 4. EHM vs. OHM during 1 to 1 interval protocol

Table 5. Summary of analysis of heart rate data during 1 to 1 interval protocol

Total Observations		176
# of Signal Drops		38
# of Outliers Removed		4
Mean	OHM: 154.24 EHM: 160.87	
Pearson Correlation		0.78
Coefficient of Determination		0.608
T Stat		6.68
T Critical Value		1.97
Average Difference		6.63

## References

1. American College of Sports Medicine (2013). *Guidelines for Exercise Testing and Prescription* (10<sup>th</sup> ed.). Philadelphia, PA: Wolters Kluwer.
2. Calabro, M. A., Lee, Jung-Min, Saint-Maurice, P. F., Yoo, H., & Welk, G. J. (2014) Validity of Physical Activity Monitors for Assessing Lower Intensity Activity in Adults. *International Journal of Behavioral Nutrition and Physical Activity*. 11, 119-131.
3. Engström, E., Ottosson, E., Wohlfart, B., Grundström, N., & Wisèn, A. (2012) Comparison of heart rate measured by Polar RS400 and ECG, validity and repeatability. *Advances in Physiotherapy*. 14, 115 – 122.
4. Flanagan, S. D., Comstock, B. A., DuPont, W. H., Sterczala, A. R., Looney, D. P., Dombrowski, D. H., McDermott, D. M., Bryce, A., Maladouangdock, J., Dunn-Lewis, C., Luk, H., Szivak, T. K., Hooper, D. R., & Kraemer, W. J. (2014) Concurrent Validity of the Armour39 Heart Rate Monitor Strap. *Journal of Strength and Conditioning Research*. 28(3), 870 – 873.
5. Gillen JB, Martin BJ, MacInnis MJ, Skelly LE, Tarnopolsky MA, Gibala MJ (2016) Twelve Weeks of Sprint Interval Training Improves Indices of Cardiometabolic Health Similar to Traditional Endurance Training despite a Five-Fold Lower Exercise Volume and Time Commitment. *PLoS ONE* 11(4): e0154075. doi:10.1371/journal.pone.0154075
6. Haskell, W. L., Lee, I., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D., & Bauman, A. (2007). Physical Activity and Public Health: Updated Recommendation for Adults from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise*. 39(8), 1423-1434.
7. Profis, S. (22 May 2014) Do wristband heart trackers actually work? A checkup. CNET. Retrieved from <http://www.cnet.com/news/how-accurate-are-wristband-heart-rate-monitors/>

## **Games as a Force for Good: Strategies for Incorporating Pokémon Go in the Classroom**

*Elizabeth A. Whitney Fettrow, University of Kentucky*

*Donovan Ross, University of Kentucky*

### **Abstract**

Pokémon Go – we’ve all heard of it. Some of us try to ignore it. And some of us embrace it. If we are in the former category, our initial reticence is likely due to our belief that gaming is a sedentary, passive process and our kids should not be encouraged to be technologically stimulated more than they already are – fair point. If you fall in the latter category, then you understand that gaming (in this case Pokémon Go) can be used as a force for good. The purpose of this article is to explain four (4) ways in which Pokémon Go can be incorporated in the school setting. The behavioral objectives of this article relate to each individual strategy and range from physical activity outcomes to academic content and civic engagement outcomes. The procedures for implementing each strategy will be described, and considerations for safety will be addressed. The primary target audience for this article is 5<sup>th</sup> – 12<sup>th</sup> grade educators.

### **Introduction**

Pokémon Go is more than just a game – it’s a phenomenon. In this era of virtual reality and gaming, it’s hard to go to places and not see people playing it. Niantic - The Pokémon Company - and Nintendo released the app in July of 2016, where it quickly reached global popularity being downloaded over 500 million times worldwide. The location-based augmented reality game, compatible with iOS and Android devices, soon took the world by storm. Users of all ages sifted through their real world surroundings in search of the cute little monsters, made visible through their mobile device’s GPS capability. Players used their avatar to travel through their setting in search of PokéStops and Pokémon gyms, where in the former they can retrieve items such as eggs, Poke Balls, berries, and the latter serve as battle locations for team-based matches, where a player is able to challenge a leader, gaining more prestige in victory. Pokémon Go was released with mixed reviews, and there is no doubt that despite its popularity and attractiveness to the gaming community, it was surrounded by much controversy for contributing to accidents as well as becoming a public nuisance. Interestingly, as it relates to physical activity outcomes, approximately 45% of Pokémon Go players reported being active for at least 30 minutes per day on the day the app was launched, and many continue to accrue more than appreciable levels of physical activity while gaming (Piercy, 2016). With one in five users of Pokémon Go between the ages of 13 – 17, it would be wise for educators to familiarize themselves with the app (Malcore, 2016). Thus, the purpose of this article is to discuss four (4) strategies by which Pokémon Go can be incorporated into the school setting.

### **Materials and Resources**

- Smartphone
- Other materials: Fitbit, walking maps, step-tracking handouts, etc., at the discretion of the instructor.

### **Procedures**

Explore the possibilities of using Pokémon Go! Most students already have smartphones – so why not put them to good use? We've identified four (4) ways that Pokémon Go can be incorporated into the school setting.

### *Strategy #1: Step Tracking*

In a time where the U.S. Department of Health and Human Services (USDHHS) recommends that children ages 6 – 17 engage in at least 60 minutes of physical activity per day (CDC, 2015b), only 1/3 of youth are actually meeting these standards (President's Council on Fitness, Sports, & Nutrition, 2016). One behavioral objective related to incorporating Pokémon Go into the school setting is directed toward increasing physical activity outcomes among youth. Thus, the first strategy is related to tracking the number of steps students are accruing while playing Pokémon Go.

Students can track their steps in a number of different ways. Assuming students are playing Pokémon Go (using an app), they can download the free app 'Steps,' where they will be prompted to enter details concerning their weight, height, age, and sex (Note - they do not need to set up an account or enter an email address). After entering those data, they are able to track their total number of steps, as well as miles, calories, and time spent 'stepping.' The app records these data and stores it as history – wherever the student goes with their phone, data are being recorded. The students can manually record their steps using either an excel sheet or a handout that allows them to visually see their steps and calculate their totals weekly. Students can even find a weekly average step total individually, and compare those across a class average. If FitBits are available, they can be substituted for using the app – such is at the discretion of the teacher to decide which would be the best approach.

### *Strategy #2: Odds & Ratios*

This suggestion requires some preparation on behalf of the classroom teachers. The teacher will need to locate and map various locations throughout the school building (or outside if permitted) and identify the approximate distances (or have students use their 'Steps' app and do this prior to the start of the activity) for those locations. In some way, the teacher will need to create a visual – or map – of these locations. It does not have to be sophisticated. The task of the student will record three things while attempting to capture Pokémon by walking to these predetermined locations: 1. The total number (and name) of Pokémon they discovered while on the walk, 2. The difficulty level of each Pokémon they encountered and 3. How many attempts it took them to capture it. Table 1 provides an illustration of what these data might look like, and students can learn more about odds and ratios by recording these data while playing Pokémon Go. (See Table 1)

### *Strategy #3: Becoming a History Buff*

Pokémon Go can be used to help students learn more about the history of their local area, or on a field trip to a museum, attraction, or other location. Because Pokémon Go is GPS enabled and players' real world surroundings are made visible on their mobile device, teachers could incorporate a history lesson beyond just visiting a museum. Teachers can instruct students to screen capture an artifact near which they capture their Pokémon, and have them later conduct research on that piece of work (statue, artwork, etc.). Students can be instructed to write a short description on the artifact and share it with the class. In this sense, Pokémon Go can be used to reinforce a history lesson – or field trip experience.

### *Strategy #4: Community Service*

Community service projects and civic engagement in general are without a doubt important experiences for children to have. Teachers can schedule a Pokémon Go community service day where they do something simple, such as collecting litter in their community, park, or neighborhood. While students and teachers are picking up and throwing away trash they will also be on the lookout for Pokémon. Ideally, students would be partnered-up or in teams where one student will monitor Pokémon at a time. Over time (weeks, months), students can make observations about the amount of litter collected per a certain geographic area, and perhaps make suggestions for how to keep their community “cleaner” upon learning more about litter patterns.

### **Conclusions**

Let’s face it – gaming is fun for kids. Pokémon Go may also contribute to some improvements in health outcomes, such as daily physical activity. Adequate physical activity helps improve mental functioning, improve mood, decrease the risk of depression and anxiety, and help individuals deal with stress (Teague, Mackenzie, & Rosenthal, 2015). Such health benefits are particularly important for students who may feel overwhelmed by their daily demands at home or at school. Research has demonstrated that behavior issues in the classroom may be improved due to the cognitive benefits acquired through physical activity, which can help students be successful academically (CDC, 2015a). Pokémon Go can be used to complement academic content such as math, history, and geography – a win-win for students and teachers.

### *Safety First!*

Some of you are reading this thinking “yeah right! I can’t even get my kids to look both ways before crossing the street!” so let us acknowledge there are some obvious safety considerations that come into play with these suggestions – so here goes: Special attention should be paid to safety while in pursuit of Pokémon. Users may endanger themselves or others if they fail to take their eyes off their phone during gameplay. Teachers should remind students to look up from their phones often to monitor their environment – especially prior to crossing a hallway, entering a room, making a turn, crossing a street (if off school property), etc. Teachers can assign students to partners or groups, where one student is playing the game and another (or others) is/are making sure the environment is safe – this does not exempt the student who is playing from being aware of his/her surroundings, it is just an added measure that can be used as a safety precaution. Without exception, Pokémon chasing and driving should NEVER occur together, and teachers should consistently warn students of the dangers of this (and any form of distracted driving) to appropriately aged audiences. Prior to conducting any Pokemon Go activity that takes place outside of the classroom and most certainly off school property, teachers should first contact and seek permission from their school administrator (principal), as there may be trespassing laws of which they are unaware near school grounds. Teachers should remind students to respect the privacy of others while playing and importantly that Pokémon Go is only a game and the real world still exists around them. While there is little doubt that we are living in a revolutionary technological era, we can certainly choose to embrace gaming as a force for good in the educational process and create meaningful experiences using those games – with personal safety in mind, of course.

## References

- Centers for Disease Control. (2015a, June 14). *Physical activity and health*. Retrieved October 11, 2016, from <http://www.cdc.gov/physicalactivity/basics/pa-health/index.htm>
- Centers for Disease Control. (2015b, August 27). *Youth physical activity guidelines toolkit*. Retrieved October 11, 2016, from <https://www.cdc.gov/healthyschools/physicalactivity/guidelines.htm>
- Malcore, P. (2016, September 15). *111 Pokémon Go statistics*. Retrieved October 7, 2016, from <http://www.rawhide.org/blog/infographics/pokemon-go-statistics/>
- Piercy, K. (2016, September 6). *Pokémon Go: A game changer for kids' physical activity?* Retrieved October 7, 2016, from <https://health.gov/news/blog/2016/09/pokemon-go/>
- President's Council on Fitness, Sports, & Nutrition. (2016). *Facts and statistics*. Retrieved October 7, 2016, from <http://www.fitness.gov/resource-center/facts-and-statistics/>
- Smith, C. (2016, October 10). *Pokémon Go statistics (October 2016)*. Retrieved October 12, 2016, from <http://expandedramblings.com/index.php/pokemon-go-statistics/>
- Teague, M., Mackenzie, S., and Rosenthal, D. (2015). *Your health today: Choices in a changing society, fifth edition*. New York, NY: McGraw-Hill Education.



**Table 1. Example of Pokémon observed, Capture difficulty, Capture attempts, and Ratios of Capture to Attempts**

Pokémon	Quantity	Catch rate	Attempts	Successful capture
Bulbasaur	1	45	3	Yes
	1	45	2	Yes
Total	2	-	5	5 attempts for 2/2 captures
Charmander	1	45	2	Yes
	1	45	4	No
	1	45	2	Yes
Total	3	-	8	8 attempts for 2/3 captures
Venipede	1	255	1	Yes
	1	255	1	Yes
Total	2	-	2	2 attempts for 2/2 captures

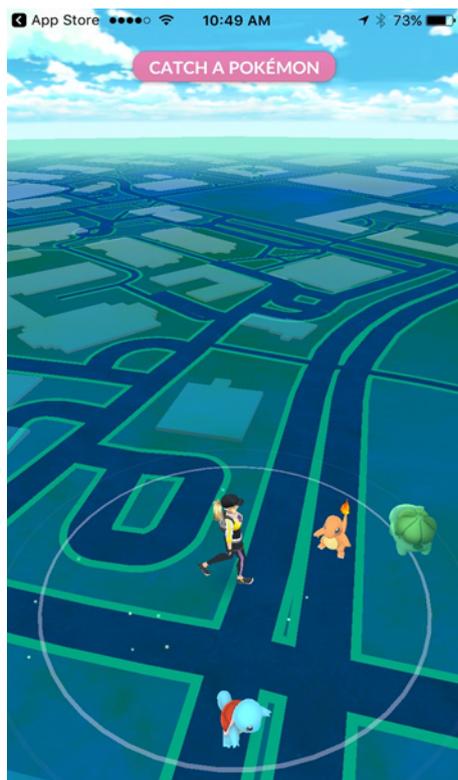
Pokémon catch rates vary from 255 to 3, with 255 being easiest to capture and 3 being most difficult.



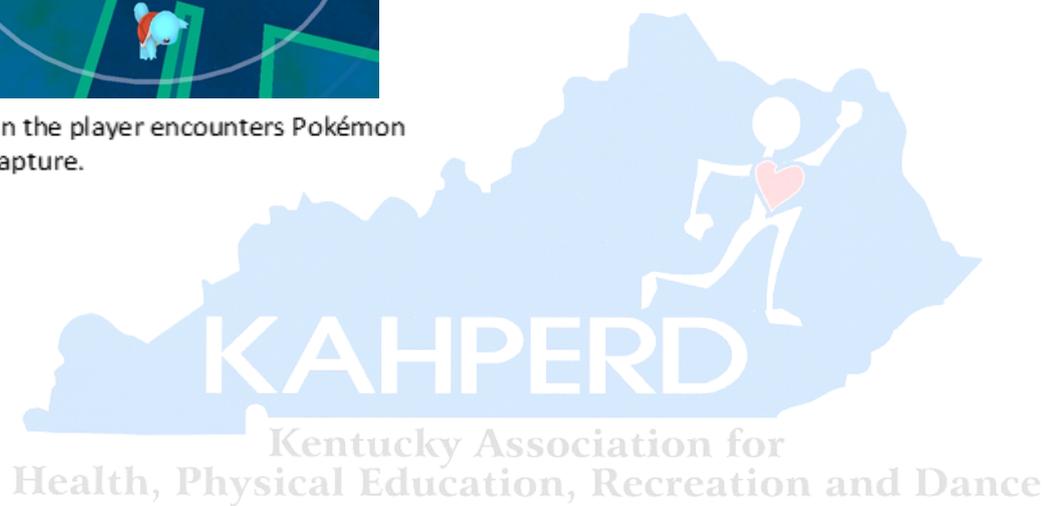
Example of Pokémon – “Charmander.” The user will see this after capturing a Pokémon.



What the player sees when exploring his/her surroundings – the user will create an avatar and nickname.



When the player encounters Pokémon for capture.



**(Peer Reviewed Article)****A Pre-Test Post-Test Pilot Assessment of Environmental Education on Youth's Knowledge and Intended Behavior Changes**

*Michael J. Bradley, Eastern Kentucky University*

*Ryan L. Sharp, Kansas State University*

*Christina Bradley, Eastern Kentucky University*

*Tessa Riley, Eastern Kentucky University*

**Abstract**

Middle school students in central Kentucky often visit Eastern Kentucky University's Maywoods during a fall or spring semester for a day of environmental education programming. As part of the comprehensive program, teachers prepare students for a day of environmental education and debrief after the day at Maywoods. This project investigated various assessment methods to identify if such program would affect overall environmental education scores of participants. A pretest-posttest design highlighted no significant differences of environmental education scores between the pretest and posttest. While repeat studies are needed to confirm findings, current insignificant differences between the two tests could encourage the need to identify the necessary programmatic changes for group visitors of Maywoods. Programmatic changes on site, coupled with innovative methods to increase environmentally friendly behaviors among youth, is warranted to meet science education standards and increase knowledge retention.

**Key words:** environmental education, assessment, information retention

**Introduction**

The progression of environmental education has included numerous movements over the last two or three hundred years. From Jean-Jacques Rousseau (1762) whose educational philosophy focused on the environment, to the development of environmental education goals in curriculum development (1980), environmental education has progressed slowly but steadily (McCrea, n.d.). After decades of arguments and lack of awareness of the need for environmental education, the modern era of environmental education has been a maturation process. In 1969, the National Environmental Policy Act was passed, *The Journal of Environmental Education* was founded, the term 'environmental education' began commonplace use, and environmental education and related research continued to grow and evolve to present day (McCrea, n.d.). In concert with the evolution of environmental education, programming directed at students in formal and non-formal education settings has also increased significantly in recent years (Roczen, Kaiser, Bogner, & Wilson, 2013).

While environmental education programming has increased for youth and students in formal and informal settings, assessment of these programs and intended outcomes are usually absent (citation preferred). Assessing environmental education outcomes allows for program facilitators to identify, understand, and alter program aspects to increase retention of materials and progression of environmental education behaviors.

The purpose of this study was to perform pre and post tests to measure differences in environmental knowledge and behavior intentions before and after environmental education programming. While various studies have investigated knowledge retention and behavior intention immediately after programming, few have measured such on any type of delay to measure longer term affects.

### ***Literature Review***

The foundation of environmental education can be dated back to the late 1700s with author Jean-Jacques Rousseau, penning the educational philosophy novel *Emile* (1779). In *Emile*, Rousseau argues that education should include a focus on the environment, a philosophy that was instrumental in the passage of The National Environmental Policy Act of 1969. Providing the boost necessary to propel environmental education forward, the purpose of this act was to encourage productive and enjoyable harmony between man and the environment. Subsequently, The Congress passed the National Environmental Education act of 1970, creating the Office of Environmental Education, the National Advisory Council of environmental education and a domestic grants program. These events provided professional development for teachers, helped propel development of environmental education curricula (McCrea, n.d.), and cemented environmental education as a part of the formal education experience of children. One, if not the primary, tenet of these changes was to ensure environmental stewardship into the future. The goal of providing environmental stewardship development is to change behaviors, values, or beliefs related to human-environment interaction (Hungerford & Volk, 1990).

While environmental education programming and education has increased, evaluation to ensure effectiveness has lacked. When assessment has been facilitated, instructors have used various assessment tools to ensure outcomes and knowledge retention with the goal of increasing environmental stewardship. For example, a study by Ramsey, Hungerford and Tomera (1981) showed the effects of three different treatments on environmental behavior after an initial training event for three years. The experimental reinforced group was more involved in environmentally appropriate behaviors compared to the control group. Ramsey, et al. (1981) concluded that some reinforcement or intervening treatment would have been needed to maintain the original level of involvement that was assessed three years prior. Thus, while an initial experience is critical, continual education may also be as important. In 2009, Keil, Haney and Zoffel found that environmental health education program improved students' test scores and general performance across multiple disciplines. Further, evidence related to the benefits of continued environmental education, and stewardship curriculum have shown to impact students test scores in areas not associated with environmental education (Stern, Powell, & Ardoin, 2008).

Though more commonplace in formal education settings, environmental education program effectiveness can be difficult to measure quantitatively. Surveys and tests provide good baseline knowledge about effectiveness in numerical form, and are often the preferred assessment in formal settings. Hungerford and Volk (1990), however, suggest varied and long term evaluation is necessary to fully assess environmental education outcomes. There are also salient factors that interfere with outcome attainment during environmental education experiences.

According to Boyce, Mishra, Halverson, & Thomas (2014), middle school (grades 7-9) students are more likely to lose interest in scientific education compared to other age/grade groups. These grades include students who are not attentive to STEM education due to boredom, confusion, and irritation with the material given in traditional learning environments. In such cases, informal learning atmospheres have been shown to help improve classroom experiences by developing interest beforehand, studying attitudes among peers, and offering a platform to discover STEM interests. Further, researchers noted that introducing technology facilitated many students to actively participate and become more engaged (Boyce et al, 2014).

Informal learning experiences are not always available or common in school systems nor is student involvement in informal learning environments (Boyce et al, 2014). However, environmental education programs are becoming more common in parks and recreation agencies, youth organizations, and adult volunteer groups. In that informal environmental education has shown to increase interest and knowledge during formal environmental education experiences, ensuring the students receive optimal informal experiences is essential.

School systems in the service region of Eastern Kentucky University (EKU) have a unique opportunity to ensure their students experience nonformal (informal) environmental education. The Division of Natural Areas at EKU facilitates environmental education for various school groups at one of their managed natural areas. For many school groups, the Maywoods Environmental and Educational Laboratory (Maywoods) is the location of the onsite environmental education experience. Before visiting Maywoods, formal middle school education instructors (teachers) work through an environmental education curriculum with students. Teachers then bring students to Maywoods, where EKU provides staff to facilitate a full day of programmed environmental education experiences.

The purpose of this pilot research study was to facilitate program assessment; what are the affects from the environmental education curriculum and experiences for middle school students. Specifically, researchers sought to identify differences in student answers from a pre and post test mechanism.

## **Methodology**

This research project was facilitated within a partnership between the Department of Recreation and Park Administration (RPA) and the Division of Natural Areas (DNA) of Eastern Kentucky University. The Division of Natural Areas manages several outdoor recreation and learning environments, one such being Maywoods Environmental and Educational Laboratory (Maywoods). As Maywoods planned its environmental education programming for middle school student groups in the Fall 2013 and Spring 2014 semesters, the director of Maywoods asked two specific school groups to participate in an environmental education pilot research study that would be facilitated by RPA. The two schools selected for participation in this study were Lincoln County Schools (October 2013) and Garrard County Schools (April 2014), with both school systems being located in the Eastern Kentucky University service region. Each school visited Maywoods once, with all 7<sup>th</sup> grade science students in that school system taking part in a full day of environmental educational activities. A final total of 100 respondents was included in the analysis.

Researchers used a slightly modified version of Larson's (2008) *The Environmental Attitude and Awareness Survey*, containing sixteen Likert-type responses (statements) in which the child participant must circle the symbol, thumbs up or thumbs down, indicating their agreement or disagreement with the statement. Topics covered in these questions were interest in nature, importance of nature, endangered ecosystems, and environmental stewardship. Furthermore, the research instrument included four multiple choice questions and one open ended question, modified for grade-level word use and answer options directly related to the environmental education curriculum facilitated during the Maywoods visit. The researchers worked in collaboration with the science teachers of each school system to coordinate dates for pre-tests and post-tests related to their environmental education curriculum and students' Maywoods experience. For each student group, the pretest and posttest were scheduled within five days of the group's Maywoods visit. The researchers tested students during their science class period. During each pretest session, the researcher randomly chose 10 students to complete the survey on a tablet computer. Any student not chosen to use the tablet computer as an assessment tool was given a traditional paper and pencil survey. Within five days of the pretest, students participated in a full day of environmental education activities at Maywoods.

Within five days after the environmental education activities, the students were asked to complete a posttest. The researchers facilitated the posttest in a similar fashion as the pretest; the students who took the pretest on the tablet computers, took the posttest on the same device, and the children that took the traditional paper and pencil survey did so again for the posttest. For those students that completed their pretest and posttest on an iPod or tablet computer, survey data was automatically entered into a spreadsheet via Qualtrics software. Researchers manually entered in pretest and posttest data for all the paper and pencil surveys into a spreadsheet. Researchers ran descriptive statistics and ANOVA to compare the pre-test results between the two student groups surveyed.

## Results

As noted in Table 1, 100 respondents were included in the pre-test analysis, 40% were male (N=40) and 60% were female (N=60). For the post-test, 42.7% (N=38) were male and 57.3% (N=51) were female. Of note, the difference in pre and post-test participation was not investigated. While all students present participated in the assessment, researchers are unable to control for attendance and certain acknowledge this limitation for this study. During the pre-test, 64% (N=64) were surveyed using traditional surveys (paper) and 36% (N=36) were surveyed using a tablet computer. For the post-test, 58.4% (N=52) were surveyed using traditional surveys (paper) and 41.6% (N=37) were surveyed using a tablet computer.

The overall mean was 3.86 for the pre-test and 3.87 for the post-test (Table 2), indicating a level between neutral (3) and agree (4). Ten items showed increased mean scores, five showed decreased mean scores and one item did not show an increase or decrease in scores between the pre-test and post-test. However, as noted in Table 2, increases or decreases in scores seemed minimal and thus warranted further analysis to identify if differences exist between pre and post test scores.

The researchers ran several ANOVA to identify any statistical differences between environmental education scores when investigating pretest and posttest per male and female, paper and tablet surveys, and across ages. As may be seen in Table 3, ANOVA analysis showed no significant statistical difference in test scores between any of the groups when

investigating mean environmental education scores. Therefore, while increases or decreases were minimal, such changes were not statistically significant.

### **Discussion & Conclusion**

The purpose of this pilot research study was to identify differences in environmental knowledge and intended behaviors of Kentucky middle school (7<sup>th</sup> grade) students participating in an outdoor environmental education experience when combined with in-classroom curriculum facilitation. As shown in the analysis, the results showed there was no significant difference in environmental education scores from pretest to posttest across all groups.

One aspect of this study to consider in a repeat study is the actual sample size and population. The lack of significant differences between pretest and posttest scores is something to consider for programmatic development, however, a repeat study should be facilitated before any programmatic changes are instituted. While there was an increase in environmental education scores between the two assessments, the increase was slight to negligible. The researchers suggest this study be repeated for several groups that come to Maywoods for environmental education programming. If results are similar to the findings in this study, teachers and program facilitators should consider curricular and/or programmatic changes at various levels of the process.

Of note, the most common answers for the last survey question, "I help the environment by?" were recycling, watering plants, taking shorter showers, picking up trash and not killing trees. This suggests that the participants may not fully understand the meaning of the word "sustainability." The students may need more, varied, or different environmental and outdoor education as the students differed on what the term sustainability means in all cases. In conclusion from pre-test to post-test, the students showed improvement on knowledge of the environment, but the increase is not significant. They are also unsure of what exactly sustainability is, therefore, changes are necessary for the students to have a better understanding of environmental issues and sustainability.

In that this was pilot study, the sampling was small and the population was singular. Additionally, due to the small sample size, the aspect of missing students in the post test is also a limitation. In conclusion, this pilot study should be adjusted and repeated to ensure results are not due to salient factors. To gain a better understanding of the environmental education outcomes and any differences between surveying processes, this study should be expanded and repeated.

## References

- Boyce, C., Mishra, C., Halverson, K., & Thomas, A. (2014). Getting Students Outside: Using Technology as a Way to Stimulate Engagement. *Journal of Science Education & Technology*, 23(6), 815-826. doi:10.1007/s10956-014-9514-8
- Hungerford, H.R. & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*. 12(3), 8-21.
- Keil, C., Haney, J., & Zoffel J. (2009). Improvements in student achievement and science process skills using environmental health science problem-based learning curricula. *Electronic Journal of Science Education*, 13(1) 1 – 18.
- McCrea, E.J. (n.d.). The roots of Environmental Education: How the past supports the future. Retrieved from <http://files.eric.ed.gov/fulltext/ED491084.pdf>
- Ramsey, J., Hungerford, H. R., & Tomera, A. N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behavior of eighth-grade students. *The Journal of Environmental Education*, 13(1), 24-29.
- Roczen, N., Kaiser, F. G., Bogner, F. X., & Wilson, M. (2014). A competence model for environmental education. *Environment and Behavior*, 46(8), 972-992.
- Rousseau, J. J. (1979). *Emile or on education* (A. Bloom, Trans.). *New York: Basic*. (Originally published 1762).
- Stern, M. J., Powell, R. B., & Ardoin, N. M. (2008). What difference does it make? Assessing outcomes from participation in a residential environmental education program. *The Journal of Environmental Education*, 39(4), 31-43.

## Acknowledgement

This is contribution No. 1 of Maywoods Environmental and Educational Laboratory, Eastern Kentucky University.

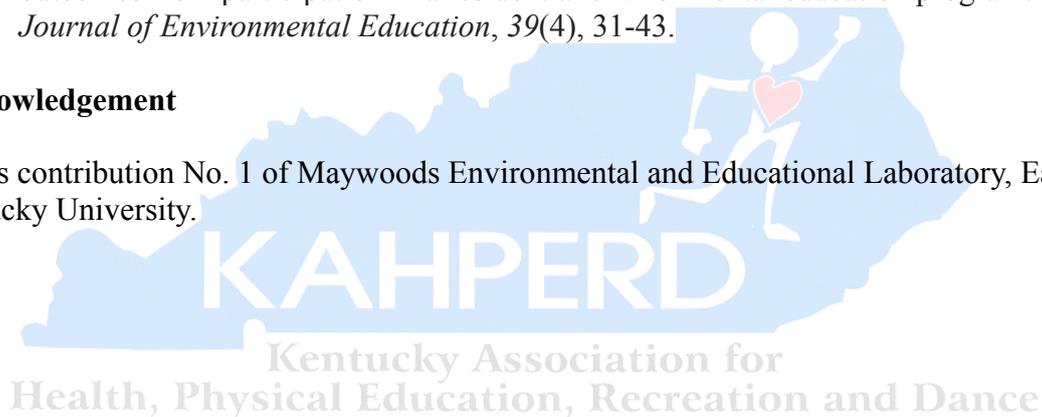


Table 1. Respondent Descriptive Statistics

Variable	Category	N	%
Pre Test	Boy	40	0.400
	Girl	60	0.600
Post Test	Boy	38	0.427
	Girl	51	0.573
Pre Test	Online	36	0.360
	Paper	64	0.640
Post Test	Online	37	0.416
	Paper	52	0.584
Test	Age	N	Mean
Pre Test	13	73	13.29
	14	25	
	15	2	
Post Test	13	55	13.40
	14	32	
	15	2	

Table 2. Pre and Post Test Environmental Education Statement Means

PreTest Scores			PostTest Scores			Pre/Post Difference
Statement Number	Mean	Standard Deviation	Statement Number	Mean	Standard Deviation	
1	3.64	1.054	1	3.61	1.029	-0.03
2	4.28	.766	2	4.33	.823	+0.05
3	3.01	1.124	3	3.10	1.168	+0.09
4	4.17	.842	4	4.26	.953	+0.09
5	3.60	.950	5	3.58	1.053	-0.02
6	4.36	.763	6	4.46	.799	+0.10
7	4.56	.690	7	4.56	.800	+0.00
8	3.42	1.015	8	3.40	1.012	-0.02
9	3.51	1.018	9	3.38	1.028	-0.13
10	3.58	.852	10	3.62	.860	+0.04
11	4.03	.968	11	3.97	.923	-0.06
12	3.62	.975	12	3.60	.973	-0.02
13	3.80	.969	13	3.88	.946	+0.08
14	3.35	.660	14	3.37	.650	+0.02
15	4.30	.759	15	4.33	.765	+0.03
16	4.49	.722	16	4.54	.723	+0.05
Mean	3.86		Mean	3.87		

\*1=Strongly Disagree to 5=Strongly Agree

*Table 3. Environmental Education Mean Score ANOVA Results*

<b>Variable</b>	<b>F</b>	<b>p</b>	<b><math>\eta^2</math></b>
Pre/Post	.673	.917	.1466
Sex	1.338	.119	.2546
Paper/Online	.881	.663	.1836
Age	1.120	.314	.2223



**(Peer Reviewed Article)****Parental Views on Sexual Education in Public Schools in a Rural Kentucky County Eastern Kentucky University**

*Tiffany R. Howard, Eastern Kentucky University*

*Lauri J. Larkin, Eastern Kentucky University*

*Michael D. Ballard, Eastern Kentucky University*

*Molly A. McKinney, Eastern Kentucky University*

*Jonathan S. Gore, Eastern Kentucky University*

**Abstract**

Despite Kentucky having almost twice the national birth rate with 50 births per 1,000 female population ages 15-19 (County Health Rankings, 2015), the implementation of comprehensive sexual education in Kentucky public schools remains a controversial topic. This study examined parental attitudes regarding comprehensive sex education curriculum in a rural Kentucky middle school. A survey was distributed to a convenience sample population of parents (N=100) whose children were enrolled in a rural Appalachian middle school in grades 6th thru 8th. Data were analyzed using Chi square and multi-variate techniques. Of the 63 participants, 58.7% believed that sex education should begin in middle school. Of the 73% (n=46) of respondents who believed abstinence-plus should be taught, 58.7% (n=27) were between the ages of 26 and 35, and 28.3% (n=13) were between the ages of 36 and 45. Differences in attitudes towards sex education was strongly influenced by both age and education level.

**Introduction**

Sexual education in American schools has historically been a controversial topic. In the United States, each state has their own set of laws regarding sex education in public schools. HB 231 was proposed by the legislature in 2015 in Kentucky which: Requires school districts, public schools or family resource, and youth services centers that offer human sexuality education to use science-based standards with age-appropriate, culturally sensitive and medically accurate information. Information includes, but is not limited to abstinence education and contraception. Mandates the option for parent or guardian to opt out from human sexuality education and for content to be available for review upon request. Does not require school districts, public schools, family resource, and youth services centers to provide human sexuality education. Also allows the Cabinet for Health and Family Services to refuse federal funding that requires teaching abstinence- only programs. If state funds are appropriated for human sexuality education, requires the Cabinet to meet the same science-based, age-appropriate, culturally sensitive and medically accurate standards as above. Any organization receiving state funds that offers human sexuality education or pregnancy prevention services must also use the same standards (National Conference of State Legislatures, 2015).

As of June 2015, this bill failed and instead an Act regarding public health created a new section of KRS Chapter 158 that mandates schools to:

Require science-based content and age-appropriate and medically accurate standards for human sexuality education; permit a parent or guardian to excuse a child from the educational

program and permit the parent or guardian to review instructional material upon request; specify that nothing requires a school district, public school, or family resource and youth services center to offer human sexuality education; create a new section of KRS Chapter 211 to permit the Cabinet for Health and Family Services to refuse federal funding for abstinence-only education; require science-based content if state funds are received by the cabinet or subcontractor for human sexuality education or teen pregnancy prevention; permit the cabinet to promulgate an administrative regulation to specify instructional content; require an entity that receives state funding and offers human sexuality education or teen pregnancy prevention to adopt science-based content (National Conference of State Legislatures, 2015). According to the Centers for Disease Control and Prevention, 2013, a total of 273,105 babies were born to women aged 15–19 years, for a live birth rate of 26.5 per 1,000 women in this age group. Kentucky, however, had almost twice the national rate with 50 births per 1,000 female population ages 15-19 (County Health Rankings, 2015). Kentucky ranked seventh out of 51 (50 states plus the District of Columbia) in the 2011 final teen births rates among females aged 15-19, with 1 representing the highest rate and 51 representing the lowest rate (HHS, 2015). Teen pregnancy is linked to a number of other issues, including economic costs associated with teen pregnancy such as child welfare, infant health, education and economic wellbeing. The National Campaign to Prevent Teen and Unplanned Pregnancy in 2011 estimated that the costs of childbearing on taxpayers are at least \$10.9 billion annually. The estimated savings for U.S. taxpayers in 2008, due to the substantial decline in the teen birth rate between 1991 and 2008 was \$8.4 billion (The National Campaign, 2011). Only 40 percent of those teen mothers' finish high school, and less than two percent of those girls earn a college degree by the age of 30 (The National Campaign, 2011).

In 2011, the state of Kentucky received federal funding totaling \$835,884.00 for abstinence-only education programs (Sexuality Information and Education Council of the United States, 2011). Teaching about contraceptives, which include; condoms, the birth control pill, or the patch, is not a requirement. One of the many debates among parents is whether sex education should include abstinence-only curricula or abstinence-plus contraception methods curricula (Cuccaro, Johnson, Markham, Peskin & Tortolero, 2011). The opinions of the parents may have an important impact on the type of sex education taught in local schools.

### Health, Physical Education, Recreation and Dance

In addition, “prevalence estimates suggest that young people aged 15–24 years acquire half of all new STD’s,” and that 1 in 4 sexually active adolescent females have an STD, such as chlamydia or human papillomavirus (HPV; CDC, 2015). The CDC in 2012 stated that reported STD cases were as follows: chlamydia cases aged 15-24, 12,082 per 100,000, gonorrhea, 2,363 per 100,000, and syphilis, 35 per 100,000 (CDC, 2015). The cost of STDs to the U.S. health care system is estimated to be as much as \$15.9 billion annually (Healthy People 2020).

In 2014, Pike County Kentucky a rural area located in the Eastern region of the state, had a population of 63,034 (United States Census Bureau, 2015). According to The County Health Rankings (2013), teen birth rates for Pike County Kentucky were 58 births per 1,000-population age 15-19 years old. The Pike County Board of Education confirmed that sexual education is taught at the high school level (grades 9-12), but not at the junior high level (grades 6-8) because of previous opposition from the parents.

The purpose of this study was to assess parental attitudes and support for a comprehensive sex education curriculum in a rural Kentucky middle school. It is hypothesized that parents' will be in favor of implementing abstinence-plus contraception sex education in public middle schools in Kentucky. Results from this study could be used to potentially influence

school-based policies regarding sexual education to aid in reducing the rates of teen pregnancy and STD's within rural Kentucky counties.

### Literature Review

A review of the literature indicated an overall general support from parents for comprehensive sexual education to be included in the middle school and/or high school curriculum (Constantine, Jerman, & Huang, 2007). Several national studies have focused on formulating qualitative and quantitative research methods on how parents feel about sex education being taught in schools.

A study conducted by Millner, Mulekar & Turrens (2015), examined parental attitudes of parents of public school children in Alabama regarding the consolidation of various youth pregnancy prevention methods included in public school curriculum. Results showed that 80% of parent participants agreed that sex education should be taught in public schools, while 16.5% disagreed (Millner, Mulekar, & Turrens, 2015). At least three-fourths of the participants supported different strategies for pregnancy prevention among youth, results indicated strong parental support for more comprehensive sex education curriculums within Alabama public schools that included more than abstinence-only education (Millner et al., 2015).

Constantine, Jerman & Huang (2006,) assessed sex education preferences among California parents, an understudied but critical population of key stakeholders. The results showed that 89% (n=1,284) of parents reported a preference for comprehensive sex education, but only 11% for abstinence-only education (Constantine, Jerman & Huang, 2007). Preferential reasons that occurred were those focused on the consequences of actions, on the importance of providing complete information, on the inevitability of adolescents' engaging in sex and on religious or purity-based morality concerns (Constantine, Jerman & Huang, 2007). Of abstinence-only supporters, 64% listed religious concerns as influential, while 94% of comprehensive sex education supporters listed non-religious concerns as most influential. (Constantine et al., 2007).

McKee, Ragsdale & Southward (2014) explored the parents' opinions in regards to the implementation of sex education and age-appropriateness in Mississippi. The results of the study revealed that more than 90% (n=3,600) of parents were in agreement on implementing age- appropriate sex education in Mississippi public schools, including; discussing the transmission and prevention of HIV/STIs, and discussing how to get tested for HIV/STI's (McKee, Ragsdale & Southward, 2014). More than 80% agreed in regards to discussing where to obtain birth control, and more than 70% agreed that correct condom use demonstration should be included (McKee, Ragsdale & Southward, 2014). The results did vary based on race, ethnicity, and gender.

Heller and Johnson (2013), assessed parental opinions concerning school sexuality education by assessing a culturally diverse, low-income urban community college parent's population. Results of the study indicated that 80% of the parents (N=191) were in favor of sex education in the schools (Heller & Johnson, 2013). However, there was an important negative correlation between attendance at religious services and support for school sex education for these parents (Heller & Johnson, 2013). The original hypothesis that there would be less support for comprehensive sexuality education in the sample population than in national and statewide surveys was rejected (Heller & Johnson, 2013).

Draw the Line/Respect the Line was a program used in a trial conducted by Coyle, Kirby, Marín, Gómez & Gregorich (2004) that assessed the impact of a specific curriculum based program on reducing sexual risk behaviors in middle-school children. Intervention techniques produced postponement effects within the male sample population but this was not mirrored within the female sample. Male students were more likely to hold a positive attitude towards postponing sexual involvement and appeared more knowledgeable on the subject, while setting more specific sexual personal limits and decreased participation in behaviors or situations promoting risky sexual behaviors. (Coyle, Kirby, Marin, Gomez, & Gregorich, 2004). The boys also displayed more knowledge and had a more positive attitude towards not having sex, more specific sexual limits, and were less likely to participate in behaviors or situations that could lead to sexual risk behaviors (Coyle et al., 2004). The psychosocial effects were more limited for the girls.

## **Method**

This study assessed the knowledge, attitudes, and support from parents for sex education in a rural Kentucky Middle school. A survey (See Appendix A for survey questions), created by the University of Texas School of Public Health, was used with the authors' permission and administered via Survey Monkey to a population of parents whose children were enrolled in a rural Kentucky middle school. The informed consent (See Appendix C for informed consent) was included in the letter sent to parents explaining the study before they were able to access and complete the survey.

An Elementary school located in Pike County Kentucky approved the research to be conducted involving the parents of students' enrolled in grades 6th-8th. A convenience sample was used as the surveys were distributed to all 100 parents of these students. The parents were contacted via cover letter sent home by the teachers, which included a description of the research project and a link to the survey. Participants who voluntarily chose to participate by answering yes were redirected to the survey, while participants who refused to participate were redirected.

The survey was pilot tested among graduate students to assess the amount of time needed to complete the survey. The readability level of the survey was at the sixth grade level, as determined by Flesch Reading Ease located on Microsoft Word. The survey assessed parental views regarding sexual education in Kentucky public schools. Respondents were not compensated for participation in the 10-minute survey. The Eastern Kentucky University Institutional Review Board (IRB) approved the study.

## *Measures*

The 21-item standardized survey collected information on parents' socio-demographic and opinions involving implementing sex education in Kentucky public schools. For the survey, the definition of abstinence-only sex education was described as "It should only teach young people to wait to have sex until marriage" Abstinence-plus sex education was defined by the statement "It should teach young people to wait to have sex but also provide them with information on condoms and contraception methods".

Statistical Analysis

Descriptive analyses (i.e., frequencies/cross tabulations) were utilized to summarize demographics of the subjects. Next, Chi Square analyses were used to compare relationships between categorical variables.

## Results

### *Demographics*

Of the 100 parents who were invited to participate, 68 parents participated. However, because of incomplete surveys, a total of 63 parents were included in the analyses. All participants identified as Caucasian and spoke English as a first language.

### Parental Opinions Regarding Sexual Health Education

Multiple choice and Likert-scale questions were used to assess parental attitudes regarding sexual health education in Kentucky public schools. The attitudes measured were parents' views on sex education in public schools and at what grade level that education should begin. Beliefs on the key stakeholders that should be making the decisions on sex education being taught in public schools were measured, as well as the attitudes towards abstinence-only and abstinence-plus education.

The bar chart (see figure 1) shows, 58.7% (n=37), believed that sex education should be taught in middle school, 28.6% (N=18) believed sex education only be taught in high school, 7.9% (N=5) believed sex education should be taught in elementary school, and only 3.2% (N=2) believed sex education should not be taught in schools at all.

There was a marginal significant association between parent's age and the grade level parents believed sex education should be taught in school ( $p > .05$ ) (see Figure 1). Of the 58.7% (N=37) of those who believed sex education should be taught in middle school, over half (56.7%, N=21) were between the ages of 26-35, and 29.7% were between the ages of 36-45.

### *Parental Education Level and Preferred Grade for Sex Education*

In regard to the education level of parents, 58.7% (N=37) of the participants who believed sex education should be taught in middle school, 59.5% (N=22) were college graduates, 21.6% (N=8) had some college, and 16.2% (N=6) were high school graduates. Of the 28.6% (N=18) of the total participants who believed sex education should begin in high school, 61.1% (N=11) were college graduates, 11.1% (N=2) had some college, and 27.7% (N=5) had a high school diploma (see figure 1).

There was a significant association ( $p < 0.05$ ) between parent's age and what type of sexual education should be taught in public schools (see Figures 9 & 11). Of the 73% (N=46) of respondents who believed abstinence-plus should be taught, 58.7% (N=27) were between the ages of 26-35 and 28.3% (N=13) were between the ages of 36-45 (see figure 2).

### Parental Age, Type of Sexual Education, and Curricula Decision-Makers

Of all 63 participants, 73% (N=46) believed sex education should include information regarding abstinence-plus contraception, while 23.8% (N=15) believed it should be abstinence-only. Of the seventy-three percent (N=63) who believed abstinence-plus contraception should be taught, 58.7% (N=27) were between the ages of 26 and 35, and 28.3% (N=13) were between the ages of 36 and 45. Finally, when participants were asked to choose who should be considered most important when making the decision on sexual health

education being taught in public schools, 83% (N=52) listed parents as the most important, 71% (N=45) listed teachers, and 49% (N=31) listed public health officials (see table 1 & figure 2-5).

*Table 1. Responses of Likert-scale Survey Questions*

Item	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Students should get more education about abstinence in sexual health education classes	60.32%	34.92%	3.17%	0%	1.59%
Students should get more education about both abstinence and birth control/condoms in sexual health education classes	43.55%	43.55%	8.06%	3.23%	1.61%
Students should get more education about birth control/condoms in sexual health education classes.	22.22%	55.56%	17.46%	4.76%	0%
Whether or not young people are sexually active, they should receive sexual health education to help them make more responsible choices.	43.55%	51.61%	3.23%	0%	1.61%
Young people need a clear message of abstinence until marriage.	62.90%	30.65%	1.61%	3.23%	1.61%
Giving young people information about both abstinence and birth control in sexual health education classes, would send a mixed message.	9.68%	17.74%	14.52%	46.77%	11.29%
Should schools be doing more to help prevent teen pregnancy and sexually transmitted infections among students.	36.51%	42.86%	19.05%	0%	1.59%

## Implications

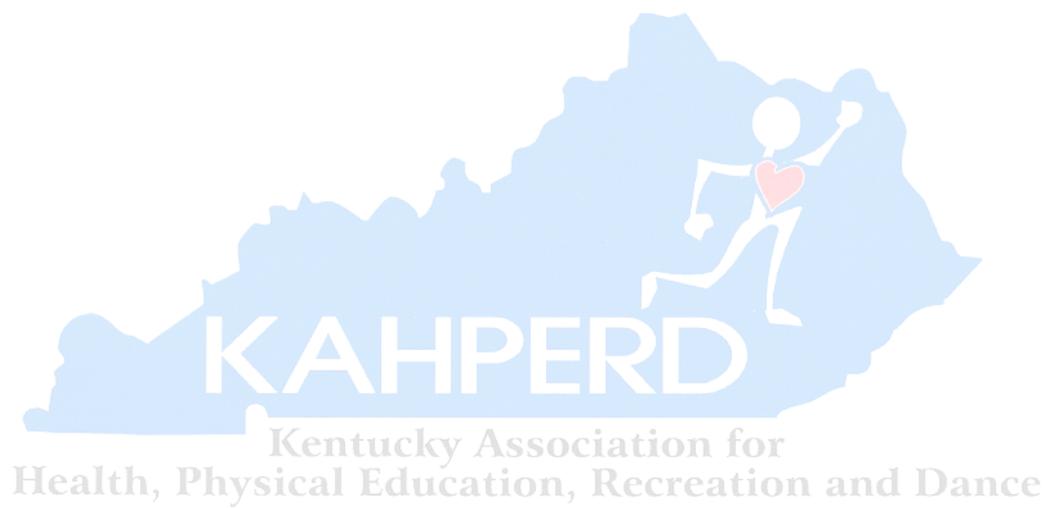
Important implications of the study included most parents endorsing implementation of middle school abstinence-plus sex education within Kentucky public schools. The majority of surveyed parents also believed that sex education should begin in middle school. The differences in attitudes towards sex education among the surveyed parents appears to be strongly influenced by the parent's age. Parents between the ages of 26-45 were more likely to believe that some form of sex education, whether that was abstinence-only or abstinence-plus, should be taught in public schools either beginning in middle school or high school. Another interesting finding was that parents with higher levels of education were more likely to endorse sex education being taught in public schools.

## Future Research

One objective of this study was to use data in order to accurately advise school policymakers regarding the importance of sexual education in a Kentucky rural school. In addition, this study aimed to increase the public's awareness about parental attitudes and beliefs regarding what types of sex education (abstinence-only or abstinence-plus) should be taught in a rural community and at what grade level those teachings should begin.

Based on the findings, parents' opinions on sex education curriculum being taught in public schools' should influence the type of sex education curriculum that is being taught in public schools. It is recommended that further research be conducted on the attitudes and beliefs of Kentucky parents in regard to sexual education. This research should be used as a tool to guide school administrators and school boards in discussions regarding the implementation of such curricula in both middle and high schools. In addition, more studies need to include the impact of sex education programs on teen pregnancy and STD rates at both local and state

levels. This study should be a starting point to open up the conversation on the topic of sex education in public schools among parents and school policymakers.



**Appendices**

Figure 1. At what grade level should sexual health education classes begin in public schools?

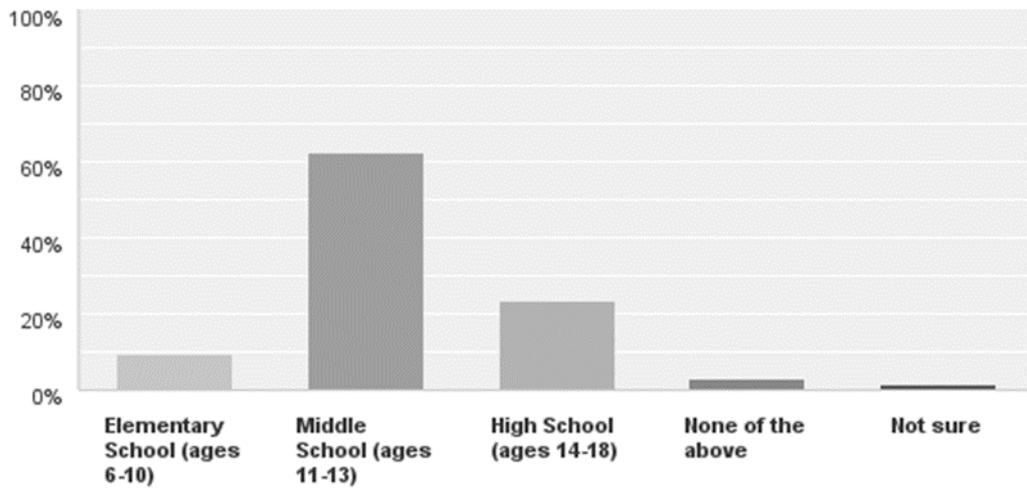


Figure 2. Which of the following statements represents your view on sexual health education in public school?

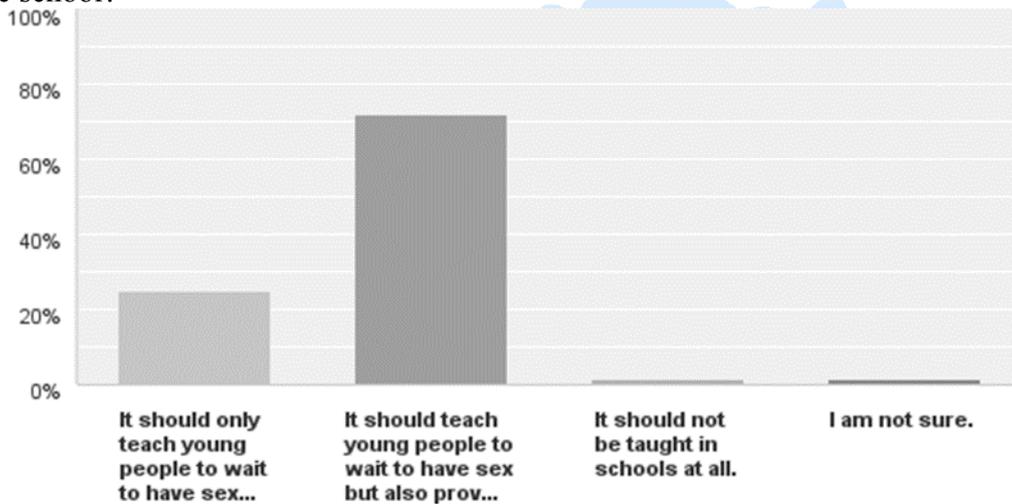


Figure 3. What grade level do you believe sexual health education should provide students with information regarding the use of condoms?

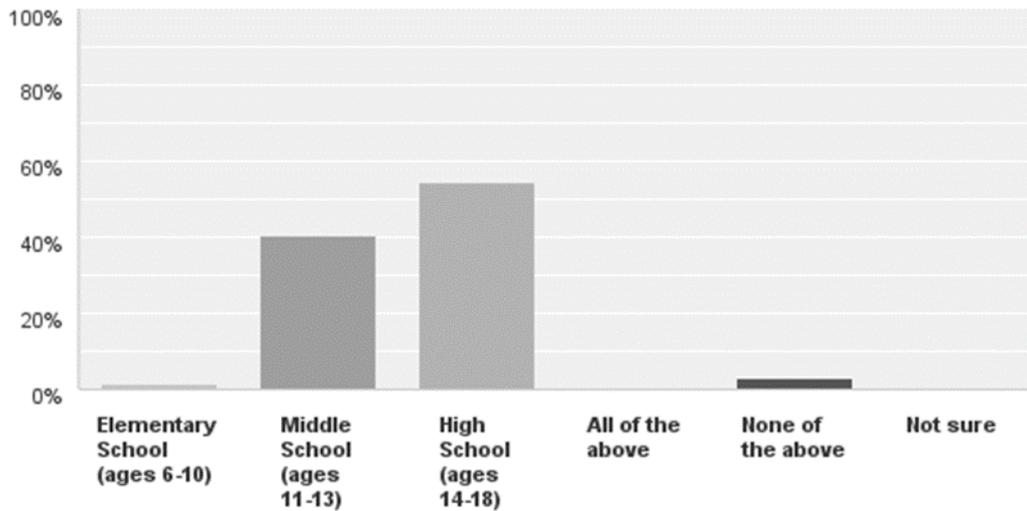


Figure 4. Choose the top 3 that you believe should make the decision regarding sexual health education being taught in public schools?

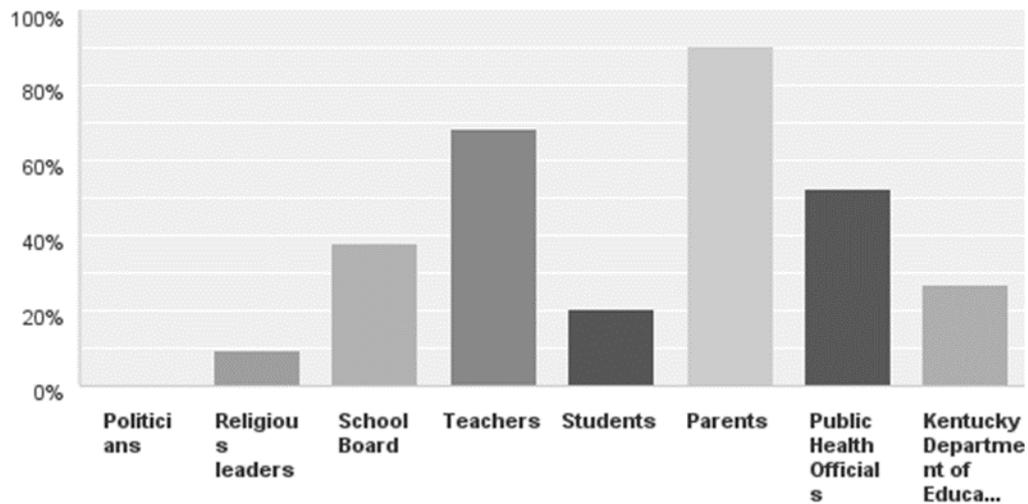
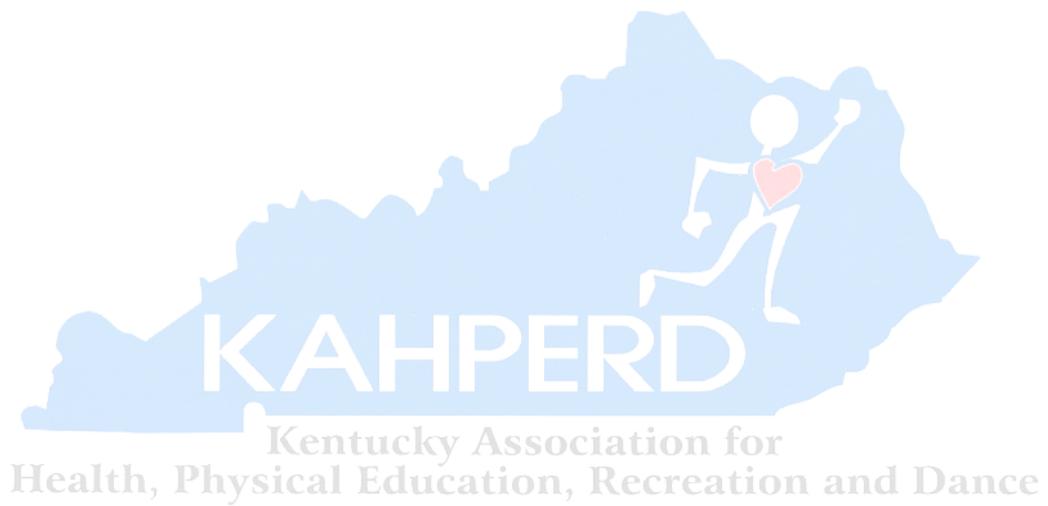
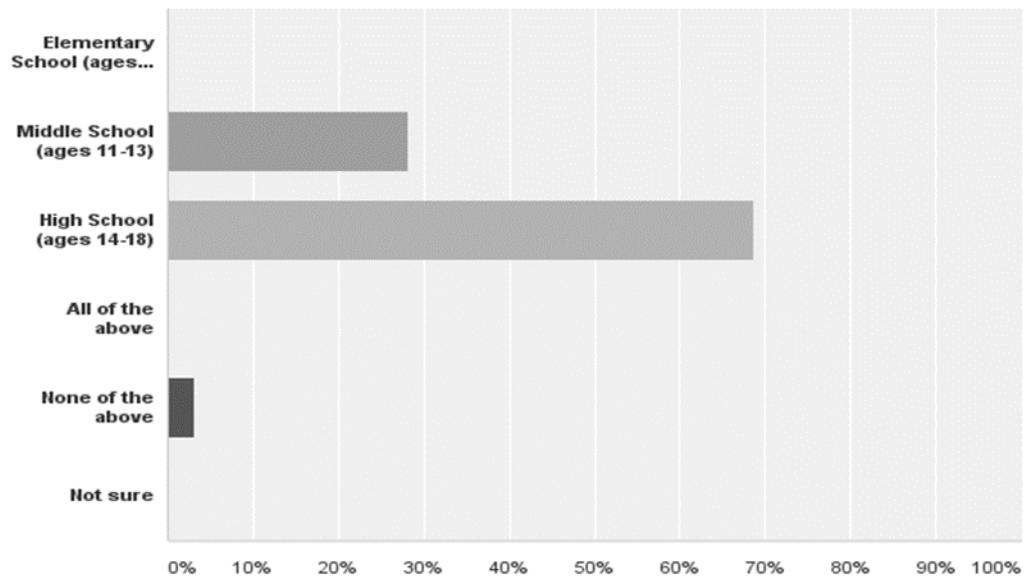


Figure 5. What grade level do you believe sexual health education should provide students with information regarding other forms of contraception such as birth control pills, contraceptive shot, patch, ring & barrier?



## References

- Centers for Disease Control & Prevention. (2015). *Reproductive health: Teen pregnancy*. Retrieved from <http://www.cdc.gov/teenpregnancy/about/index.htm>
- Centers for Disease Control & Prevention. (2015). *Sexually transmitted diseases*. Retrieved from <http://www.cdc.gov/std/stats/default.htm>
- Constantine, N. A., Jerman, P., & Huang, A. X. (2007). California parents' preferences and beliefs regarding school-based sex education policy. *Perspectives on Sexual & Reproductive Health, 39*(3), 167-175. Doi: 10.1363/3916707
- Coyle, K. K., Gómez, C. A., Gregorich, S. E., Kirby, D. B. & Marín, B. V. (2004). Draw the line/respect the line: A randomized trial of a middle school intervention to reduce sexual risk behaviors. *American Journal of Public Health, 94*(5), 843-851.
- County Health Rankings. (2015). *Kentucky data*. Retrieved from <http://www.countyhealthrankings.org/app/kentucky/2015/>
- Cuccaro, P., Johnson, K., Markham, C, Peskin, M., & Tortolero, S. (2011). Dispelling the Myth: What parents really think about sex education in schools. *Journal of Applied Research on Children: Informing Policy for Children at Risk, 2*(2). Retrieved from <http://www.academia.edu>
- Fisher, J. W. & Ha, T. T. (2011). The provision of sexual and reproductive health education to children in a remote mountainous commune in rural Vietnam: an exploratory study of parents' views. *Sex Education, 11*(1), 47-59. Doi:10.1080/14681811.2011.538148
- Healthy People 2020. (2015). *Sexually transmitted diseases*. Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/sexually-transmitted-diseases>
- Heller, J. R., & Johnson, H. L. (2013). Parental opinion concerning school sexuality education in a culturally diverse population in the USA. *Sex Education, 13*(5), 548-559. Doi:10.1080/14681811.2013.775063
- McKee, C., Ragsdale, K., & Southward, L. H. (2014). What do parents in Mississippi really think about sex education in schools? Results of a state-level survey. *Journal of Health Disparities Research & Practice, 7*(1), 97- 119.
- Millner, V., Mulekar, M., & Turrens, J. (2015). Parent' beliefs regarding sex education for their children in southern Alabama public schools. *Sexuality Research and Social Policy, 12*(2), 101-109.
- National Conference of State Legislatures. (2015). *State policies on sex education in schools*. Retrieved from <http://www.ncsl.org/research/health/state-policies-on-sex-education-in-schools.aspx>
- The National Campaign to Prevent Teen and Unplanned Pregnancy. (2011). *Policy brief: Preventing teen and unplanned pregnancy makes good economic sense*. Retrieved from <https://thenationalcampaign.org/resource/briefly%E2%80%94policy-brief-preventing-teen-and-unplanned-pregnancy-makes-good-economic-sense>
- Sexuality Information and Education Council of the United States. (2011). *A portrait of sexuality education and abstinence-only-until- marriage programs in the states*. Retrieved from <http://www.siecus.org>
- United States Census Bureau. (2015). *State & county quick facts*. Retrieved from <http://quickfacts.census.gov/qfd/states/21000.html>

## Acknowledgements

I would like to acknowledge Susan Tortolero, Kimberly Johnson, Melissa Peskin, Paula Cuccaro, and Christine Markham for allowing me to use questions from a survey that they

created. I would also like to gratefully acknowledge the support received from Ryan Howard and Linda Anderson on this project.



**(Peer Reviewed Article)****Franchise Relocation and Expansion of North American Professional Sports**

*Cole Ryan Osborn, University of Nevada Las Vegas*  
*Steve Shih-Chia Chen, Morehead State University*

**Abstract**

Many professional sports franchises in major cities give their communities identity and purpose. This article addressed the overall process and rationales of “franchise movement,” and examined the intricacy of this unique phenomenon. Through literature review and analysis of collected information concerning a host city’s population, number of Fortune 500 Corporations, ranking of national TV market, arena capacity, and income per capita, the authors identified key indicators that determined the actualization of franchise movement or relocation, and ideal destination cities for future movements. In general, the monetary factor for maximizing franchise’ potential earning and getting a free facility are the strongest incentives for moving or relocating the franchise to a new host city. An ideal host city can be determined by indicators such as population, number of Fortune 500 corporations, ranking of the national TV market size, and income per capita, etc.

**Introduction**

The North American major four professional sports are vastly guided and dominated by the pinnacle professional leagues. The franchises of those big-four leagues (National Football League, Major League Baseball, National Basketball Association, and National Hockey League) have expanded continuously. The financial prosperity, media exposure, and franchise expansion clearly demonstrate the influence of those professional sport leagues in the American culture and society. As franchises and leagues continue to strive for their financial and performance success, expansion and relocation of the teams have emerged as an eminent issue as owners trying to seek for the most suitable place to reside and develop their team (Rascher, 2004). The movability of franchises has been widely scrutinized because of its enormous financial impact, tax issues and benefits (i.e., the franchise may receive federal tax subsidies for the stadium construction), controversies of raising anti-trust litigations, and requirements for obtaining consensus approval by the league owners (Jensen, 2000; Mitten & Burton, 1997; Rascher, 2004; Shropshire, 1995; Wong, 1985). The new or relocated franchise will often receive a brand new stadium or arena, and is able to grow its new fan base from the host city’s large population (Noll & Zimbalist, 1997). When a team successfully moves into a new market, the financial benefits often go beyond the first year. The attendance and ticket sales usually will rise and peak, and sustain for three additional years (Lertwachara & Cochran, 2007). The politicians of host cities often claimed that the cities were able to reap great economic impact due to the inception of the new franchise (Bruggink & Schiz, 2008; Coates & Humphreys, 2003). It is often claimed that the new or relocated franchises could bring jobs, development, and growth of restaurant and retail industries that worth over a hundred million dollars (Santo & Mildner, 2010). However, many economists rejected this notion by stating the economic impact was often inflated (i.e., overestimating the employment opportunities created by the franchise), miscalculated (i.e., using incorrect multiplier), and misinterpreted (i.e., including the local residents’ spending) (Badde, 1996; Leeds & von Allmen, 2014; Lertwachara & Cochran, 2007; Siegfried & Zimbalist, 2000).

One thing for certain is that the franchise value of the team often increases significantly by receiving a well-public funded stadium or arena after relocation (Alexander & Kern, 2004). Thus, there are imperative elements for the new or relocating franchise to achieve financial success: (1) having tons of fans that welcome the team with open arms, and (2) receiving a state-of-the-art facility without paying any cost to the host city. Residents often buy-in to the politicians' policies and owners' promise and embrace the team by offering subsidies for the stadium construction (Friedman & Mason, 2004; Wong, 1985).

National media attention has consistently focused on the movement and expansion of franchises. In this 2017 season, the National Hockey League (NHL) welcomes its newest expansion team in Las Vegas. Los Angeles has also reunited with its previous National Football League (NFL) team, Rams, after losing it to St. Louis a couple of decades ago. And very likely, the Oakland Raiders of the NFL will call Las Vegas home soon as well. To demonstrate the popularity of this topic, the authors used Google Scholar to locate numerous primary and secondary materials utilizing three specific search terms, professional sports, franchise expansion, and franchise relocation. The search yielded a total of 14,300 results related to those three terms. The authors further selected relevant 25 scholarly articles that appeared in the first seven webpages along with many other, books, news and magazine articles to compose this commentary review. The foci of this review covered key aspects such as development and causes of franchise movement, benefits and disadvantages of expansion and relocations of teams, and strategic determinants for achieving franchise movement.

#### *History and issues related to franchise movement*

By reviewing the past literature concerning the development of professional sports, we can have a better understanding about the process of future franchise movement. When professional sports leagues were originally formed in America, the majority of the initial teams resided in a small industrial center or geographical area in the Midwest region. Those teams often played in the regional leagues until 1950s (Leeds & von Allmen, 2014). In 1958, the baseball team that was originally established in Brooklyn, NY had moved to Los Angeles. This franchise relocation affected all professional sports in two significant ways (Beisner, 1988; Leeds & von Allmen, 2014). First, it expanded the market of professional sports to the west coast and the southern region of America. Secondly, it changed the relationship between sports franchises and the communities in which they resided. The relocation of Brooklyn Dodgers was not due to poor support by the community fans, which is the traditional justification for franchise movement (Johnson, 1983). Rather, this move is about expanding the market to the west coast, and gaining more financial opportunities by tapping into an underdeveloped market.

This type of dynamic shift is still present today, where owners mainly look for the best financial package on top of the strong fan support. Furthermore, owners are often leveraging stadium construction funds from the host cities by threatening to relocate (Lertwachara & Cochran, 2007; Mildner & Strathman, 1997; Noll, 2002). These threats manipulate cities to lease unfair agreements under difficult financial situations. Since the professional sports leagues somewhat control the supply of teams, owners have a monopoly power on the market, and can use the shortage of teams to garner the best financial deal for their franchises (Legal Forum Editors, 2000).

One may think that legislator would intervene in relocations and expansion of the teams to satisfy the market demand of the community fans. In general, the antitrust principles are

applied to NFL, NBA and NHL concerning the restriction of employment and market (Lazaroff, 1984). The common argument is whether the relocation restriction should be enforced to prohibit an individual team from moving to a different city without the prior approval of a specified percentage of other league members (Lazaroff, 1984). Apparently, federal antitrust law has an exemption in regards to franchise management (Gorton, 1985; Lazaroff, 1984; Mitten & Burton, 1997). The antitrust law exemption, broadcasting rights, league mergers, and manipulative asset management have enabled all franchise owners to maintain a negotiation advantage over host cities. The city government has not been able to foster a structure that stops the financial abuse on taxpayers by the franchise (Euchner, 1994). Over the span of 30 years, there were many attempts (i.e., introducing new bills) that aimed to protect communities by stopping franchise relocation (Associated Press, 2006; Johnson, 1983; Taylor, 1985). However, none of those attempts gained enough support to become actual laws that can truly restrict any relocation (Lazaroff, 1984; Nathanson, 2007; Wilson, 1994). Many of the major litigations concerning franchise movement are fruitless. Although some facets of the federal antitrust laws are upheld in the court; however, at the municipal level, franchise management is highly owner driven, and controlled by league officials (Fisher, Maxwell & Schouten, 2000; Siegfried & Zimbalist, 2000). The professional leagues fully exercise their monopoly power to determine the locations for residing their teams. Nevertheless, some provisions have been made to make franchise relocation more equitable and improve the relationship between the franchise and its residing community. Those provisions include requiring leases of certain lengths, paying for leasehold improvement, and making financial contributions to the city (Johnson, 1983). Under a relegation system, a top team in a lower division can be promoted to the next level up for the following season, thus a team in a higher division that ends its season with poor records is relegated to the next level down (Hershberger, 2015). Unlike English football league, there is no relegation system to check the American professional teams' substandard performance and financial management. When American sport teams do not perform well on the court, their owners constantly blame the local fans for poor support and exploit the host city by requesting a new stadium. If this demand is not met, the team will further threaten to leave the town (Noll, 2003). The legislations concerning franchise movement are complicated and sophisticated. Citizen may wonder why a city and its legislators would like to acquire a franchise, since there is no guarantee that the franchise will be profitable and stay around permanently.

#### *Benefits, problems, and consequences associated with the franchise movement*

The local impact of franchise movement is apparent on both departure and arrival of the professional sports team in a community. When a professional sports team arrives in a new community, there are several positive benefits. The benefits of hosting a sports franchise can be both tangible and intangible. Cities that host teams receive direct economic benefit through tax revenues and the creation of employment opportunities, and indirect benefits through the necessary accommodations used to support a team, such as food, lodging, transportation and tourism (Badde, 1996; Coates & Humphreys, 2003; Jozsa, 2014; Lertwachara & Cochran, 2007; Quirk, 1973; Shropshire, 1995). Along with the economic impact, having a successful sports franchise adds prestige to the host city, and attracts other non-sports industries (Beisner, 1988).

Conversely, the inherent impact on the local community after the departure of a team is also significant. When a city failed to retain its original professional sports franchise, it often would reach out to another franchise to replace the lost one (Beisner, 1988). The left-behind fans' feelings can be classified into two extreme categories. They would either embrace and cheer for a new coming team, or completely turn away from the new arrival team with a bitter

sense of betrayal and strong resentment (Foster & Hyatt, 2007). Fans' nostalgic feelings toward the previous team can be a driving force for expecting a new relocating or expansion team. For this reason, it is not difficult to imagine that St. Louis would eagerly expect to host another NFL team to replace Rams (Kerr-Dineen, 2016).

*"Nuts and bolts" about franchise relocation and expansion*

The topics of selecting an ideal location (market) for the new expansion or relocation team are heavily examined and studied (Beisner, 1988; Bruggink & Schiz, 2008; Rascher 2004; Kushner, Martin, Sucurovic, Sutton, & Joshi, 2007). While selecting an ideal city to call home, sports franchises often conduct marketing research and look into many factors other than the initial offered package (rental and constructional cost of the stadium/arena) alone. Literature notes that population demographic, ticket sales records, the existing competitive sport teams in the area, climate, and many other factors all have strong influence on the success of expanding and relocating (Bruggink & Schiz, 2008). Franchises expect a new stadium, financial incentives, and significant indicators that make the city a sustainable location. They also anticipate building a supportive fan base that could follow the team. The marketing factors that help the franchise make the relocation and expansion decision include census reports of gender and age distribution, and residents' income and education level. Male individuals with a college education and a high level of income would have more dispensable money, and are more willing to attend the games. A city with a greater amount of older populations tends to generate higher game attendance (Mitchell, 2015). Warmer cities have a tendency to attract more sports franchises. The relationship among the professional sports team, teams of different leagues, fans, city government, and cooperate sponsors in a city also has an effect on overall game attendance. Sport leagues often do cross-promotion and may share the facilities to operate the events. Ultimately, it is vital to examine the team's historical path and progression in order to gain a better understanding of needs and strategies for both city and the franchise for making the expansion or relocation an ideal fit for all shareholders (Mitchell, 2015).

Franchise movement is a multi-dimensional process, which includes planning and conducting market research on potential cities. The probability of relocation and expansion of a sport franchise is gauged by a sliding scale that is monitored by supporting population, owners' happiness, and viable alternative markets. Taking the most recent National Hockey League (NHL) expansion team, Golden Knights, as an example, it needs the vibrant support from Las Vegas' 2.2 million area-residents (Prewitt, 2016a). The population of greater LV had increased by 50.6% since 2000 along with a whopping 42 million tourists visiting the city annually (Prewitt, 2016a). The fee of this new expansion team costs \$500 million, which is 1.5 times more than what Nashville, Atlanta, Minnesota and Columbus had paid accumulatively in the last round of NHL's expansion. This case just showed how much confidence that the owner has on the city and its fans for supporting the franchise. Fans were giving deposits on a team that might never arrive with season ticket sales reached 10,000 a year before its opening season (Prewitt, 2016a; Prewitt, 2016b). This is an unprecedented phenomenon according to the NHL Commissioner Bettman. The Golden Knights' case clearly illustrates how the proposed sliding scale is operated.

Franchises are not likely to move, if they are happy with their fan base, stadium, location, and team performance. If there is no existence of better offers, the franchise will not attempt to move to a new market (Bruggink & Schiz, 2008). The franchise owners often dictate team relocation. Cities may offer a free stadium and tax abatements to lure franchises that are seeking a new home. Once an agreement has established between the franchise and the city,

the movement process is controlled by the votes of other affiliated teams in the league. Each league has different relocation policies and is regulated in various ways under legislature (Bruggink & Schiz, 2008).

The destiny of an expansion franchise is primarily controlled by the bidding cities. To win the battle, cities need a strong profile to earn the favor from the owner of the future franchise. Ideally, cities need to have a population size of approximately two millions (Mitchell, 2015), and top-40 broadcasting market to sustain a franchise (Galletti, 2011). Expansion teams tend to struggle financially during its first two decades. The most feasible and risk-free option for creating an expansion team is to lure teams currently located in publically owned facilities, in floundering towns, or with losing records (Mildner & Strathman, 1997).

#### *Indicators and characteristics of ideal host cities*

Studies have been done to help public understand which ideal city could be a great candidate for hosting a new relocating or expanding professional sports franchise. Bruggink and Schiz (2008) examined the conditional probability of cities that may host a new NFL team. Their key indicators included:

1. the existing number of other professional franchise,
2. population of the city,
3. the trend of population growth,
4. income per capita,
5. the city's distance to other closest NFL franchise,
6. number of Fortune 500 headquarters in the city,
7. number of professional sports teams in city, and
8. Monday Night Football TV rating of the city.

Those aforementioned indicators were used to create a regression equation that predicted the five most ideal candidate cities for expansion or relocation. They are Los Angeles, San Antonio, Salt Lake City, Sacramento, and Columbus (OH). Based on those indicators, some cities are considered vulnerable to losing their teams, such as Buffalo, Jacksonville, and New Orleans.

In studies of Rascher (2004) and Kushner et al. (2007), similar indicators along with other data related to arena capacity, the moving franchise's records, size of TV market, and consumer price index within the region were utilized to predict the most viable candidate cities for a new franchise of National Basketball Association. Those cities are Cincinnati, Hartford, Baltimore, Louisville, San Diego, Las Vegas and Nashville. Regardless the differences of sports, cities were still identified based on many similar key indicators with a greater emphasis on the number of Fortune 500 corporations, and marketing potential, and economic development. The sales of the luxury suites, boxes and bolstered revenues produced through local TV deals and sponsorships are the mandatory requirements to ensure franchise' financial vitality. By understanding the essential indicators for selecting the most appropriate expanding and relocating destination, both cities and franchises can make better preparation and bidding proposal to smoothly execute franchise movement transition. It would not be a surprise to witness how certain cities could lose (or have already lost) their franchise to another place, when the aforementioned indicators were adopted and utilized (Kerr-Dineen, 2016).

To demonstrate the importance of many aforementioned indicators, the authors composed a summary table (see Table 1) to illustrate the characteristics of last few relocating and expanding franchises of each major professional sports league in North America. The data of this table were collected mainly from two search engines, Google.com and Ask.com, and other online encyclopedias by using the name of cities and leagues and aforementioned indicators (same as the categories in Table 1) as key words. The collected information covered categories such as city's population, number of Fortune 500 corporations, ranking of the national TV market size, arena capacity, income per capita, and percentage of public subsidies for the new stadium from the host city. Please refer to the Appendix A for the useful websites and articles concerning the collected information. This table provides baseline information that can be used by cities and franchises to examine the qualification of proposed new candidates in the cases of franchise movement. In general, over 76% of the listed teams had a metro population over a half of million. Nearly, all of them, except one, were in a top-50 national TV market. Newly relocated and expansion teams in the NFL and MLB had resided in a city that exhibited a greater number of income per capita (over \$50,000) than those teams of NBA and NHL (under \$45,000). Newly relocated and expansion teams of NBA had received the highest percentage of public subsidies for their arena (at least 91%).

*Table 1. Information of Most Recent Expanding or Relocating Professional Sports Teams*

Category	Population	Number of Fortune 500 Corporations	Ranking of National TV market	Arena Capacity	% of Public Subsidies	Income per Capita of the City
NFL						
Los Angeles (2016)	3.93M	13-15	2	9,3207	0??	> \$59,092
Houston (2002)	2.24M	25	10	7,2220	43.2%	> \$54,346
Nashville (1997)	0.66M	8	29	6,9143	75.7%	> \$50,635
Baltimore (1996)	0.62M	None	26	7,1008	90%	> \$55,275
MLB						
Washington DC (05)	0.66M	15	9	4,1418	100%	> \$64,882
Phoenix (1998)	1.54M	4-6	12	4,8519	71%	> \$40,811
Tampa (1998)		3	13	3,1042	100%	> \$43,008
Denver (1993)	0.66M	9	18	5,0398	75.3%	> \$55,975
Miami (1993)	0.43M	3	16	3,6742	46.0%	> \$49,819
NBA						
Oklahoma (2008)	0.62M	1	45	1,8203	100%	> \$46,076
New Orleans (2005)	0.38M	1	53	1,6867	100%	> \$56,943
Charlotte (2004)	0.81M	7-8	24	1,9077	100%	> \$44,935
Memphis (2001)	0.65M	Around 9	48	1,8119	91.2%	> \$42,300
NHL						
Las Vegas (2016)	0.61M	3	42	1,7500	> 80%	> \$40,652
Winnipeg (2011)	0.35M	None	N/A	1,5294	90.5%	> \$45,011
Raleigh, NC (1997)	0.44M	None?	27	1,8680	87.3%	> \$48,411
Phoenix (1996)	1.54M	4-6	12	1,6210	100%	> \$40,811

## Conclusions

By knowing the underlying circumstances and process of franchise movement, readers can have a better understanding of the potential occurrence of franchise relocation and expansion. Sport administrators can learn more about historical background of franchise movement, and common financial and economic rationales to strengthen their bidding proposals for securing a new home for their franchise. Based on our review, the researchers assumed that many cities are capable of supporting existing franchises within their community; however, the

serious commitment in offering public funds to build a new stadium/arena can really hamper the existing collaborative relationship between the city and its franchise. Basically, franchises will continually look for the best deal, where they can get the most financial gains with the least commitment. Fundamentally, we reject the notion of allowing franchises to request voluptuous free stadium deal from their host city. If consumer satisfaction and service quality really mean something to franchise administrators, then those administrators should know the current schemes and practices of franchise movement are no more than exploitation and treats to the host city and their community fans.



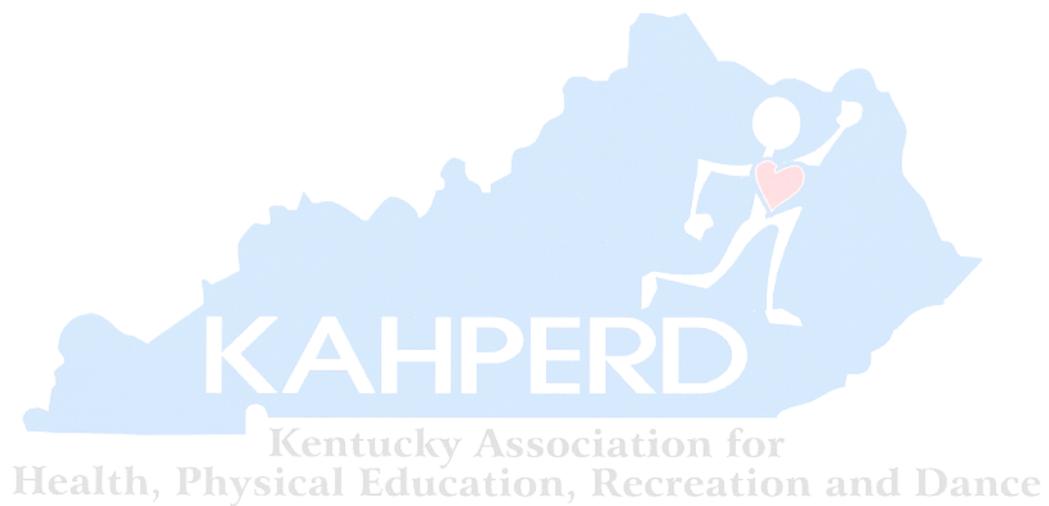
## References

- Alexander, D. L., & Kern, W. (2004). The economic determinants of professional sports franchise values. *Journal of Sports Economics*, 5(1), 51-66.
- Associated Press. (2006). *Feinstein aims to stop 49er relocation*. Retrieved from <http://www.eastbaytimes.com/2006/11/15/feinstein-aims-to-stop-49er-relocation/>
- Baade, R. A. (1996). Professional sports as catalysts for metropolitan economic development. *Journal of Urban Affairs*, 18(1), 1-17.
- Beisner, J. (1988). Sport franchise relocation: Competitive markets and taxpayer protection. *Yale Law & Policy Review*, 6(2), 429-448.
- Bruggink, T., & Schiz, D. (2008). Location model in the national football league: Predicting optimal expansion and relocation sites. *The Sport Journal*. Retrieved from <http://thesportjournal.org/article/location-model-in-the-national-football-league-predicting-optimal-expansion-and-relocation-sites/>
- Coates, D., & Humphreys, B. R. (2003). Professional sports facilities, franchises and urban economic development. *Public Finance and Management*, 3(3), 335-357.
- Euchner, C. C. (1994). *Playing the field: Why sports teams move and cities fight to keep them*. Johns Hopkins University Press.
- Fisher, F. M., Maxwell, C. & Schouten, E. S. (2000). The economics of sports leagues and the relocation of teams: The case of the St. Louis Rams. *Marquette Sports Law Journal*, 10(193), 193-218.
- Foster, W. M., & Hyatt, C. (2007). I despise them! I detest them! Franchise relocation and the expanded model of organizational identification. *Journal of Sport Management*, 21(2), 194-212.
- Friedman, M. T., & Mason, D. S. (2004). A stakeholder approach to understanding economic development decision making: Public subsidies for professional sport facilities. *Economic Development Quarterly*, 18(3), 236-254.
- Galletti, A. (2011). Could your city give a sports team a good home? *Wages of Wins*, Retrieved from <http://wagesofwins.com/2011/10/31/could-your-city-give-a-sports-team-a-good-home/>
- Gorton, S. (1985). Professional sports franchise relocation: Introductory views from the Hill. *Seton Hall Legislative Journal*, 9, 1-6.
- Hershberger, (2015). *Why American sports don't have promotion and relegation?* Retrieved from <http://ordinary-gentlemen.com/2015/11/15/why-american-sports-dont-have-promotion-and-relegation/>
- Jensen, S. A. (2000). Financing professional sports facilities with federal tax subsidies: Is it sound tax policy? *Marquette Sports Law Journal*, 10(2). Retrieved from <http://scholarship.law.marquette.edu/sportslaw/vol10/iss2/15>
- Johnson, A. T. (1983). Municipal administration and the sports franchise relocation issue. *Public Administration Review*, 43(6), 519-528.
- Jozsa, F. A. (2014) *National basketball association strategies: Business expansions, relocations and mergers* (1st ed.). Switzerland: Springer International. DOI: 10.1007/978-3-319-10058-6.
- Kerr-Dineen, L. (2016). *Five cities that could land an NFL team soon from least to most likely*. Retrieved from <http://ftw.usatoday.com/2016/10/nfl-teams-cities-relocation-las-vegas-los-angeles-london-oakland-raiders-chargers-rams>
- Kushner, D., Martin, S., & Sucurovic, S., Sutton, W., Joshi, A. (2007). *A statistical base predictive model for NBA franchise expansion/relocation*. Unpublished manual script.

- Lazaroff, D. E. (1984). The antitrust implications of franchise relocation restrictions in professional sports. *Fordham Law Review*, 53(2). Retrieved from <http://ir.lawnet.fordham.edu/flr/vol53/iss2/2>
- Leeds, M. A., & von Allmen, P. (2014). *The economics of sports* (5th ed.). Upper Saddle River, NJ: Pearson.
- Legal Forum Editor. (2000) Leveling the playing field: Relevant product market definition in sport franchise relocation cases. *University of Chicago Legal Forum*, 2000(1), Retrieved from <http://chicagounbound.uchicago.edu/uclf/vol2000/iss1/10>
- Lertwachara, K., & Cochran, J. (2007). An event study of the economic impact of professional sport franchises on local U.S. economies. *Journal of Sport Economics*, 8(3), 244-254.
- Mildner, G. C.S. & Strathman, J. G. (1997). Baseball and basketball stadium ownership and franchise incentives to relocate. *Center for Urban Studies Publications and Reports. Paper 32*. Retrieved from <https://www.pdx.edu/sites/www.pdx.edu.cus/files/DP97-6.pdf>
- Mitchell, C. (2015). Examining potential MLB expansion cities, Part 1. *The Hardball Times*, 4(9), Retrieved from <http://www.hardballtimes.com/examining-potential-mlb-expansion-cities-part-1/>
- Mitchell, C. (2015). Examining potential MLB expansion cities, part 2. *The Hardball Times*, 4(10), Retrieved from <http://www.hardballtimes.com/examining-potential-mlb-expansion-cities-part-2/>
- Mitten, M. J., & Burton, B. W. (1997). Professional sports franchise relocations from private law and public law perspectives: Balancing marketplace competition, league autonomy, and the need for a level playing field. *Maryland Law Review*, 56(1). Retrieved from <http://digitalcommons.law.umaryland.edu/mlr/vol56/iss1/5/>
- Nathanson, M. (2007). What's in a name or, better yet, what's it worth--Cities, sports teams and the right of publicity. *Case Western Reserve Law Review*, 58(1). Retrieved from <http://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1738&context=caselrev>
- Noll, R. G. (2002). The economics of promotion and relegation in sports leagues: The case of English football. *Journal of Sports Economics*, 3(2), 169-203.
- Noll, R. G., & Zimbalist, A. (1997). Sports, jobs, & taxes. *The Brookings Review*, 15(3), 35.
- Prewitt, A. (2016a). All in. *Sports Illustrated*, 125(19), 93-98.
- Prewitt, A. (2016b). Scorecard: Desert bloom. *Sports Illustrated*, 124(24), 15-16.
- Quirk, J. (1973). An economic analysis of team movements in professional sports. *Law and Contemporary Problems*, 38, 42-66.
- Rascher, D. (2004). NBA expansion and relocation: A viability study of various cities. *Exercise and Sport Science*. 20. Retrieved from <http://repository.usfca.edu/cgi/viewcontent.cgi?article=1009&context=ess>
- Santo, C. A., & Mildner, G. C. S. (Eds.). (2010). *Sport and public policy: Social, political, and economic perspective*. Champaign, Illinois: Human Kinetics.
- Shropshire, K. L. (1995). *The sports franchise game: Cities in pursuit of sports franchises, events, stadiums, and arenas*. Philadelphia, Pennsylvania: University of Pennsylvania Press.
- Siegfried, J., & Zimbalist, A. (2000). The economics of sports facilities and their communities. *The Journal of Economic Perspectives*, 14(3), 95-114.
- Taylor, S. (1985). *Legislators study defenses to keep teams in place*. Retrieved from <http://www.nytimes.com/1985/01/20/sports/legislators-study-defenses-to-keep-teams-in-place.html?pagewanted=all>

Wilson, J. (1994). *Playing by the rules: Sport, society, and the state*. Detroit, Michigan: Wayne State University Press.

Wong, G. M. (1985). Of franchise relocation, expansion and competition in professional team sports: The ultimate political football. *Seton Hall Legislative Journal*, 9, 7-15.



## Appendix A

*Useful websites and articles for listed information in Table 1*

Komisarchik, M., & Fenn, A. J., (2010). Trends in stadium and arena construction, 1995-2015. *Colorado College Working Paper No. 2010-03*. Retrieved from <https://ssrn.com/abstract=1584733> or <http://dx.doi.org/10.2139/ssrn.1584733>

<https://www.geolounge.com/fortune-500-list-by-state-for-2015/> (Fortune 500 list by state for 2015)

[https://en.wikipedia.org/wiki/List\\_of\\_highest-income\\_metropolitan\\_statistical\\_areas\\_in\\_the\\_United\\_States](https://en.wikipedia.org/wiki/List_of_highest-income_metropolitan_statistical_areas_in_the_United_States) (List of highest-income metropolitan statistical areas in the United States)

<https://www.statista.com/statistics/205618/per-capita-income-in-the-top-20-most-populated-cities-in-the-us/> (Per capita income in the most populated U.S. cities in 2015 in U.S. dollars)

<http://www.newsgeneration.com/broadcast-resources/top-100-radio-markets/> (Top 100 media market)

<http://www.stationindex.com/tv/tv-markets> (Top 100 television market)

<http://www.infoplease.com/ipa/a0763098.html> (Top 50 Cities in the U.S. by Population and Rank)



**(Peer Reviewed Abstract)****Connecting Kentucky Farms to Kentucky Classrooms**

Abigail Ewing, University of Louisville ([acewin01@louisville.edu](mailto:acewin01@louisville.edu))

Carol O'Neal, PhD, University of Louisville ([csonea01@louisville.edu](mailto:csonea01@louisville.edu))

Studies have shown that farm to school programs yield many positive benefits for students, their families, teachers, schools, and entire communities. These programs can help promote healthy eating habits, increase family food security and support farmers and local food systems. To successfully reap the benefits of farm to school programs, teachers and other professionals in the school setting must access the necessary knowledge and resources available to implement the farm to school key elements: procurement, education, and gardening. Currently, there is a strong farm to school movement in America, and much support exists for schools wishing to join in this movement. The purpose of this article was to compile resources for school personnel to utilize and effectively implement initiatives for healthier students, families, and communities. Kentucky is making great strides in providing information for school professionals, with resources such as the Kentucky Farm to School Curriculum and the Kentucky Farm to School Handbook. For community and school garden start-up guidelines, a community garden guide from the University of Kentucky Cooperative Extension office should be accessed. Growing Minds, an Appalachian Sustainable Agriculture Project program, provides trainings, an annual conference, lesson plans, recipes, literature ideas, and other opportunities to incorporate farm to school programming in the classroom, cafeteria, and community. Funding opportunities exist for new and existing programs through the Whole Kids Foundation, Food Corps, and the USDA. As a paradigm of a successful farm to school organization, the Food Literacy Project in Louisville supports its local community with its farm-based education and field-to-fork offerings. Resources are available for schools at the beginning stages of farm to school activities and for schools interested in tools for enhancing their current efforts.

**Keywords:** Farm to school, eating habits, sustainability, garden

**Key References**

- Drury, D., Garland, T., & Walters, J. (2011, April 21). *Kentucky Farm 2 School curriculum*. Retrieved from [https://www.kyagr.com/consumer/documents/FD\\_FS\\_Curriculum.pdf](https://www.kyagr.com/consumer/documents/FD_FS_Curriculum.pdf)
- Growing Minds (2016). *Farm to School*. Retrieved from <http://growing-minds.org/>
- Kentucky Farm to School Task Force. (2012, June). *Kentucky Farm to School Handbook*. Retrieved from <http://education.ky.gov/federal/scn/documents/farm%20to%20school%20kentucky%20handbook.pdf>
- Song, H., Grutzmacher, S., & Munger, A. L. (2016). Project ReFresh: Testing the efficacy of a school-based classroom and cafeteria intervention in elementary school Children. *Journal of School Health*, 86(7), 543-551. doi:10.1111/josh.12404
- The Food Literacy Project. (2016, October 13). *The food literacy project*. Retrieved from <http://foodliteracyproject.org/>

**(Peer Reviewed Abstract)****Farm to School: Closing the Food Literacy Gap to Address Healthy Eating Habits**

Amanda Antonini, University of Louisville ([amanda.antonini@louisville.edu](mailto:amanda.antonini@louisville.edu))

Carol O'Neal, University of Louisville ([csonea01@louisville.edu](mailto:csonea01@louisville.edu))

Kentucky is listed as the third most obese state for children according to the Centers for Disease Control and Prevention. Only 17% of children are consuming the daily recommended servings of fruits and vegetables. The purpose of this article was to examine how farm to school programming addresses the growing need to engage and educate students to make healthy food choices. Farm to school programs are educational curricula that encourage community engagement and healthy eating habits for students. The three main elements of farm to school programming include procurement, education, and school gardens. Procurement focuses on where the food comes from and incorporating farm fresh food into school cafeterias. The education portion involves incorporating lesson plans and teaching children about food, farming and nutrition. Incorporating school gardens so that students can become actively engaged in the growing process through hands-on interaction is the final step. Immersing students in farm to school programs ensure many benefits for students, schools, farmers, and communities. Benefits include greater fruit and vegetable consumption and improved overall nutrition for youth. These programs also support local farmers and improve local economies and strengthen communities. However, such programs are lacking in Kentucky. Currently, less than 50% of school districts in Kentucky buy local foods for their school cafeterias or implement farm to school programming. There are several national organizations and resources available for teachers, schools, or communities seeking to utilize farm to school programming. Using a social ecological approach, farm to school programming can be integrated into school districts at either the classroom, school, or community levels. The flexibility and efficacy of farm to school programming provides operational solutions for every district to be able to address healthy eating behaviors in its students.

**Keywords:** Farm to school, eating habits, children, curricula

**Key References:**

Centers for Disease Control and Prevention. (2016). *Childhood obesity facts*. Retrieved from <https://www.cdc.gov/obesity/data/childhood.html>

Kentucky Department of Education. (2016). *Farm to School*. Retrieved from <http://education.ky.gov/federal/SCN/Pages/Farm-To-School.aspx>

Kentucky Department of Education. (2012). *Kentucky Farm to School Handbook*. Retrieved from <http://education.ky.gov/federal/SCN/Documents/Farm%20to%20School%20Kentucky%20Handbook.pdf>

National Farm to School Network. (2016). *About Farm to School*. Retrieved from <http://www.farmtoschool.org/about/what-is-farm-to-school>

**(Peer Reviewed Abstract)****SNACS: Recommendations for Improving the Quality of Foods/Beverages Provided to Kids during Community-Sponsored Sporting Events**

*Mallory Brown, University of Kentucky*

*Elizabeth Whitney, University of Kentucky*

*Patrick Herbert, Towson University*

**Introduction:** Community-based sports provide an outlet for children in America to engage in regular physical activity and approximately 40% of children ages 6-12 participate in sports on a regular basis (Aspen Institute Sports & Society Program, 2016). Unfortunately, there tend to be an array of unhealthy food choices available at youth sporting events. Anecdotally, there appears to be confusion and controversy concerning which snacks and beverages are considered healthy and appropriate; oftentimes those choices are based on convenience and availability, instead of nutritional quality and necessity, particularly during out-of-school sporting events. Children ages 6-11 are the most at-risk for being inadequately hydrated, and 60% of children in the US do not eat enough fruit (Kenney, Long, Cradock, & Gortmaker, 2015), (CDC, 2014) which provides an opportunity for intervention in this particular environment through education and advocacy about appropriate snacks for children after community sporting events. **Purpose:** Parents are subject to making uninformed choices when it comes to providing snacks at sporting events; their selections are oftentimes based on convenience and not necessarily that of nutritional quality. Changing the cultural norms surrounding appropriate snacks can begin with education. The purpose of this presentation is to offer a strategy by which health and physical educators can engage parents and help inform them of best-practice recommendations concerning snacks during out-of-school sporting events. **Recommendations:** “Bring Healthy SNACS: Simple Nutrition After Community Sports” is one way to help build education and awareness concerning the importance of quality snacks during out-of-school sporting events. **Discussion:** Health and PE teachers have a wealth of knowledge and can serve not only as role models, but can work with parents to help change the cultural norms that exist between food and sport. Due to this role, recommendations on engaging and communicating with parents on this important topic will be provided.

**Keywords:** Food quality, drink quality, nutrition, sporting events

**(Peer Reviewed Abstract)****The Community Engagement Academy: A Community-Campus Partnership Project to Improve Community Health and Academic Use of a Local Park**

*Karrie Quenichet, University of Louisville*

*Amanda Antonini, University of Louisville*

*Tamara (Tam) Iacono, University of Louisville*

*Kristi M. King, University of Louisville*

To increase the usage of a local park's numerous amenities, a park system in Louisville partnered with University of Louisville's Community Engagement Academy to allow interdisciplinary teams of graduate students and their faculty mentors an opportunity to practice community-engaged scholarship. During the pilot year (2015-2016) a needs assessment conducted by a previous cohort of Community Engagement Fellows indicated that utilizing the Outdoor Classroom to engage middle and high school students in outdoor classroom experiences can benefit student's academic successes as well as increase park usage. Building from the recommendations of the needs assessment, the current cohort of Community Engagement Fellows (2016-2017) are preparing a program proposal to the park director with the mission to provide educational and health programs to students in a safe and natural environment. The Generalized Model for Program Planning serves as the guiding framework to plan the proposal. The goals of the intervention are to provide interactive, field learning experiences and excursions for students, increasing attendance of students at the park, and improving student health attitudes and behaviors. Detailed interventions include "Snap into the Park" to increase physical activity and "Disconnect to Connect" to improve mindfulness and stress resilience. Measurement of the intervention's effectiveness includes park frequency usage as well as measures of attitudes and perceived challenges towards field trips at the park. Demographic and Theory of Planned Behavior constructs measuring health would be assessed as well. Once the interventions are implemented the evaluation surveys would continue as a means to measure objectives, student satisfaction, confidence levels with skills, and overall attitude toward behavior change. A program proposal will be presented to the park system director on behalf of the Community Engagement Academy Fellows in Spring 2017.

**Keywords:** Community engagement, partnership, community health

**(Peer Reviewed Abstract)****High School Cross-Country Coaches' Perception of Junior High School Athletes Competing at the Varsity Level**

*Steven Picucci, Morehead State University*

*Steve Chen, Morehead State University*

Early specialization and excessive high intensity training are two comment trends observed in today's youth sports. The results are an increase in overuse injuries and mental and physical burnout. The purpose of the study was to investigate Kentucky junior high (JHS) and high school (HS) cross country coaches' perception on issues related to runners' injuries, training levels, and psychological/mental condition. Sixty eight cross-country coaches completed an 11-item survey covered three aspects: (1) athletes' psychological motivation, (2) training related issues, and (3) injury risk and budgetary issues. The results indicated that coaches did not feel that JHS runners are more likely to burn out or drop out. Coaches also felt that training volume and intensity are slightly lower for the JHS runners as compared to the HS runners. However, after analyzing the running time of top-5 male and female JHS runners from 2010 to 2014, it was found that 40% of them did not get any better placement as they get older. The results inspired the authors to question whether it is worthy to bring up a JHS runner to compete at the high school level. To avoid issues related to overtraining and excessive injuries, we advocate that Kentucky High School Athletic Association adopts policies to regulate the amount of races that JHS runners may engage in high school competitions.

**Keywords:** Junior high school athletics, cross-country, overuse injuries,



**(Peer Reviewed Abstract)****Dietary Supplement Attitudes and Behaviors in the Personal Training Profession**

*Allison Hull, Morehead State University*

*Gina Blunt Gonzalez, Morehead State University*

Dietary supplements are a growing multi-billion dollar industry. Supplement usage is widespread and many individuals take supplements for health, performance, and disease prevention. However, due to a lack of FDA regulation, there are concerns with the safety and efficacy of many dietary supplements. Exercise professionals and personal trainers are in a position to educate the public on dietary supplements; however, it is unknown how these professionals approach this topic personally and professionally. The purpose of this study is to better understand behaviors and attitudes of personal trainers with respect to dietary supplements. An instrument was created, pilot tested and then disseminated to a larger sample. Participants (n=47) ranged in age from 22 to 62 and had a wide range of experience in the industry (3 months to 10.3 years). The majority had a college education (68%) and at least one nationally recognized certification (83%). Of the participants, 33 currently take supplements, 5 have taken them in the past, and 7 do not take them at all. When asked about supplements and their clients, the majority (n=29) responded that they never or seldom recommend/prescribe supplements. The most cited reason for recommending supplements was “benefit to the client” and the most cited reason for not recommending supplements was “scope of practice”. Although their personal behavior reflects the use of supplements, they may be more conservative when it comes to recommending them to clients. This could be due to the trainer’s perceived scope of practice, lack of necessity, and fear of legal repercussions. Future research should focus on a wider variety of trainers including those who do not hold certifications or have health-related degrees.

**Keywords:** Dietary supplements, ergogenic aids, personal trainer

Kentucky Association for  
Health, Physical Education, Recreation and Dance

**(Peer Reviewed Abstract)****The Effects of Feedback on Mastery of a New Motor Skill: A Pilot Test**

*Joanna Guerrant, Morehead State University*

*Gina Blunt Gonzalez, Morehead State University*

Mastering physical movement occurs through motor learning and experience. Motor development is needed for successful acquisition of sport and other physical skills. A lack of motor skills has been associated with decreased physical activity later in life, which has been linked to a variety of hypokinetic diseases. The current pilot experiment examined the differences in motor skill acquisition in college age students. Eighteen volunteers, ages 18-25 with no previous injuries and no previous martial arts experience, were recruited to learn, perform, and attempt to master a sidekick movement. Subjects were randomly assigned into one of three groups: visual feedback, auditory feedback or no feedback. After viewing an instructional video, subjects performed 20 trials while receiving only the type of coaching feedback assigned. Self-efficacy was recorded at baseline and after every fifth attempt and the research team determined at what trial, if at all, mastery was met from each individual. All feedback groups increased confidence from baseline with the auditory group increasing the most and the no feedback group increasing the least. At the end of 20 trials, the visual group was the most confident and the auditory feedback group was the least confident. Both genders increased confidence over 20 trials with males increasing by 7% and females increasing by 18%. Only 7 subjects achieved mastery (n=5 auditory group and n=2 visual group). Future research will include a larger scale experiment examining skill acquisition across the lifespan, specifically the differences between elementary age students, college age students, and middle aged to older adults.

**Keywords:** Motor development, self-efficacy, learning style

**KAHPERD**  
Kentucky Association for  
Health, Physical Education, Recreation and Dance