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FITNESS

Effectiveness of the Sport Education Fitness Model on Fitness Levels, Knowledge, and Physical Activity

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Abstract

The purpose of this study was to investigate changes in fitness levels, content knowledge, physical activity levels, and participants' perceptions following the implementation of the sport education fitness model (SEFM) at a high school. Thirty-two high school students participated in 20 lessons using the SEFM. Aerobic capacity, muscular strength/endurance, flexibility, and health-related fitness knowledge were measured pre- and post-SEFM. Physical activity levels during each SEFM lesson were measured using Actigraph GT3X triaxial accelerometers. After completion of posttesting, focus groups were conducted to elicit students' perceptions of SEFM. Paired sample t tests were used to compare pre- and posttest scores. Significant increases between pre- and posttest scores were found for aerobic capacity, $t(31) = -3.968$, $p < .01$; the number of push-ups performed on push-up test, $t(31) = -3.329$, $p < .01$; and health-related fitness knowledge, $t(31) = -6.355$, $p < .01$. Students achieved 60.47% moderate to vigorous physical activity in the SEFM lessons. Students were positive toward the SEFM and provided many suggestions on improving the SEFM. In conclusion, the SEFM was effective in improving fitness levels for aerobic capacity, the number of push-ups

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performed, health-related fitness knowledge, and meeting at least 50% moderate to vigorous physical activity levels in SEFM lessons. Based on analysis of qualitative data, the SEFM is an instructional model that can meet the needs of students' diverse learning styles.

According to the 2013 Youth Risk Behavior Surveillance, only 27.1% of students engaged in physical activity (PA) that increased their heart rate and made them breathe hard some of the time for a total of at least 60 min/day (Centers for Disease Control and Prevention [CDC], 2014). In addition, the percentage of students participating in muscle strengthening exercises (e.g., push-ups, sit-ups, or weightlifting) on 3 or more days during the 7 days before the survey was administered decreased to 51.7%, down from the 55.6% in 2011 (CDC, 2014). The prevalence of attending daily physical education (PE) classes also declined to 29.4% in 2013 from 31.5% in 2011.

SHAPE America guidelines recommend that students participating in PE acquire at least 50% moderate to vigorous physical activity (MVPA; National Association for Sport and Physical Education [NASPE], 2009a, 2009b, 2009c). A review of studies in which middle and high school students' MVPA levels in PE were measured revealed that the goal of at least 50% MVPA was not being met (Fairclough & Stratton, 2005). With the current trend of less physical activity (PA) out of school and in school, innovative ways are needed to engage students and to foster value for PA. NASPE states, "The goal of physical education is to develop physically literate individuals who have the knowledge, skills, and confidence to enjoy a lifetime of healthful physical activity" (American Alliance for Health, Physical Education, Recreation, and Dance, 2013, p. 1). Based on the data collected by the CDC (2014), this goal is not being met. A possible answer is to promote PE programs that include more individual fitness–oriented activities so students will continue this activity after they have graduated from high school. Teaching fitness in PE can be challenging because of students' preconceived ideas (Placek et al., 2001). To change students' attitudes about PE, teachers need to choose an instructional model that will foster value for lifetime PA. One instructional model that has been researched and has demonstrated success in student engagement over the years is the sport education model (SEM).

In most of the research dealing with SEM, researchers have investigated sports rather than fitness/weight training. The SEM appears only to promote traditional sports in PE (e.g., basketball, volleyball). However, Siedentop, Hastie, and van der Mars (2011)stated that the SEM is designed not only for traditional sports, but also any activity taught in PE. In fact, SEM has been promoted in several theoretical articles with activities such as fitness/weight training (Pritchard, McCollum, & Hansen, 2014; Sibley, 2012; Sweeney, Tannehill, & Teeters, 1992), bowling (Pritchard & McCollum, 2008), and dance (Graves & Townsend, 2000). In two extensive reviews of research related to SEM spanning 1992–2010 (Hastie, 2011; Wallhead & O'Sullivan, 2005), no existing empirical research was found in fitness activities and SEM during these times except for that of Hastie, Sluder, Buchanan, and Wadsworth (2009). Hastie et al. researched the effects of SEM on fifth graders' aerobic fitness levels after an obstacle course SEM season. The participants in the SEM group performed more laps on the Progressive Aerobic Cardiovascular Endurance Run (PACER) test and had a higher number of participants in the Healthy Fitness Zone postintervention than did participants in the control group. These findings are important as the effects the SEM has on aerobic fitness levels have not been investigated. With such a dearth of research on the effects of the SEM on fitness, there is a clear need for scientific evidence. The purpose of this study was to investigate changes in fitness levels, content knowledge, PA levels, and participants' perceptions following a season of the sport education fitness model (SEFM) at the high school level. The SEFM is a combination of the original SEM and the fitness education model.

Method

Participants and Setting

Participants completing the study included 13 male and 19 female high school students (M_{age} = 14.7 years, SD = 0.6) in rural Georgia. In the state of Georgia, high school students are required to pass one semester of a health and physical education class if on a block schedule or 1 year if on a regular schedule. The high school where the study was conducted was on a block schedule. The 90-min daily lesson was broken down so students would be in the classroom for health content for 35 to 40 min, followed by 35 to 40 min of

PE in the gym, body conditioning room, or outside. The remaining time was for students to change before and after class. One student teacher taught the two classes and was chosen based on the teachers' experience in using the SEFM through previous field experience in a secondary methods course. Students who did not participate in the study were still part of the PE classes. These students did not provide participants' assent or parents' consent. Students who were absent on pre- or posttesting days or who were not present for at least 75% of the lessons during the SEFM season had their data dropped from the final results. The institutional review board approved the research before implementation of the study.

Unit of Study

Each class had five coeducational teams consisting of six to seven team members. The SEFM season lasted for 20 lessons over 8 weeks (two to three lessons per week using the SEFM). On the other days of the week, students were taught the sport of Speedminton for nine lessons using the SEM. We decided to use this alternating approach of fitness–Speedminton so students had enough rest between fitness lessons to recover. Data were not collected during the Speedminton lessons because the purpose of this study was to evaluate the SEFM. The SEFM season was broken down into a preseason, midseason, and postseason using the characteristics of the SEM (Siedentop et al., 2011). After pretesting, students were assigned to teams based on Fitnessgram pretest scores. On the first day of the preseason, teams were announced so students could choose a team name, team color, team cheer, and mascot to ensure the affiliation characteristic of the SEM was incorporated. The SEFM teacher discussed the roles that students would performed during the season and the team notebooks that included a role matrix, fitness card, coaching plan, formal assessment, and how teams earned team points for the overall championship. The preseason lessons were broken down so one lesson was instructions for exercises chosen by the teacher, and the next lesson was a competition day. Instruction lessons entailed direct instruction with the teacher correctly demonstrating the six stations of exercises students would perform during the lesson. A task card was provided at each station with a picture of the exercise, cues of the exercise, and what muscles were being activated. Teams were assigned a specific exercise station and then team members would perform

the exercise for a determined set of repetitions using correct form. The teacher traveled throughout the learning environment providing positive and corrective feedback to the students. After completing the number of sets, the teams rotated to the next station until they participated at every station.

On competition day, the same exercises were used at each station as the instructional day lesson, so the teacher did not need to demonstrate the exercises. The teacher reminded students how to perform the exercises and that task cards were at each station. Teams were assigned to a station and then the teacher allowed students to perform the exercise for 10 repetitions as a warm-up and to let students review proper form. Once the warm-up set was completed, the teacher gave teams 30 s to perform as many repetitions as possible with good form. When the 30 s was completed, statisticians for each team recorded teammate scores on the competition recording sheet in the team notebook. The teacher prompted teams to rotate to the next exercise station and follow the same protocol until all stations were completed. Teams calculated the average number of repetitions for each station and then an overall average for all stations. The team with the highest average earned 5 points toward overall point championship, followed by 4 points for second place, 3 points for third place, 2 points for fourth place, and 1 point for fifth place.

During the midseason, each team was given the task of designing an exercise for each of the six stations. The teacher gave students design guidelines and then each team designed an exercise station workout. One team then demonstrated to classmates each exercise for the six stations. The teacher made this exercise workout plan part of the overall championship by grading the quality of the exercise plan plus the instruction and demonstration provided by the team who designed the workout. Teams executed the workout like a preseason competition day with a 10-repetition warm-up, followed by a 30-s challenge when students performed as many repetitions as possible with correct form. The postseason was the posttesting of the Fitnessgram. Team averages were calculated for the curl-up test, push-up test, PACER test, and sit-and-reach test so teams earned points for the championship.

Data Collection

Fitness levels. Aerobic capacity, muscular strength/endurance, and flexibility were measured via the Fitnessgram (Meredith & Welk, 2007). Specific Fitnessgram components used included the PACER test, curl-up test, push-up test, and back saver sit-and-reach test. Components were administered by the research team along with graduate assistants, all who had prior experience administering the Fitnessgram through undergraduate PE methods courses. Comprehensive training entailed multiple administrations of the Fitnessgram to their peers, meeting 98.5% interobserver agreement with the instructor.

Knowledge test. A 35-question multiple-choice test with questions chosen from a test bank by McGee and Farrow (1987) was used to assess overall health-related fitness knowledge. The knowledge test had no data quality coefficients, but other researchers have used the test bank (French, Werner, Rink, Taylor, & Hussey, 1996; French, Werner, Taylor, Hussey, & Jones, 1996; Pritchard, Hawkins, Wiegand, & Metzler, 2008). Safrit and Wood (1995) considered the test bank as being "the best source of test items for sport" (p. 421). A Certified Strength and Conditioning Specialist from the National Strength and Conditioning Association evaluated the knowledge test and the objectives of the unit to further establish content validity of the test.

Physical activity. The amount of PA during the lessons was measured using Actigraph GT3X triaxial accelerometers (ActiGraph, Pensacola, Florida). Accelerometers were attached to a belt with monitors positioned on the right hip, and data were acquired in 1-min intervals. Accelerometer data were downloaded using the Actilife software (ActiGraph, Pensacola, Florida) to determine the amount of time students spent in moderate to vigorous activity (MVPA; > 3 METS) and vigorous activity (VPA; > 6 METS) using the Freedson equation for children (Freedson, Pober, & Janz, 2005).

Focus groups. Upon completion of the intervention and posttesting, the primary researcher conducted three focus groups, after which theoretical saturation of ideas was achieved. A random sample of students was selected from both classes. Seven to eight students were assigned to each focus group. Students were briefed on confidentiality, and sessions were audiotaped. Audiotapes were tran-

scribed verbatim and then analyzed to investigate emerging themes from the students.

Intervention Verification

To ensure the components of the original SEM were followed during the fitness season, the primary researcher met with the student teacher before the study began to plan the SEFM. The SEFM season plan, lesson plans, and assessments were designed to meet all six characteristics of the SEM (Siedentop et al., 2011). The SEFM was implemented the semester before the study occurred for the teacher to gain experience using the SEFM in the same high school and environment. The teacher taught a different group of students than the ones in this study. The primary researcher was present for every lesson during this period to give feedback to the teacher in implementing the SEFM. During this study, a researcher was present for every lesson to ensure that the teacher implemented the SEFM. The SEFM season met the SEM teacher and student benchmarks developed by Metzler (2011).

Data Analysis

SPSS 21.0 (SPSS Inc., Chicago, IL) was used to perform paired sample *t* tests to compare pre- and posttest scores of the following dependent variables: (1) number of laps on PACER test, (2) number of correctly performed curl-ups on the curl-up test, (3) number of correctly performed push-ups on the push-up test, (4) average scores (cm) for the back saver sit-and-reach test, and (5) number of correct answers on the knowledge test. Because there were multiple dependent variables, a Bonferroni correction was calculated, resulting in an alpha level of .01.

Focus group transcripts were analyzed using a classic systematic manual process (Krueger & Casey, 2009). Transcripts were reviewed line by line, and codes and themes were developed by two researchers independently. Codes and themes were connected and interpreted. Coders compared results and used a consensus approach to achieve 100% intercoder agreement. When agreement was not reached, a third researcher was consulted to finalize themes.

Results

Descriptive statistics generated on the dependent variables including (1) number of laps on PACER test, (2) number of correctly performed curl-ups on the curl-up test, (3) number of correctly performed push-ups on the push-up test, (4) average scores (cm) for the back saver sit-and-reach test left leg and right leg, and (5) number of correct answers on the knowledge test at each assessment point are reported in Table 1. The percentage of PA level categories of sedentary, light, moderate, vigorous, and MVPA descriptive statistics are reported in Table 2.

Table 1
Descriptive Statistics for Fitness Levels and Knowledge Test

Sport education fitness model (n = 32)	Pretest $M(SD)$	Posttest $M(SD)$
PACER laps	24.75 (16.10)	29.00 (19.08)
Curl-up test	42.84 (25.01)	53.13 (24.62)
Push-up test	11.28 (7.31)	13.25 (7.59)
Sit-and-reach test	29.71 (5.49)	30.50 (5.18)
Knowledge test	15.03 (4.67)	19.34 (4.95)

Table 2
Physical Activity Levels During the Sport Education Fitness Model Season

Sport education fitness model (n = 32)	Percentage $M(SD)$
Sedentary	24.55 (6.44)
Light	14.98 (3.18)
Moderate	50.11 (7.65)
Vigorous	10.36 (4.63)
Moderate to Vigorous (MVPA)	60.47 (7.54)

Fitness Levels

Paired sample *t* tests revealed significant increases between pre- and posttest scores for number of laps on the PACER test, $t(31) = -3.968$, $p < .01$, and the number of push-ups performed on push-up test, $t(31) = -3.329$, $p < .01$. Paired sample *t* tests revealed no significant differences between pre- and posttest scores for number of curl-ups performed for curl-up test, $t(31) = -2.388$, $p > .01$, or average scores for the back saver sit-and-reach test, $t(31) = -1.122$, $p > .01$.

Knowledge Test

A paired sample *t* test revealed a significant increase from pre- to posttest scores for the knowledge test, $t(31) = -6.355$, $p < .01$.

Activity Levels

For the 20-lesson SEFM season, students were physically active in the MVPA category for 60.47% of the average lesson time. This MVPA percentage clearly exceeds the NASPE recommended amount of having at least 50% MVPA during PE lesson time. When the activity time was broken down to moderate physical activity (MPA) and vigorous physical activity (VPA), students spent 50.11% of the lesson time in MPA and 10.36% of the lesson time in VPA.

Focus Group Data

Participants were asked what they liked, disliked, and thought could be improved about the class. Because these attributes hold different meaning, even though themes identified span all attributes, they were kept separate based on positive and negative feelings. Specific quotes shown here were used to convey meaning for each attribute. Additional quotes providing more contexts into each theme are shown in Table 3.

Table 3
Focus Group Illustrative Quotes

Theme/topic	Illustrative quotes
Likes	
Sports and Games	"I really liked Speedminton." (S1, S25)
Fitness	"It helped a lot with losing weight." (S15) "I got muscles." (S32) "I liked going to the weight room and stuff, and so I like the gym, but, like, I would rather be in the weight room." (S1)
Team Affiliation (friends and relationships)	"I like how he put us into teams, like, not with our friends because then we got to build, like, relationships, I guess." (S18)
Class/Workout Structure	"I like the competition part about it [teams]; I like being competitive." (S7)
Variety	"I thought some of them [fitness exercises] were a little interesting like jumping lunges or something. It was new to me." (S8)
Individual Attributes	"I felt like I could push myself more in the weight room, like she said. Like, in the gym it was fun, but it wasn't a lot of competition. In the weight room, I felt like you could hold up your team more and you could do more for your team upstairs." (S7)
Dislikes	
Sports	"I didn't really like Speedminton." (S14)

Table 3 (cont.)

Theme/topic	Illustrative quotes
Team Affiliation (unmotivated students)	"I don't like being in partners … because I could do way better just by myself." (S9)
	"Yes and no because, like she said, like I felt like sometimes we were trying to hold everybody up, but when it's averaged out, it's hard to carry the team." (S7)
	"I say no because, like they said, it's like I felt like I was the only one who did anything for my team, so I don't really like the teams." (S8)
Workout/Class Structure	"I didn't feel like we did a lot of physical stuff, like running. We did more, like, um, work on things." (S8)
	"… didn't like that you only had 30 seconds to spend on one thing and that one thing you went and did every time. Instead of, like, having 30 seconds kind of, like, stick to one and trade every day." (S15)
Lack of Variety	"I realize this might not benefit this group of people, but maybe in the future, I'm sure future groups would probably like to do different sports other than, like, Speedminton and stuff like that." (S25)
Individual Attributes	"A lot of the different things that we do, a lot of them I physically couldn't do, and I needed a lot more work on a lot of different things. I'm just not that physically fit. I mean, I can run. Like, you put me on a track and I can run, but when it comes to upper arm strength, I can't help you there." (S27)

Table 3 (cont.)

Theme/topic	Illustrative quotes
Staying Inside/ Classroom and Equipment	"…when we stayed in class because it seemed like we didn't…I mean, staying in class for a long time." (S6)
	"I didn't really like the in class and the bookwork; I'd rather be outside working out and doing gym stuff." (S16)
	"I didn't like wearing the accelerometers. They felt funny. And then when I had to, like, go to the counselor, everyone looked at me funny because I had it on." (S18)
Point Earning and Awarding Process	"I didn't like how people cheated." (S18)
	"I disliked it because I feel like we could have barely won, or if we barely did win that competition, but maybe if our scores were a little bit higher than the others teams maybe because we did a little better and tried to win and we really did win. Maybe if coach didn't necessarily feel like we did that, then we miss our points when we actually did our stuff. It's kind of up to him and whatever he wants to do. If he wants to give you points or not." (S?)
	"I didn't like it because when we would be up there, we would come in, like, last place, and then the next day, we would be, like, in first place. It didn't make any sense how he did it." (S?)
Improve	
Workout/Class Structure	"I didn't feel like we did a lot of physical stuff, like running. We did more, like, um, work on things."(S8)
	"I think we should have had at least, skip a week, and then next week we had a free day on Friday, like, give us a break." (S1)

Table 3 (cont.)

Theme/topic	Illustrative quotes
Variety	"Umm, the upstairs; I think it would have been a lot better if there was more of a variety of stuff we were doing instead of doing some of the same stuff over and over and over again." (S15)
	"…maybe a different sport or activity than what we were doing at the time. Like, maybe if we were playing football maybe we could play kickball or something like that. Something just to mix it up to keep us interested; that way we're not dreading every day we come into this class to play Speedminton." (S25)
Team Selection	"I think if we got to, like, choose our teams maybe that would be an option because, like, you're kind of just, like, forced on. And I know you're supposed to work with other people, yeah, but sometimes if you're working with people that you already know … [another students says,"Lazy …"] Yeah, you don't necessarily want someone on your team that is lazy, but I guess somebody [has to take them]." (S1)
	"In my opinion, like, if the people that are lazy and they don't want to work, I think they should be on a team, and if the people that want to work, then, I mean, that's just my opinion." (S8)

What students liked about the class. Focus group participants reported enjoying the inclusion of a sport such as Speedminton and doing fitness exercises that helped them lose weight and gain muscle (see Table 3). Larger themes included team affiliation, class/workout structure, variety, and individual attributes. The main component of the SEM, team affiliation, was popular as participants enjoyed working out with their friends, getting to know new friends, growing closer as a team, and having someone around to look out for them: "Your friends were there to stand by you if you were starting to slip up or something. They were there to help you out" (ID S15). The

class/workout structure, which included team challenges and points, was enjoyed as it brought an element of competition. In addition, the point contest was seen as a motivator to work harder: "I like the point contest. It kind of motivated you to do better and work harder" (ID S28). Related to class structure, the instructor was a student teacher who could relate to a younger crowd, the lower pressure of an environment where mistakes are okay, and going outside. Students also liked the variety of fitness exercises. Despite the emphasis on team affiliation, individual attributes were recognized as a benefit of the fitness component. Student ID S25, who was injured, was able to participate and work on recovery:

> … I used to be really active until I got injured. Now I'm just kind of trying to recover slowly, and when you get in a recovery stage, you get kind of lazy, and this just gives you kind of a chance to do something when in injury recovery stage.

Another student believed the point system helped him push himself more in the body conditioning room to contribute more to his team.

What students disliked about the class. Aspects that focus group participants reported disliking about the class included sports; team affiliations; being inside (the classroom); wearing accelerometers; and the fitness portion needing more variety, specifically running. Team affiliation was disliked by those who felt as if they had done all the work or who preferred to work with different people more often: "I just didn't like it. Like, I like working with a lot of people, not just, like, the same people every day" (ID S4). Unmotivated students were a concern and are addressed in the team selection theme. In respect to the theme class/workout structure, student ID S7 felt that the warm-up was deemed insufficient to prepare for the fitness activities: "I felt like the warm-ups were, kinda, they were planned warm-ups, and some of the time I wouldn't feel as warmed up I guess." In contrast, student ID S10 felt that warm-ups were too much and drained his energy prior to the 30-s bouts: "I didn't like doing the 10 warm-ups cause I've already, like, lost energy, then I have to do as many as I can in 30 seconds so it, like, decreases how many I can do." This circuit training model, which

included 30-s intervals, was not liked by one focus group participant who wanted more focus on one muscle group and exercise. The individual attribute theme also persisted and highlighted students' desire to do exercise that matched their ability. Student ID S8 did not feel as if she could physically do the exercises, and another wanted to focus on one area: "I want to improve on, like, just getting out there and my weight, like, getting faster and stuff like that." The variety theme was identified, but in the context of a deficiency as it was perceived that there was no break from the routine and not enough variety of exercises during the fitness warm-up component: "I didn't like doing the same fitness card every single day, the same way" (ID S25). More aspects of variety were presented as suggestions for improvement and are addressed later in the results.

The point awarding process was a big concern raising many frustrations among students. One participant complained about cheating that would occur during fitness bouts when students would not count their repetitions properly to try to gain more points or simply to avoid doing the workout properly. In general, students were unsure when and how points were awarded. Students thought that they had earned points, but did not know if they had been awarded: "I don't think he actually gave us the points like sometimes he said he would. I wasn't sure if we actually got them points" (ID S1). The SEFM allows for points to be awarded for team colors, effort, and other team attributes. This seemed to cause surprise as students who thought they were ahead in points for the day would be behind at the last minute because other teams received points for areas other than the fitness challenges and competition of the day. There was also a perceived disparity in effort as some team members felt as if they had worked hard to earn all the points for the team and had done most if not all the work, whereas other team members had done little to help: "I didn't because half of my team didn't work with us, and so me and her would be earning a bunch of points, but then my team wouldn't be helping us out so we ended up still . . . you know . . ." (S?).

What students thought could be improved. Focus group participants were specifically asked what could be improved. Students commented on workout structure, variety, individual attributes, and team selection. With respect to workout structure, students wanted to add running and alternate weeks when workouts were to be done

to allow more time for weight training: ". . . maybe if we could do more maybe with the weights. Maybe we could do, like, a power clean set or, like, a military press set" (ID S?). Increasing variety was a common theme directed at sports and fitness activities. Student ID S2 said, "I would have liked if we could have maybe had some better, some more sports that everyone probably would have liked." In reference to the fitness component in the body conditioning room, student ID S15 said, "… instead of doing the same things over and over, take two different days and kind of switch back and forth from different exercises; that way you never get bored of the same exercise every day." Individual choice was also a suggestion for variety. Student ID S? said, "More personal workouts because not everyone needs to work out on the same scale and same thing; they need a little bit more variety."

Many students were discontent with team members who they perceived to be lazy or not contributing. This led to many ideas above improving the team selection process:

> I kind of wish we could have chosen our own teams because the first team I was put in there was a lot of people there who didn't really want to do the work and just kind of blew it off; the people that wanted to do the work was jumped down by the others, and I finally got moved to a group that was worth it and actually wanted to do the actual work. But if we could have chosen, then it probably would have went a lot better. (ID S15)

Similarly, student ID S7 said, "I'm thinking that whenever it comes to those people that just really don't wanna work to have, like, an alternative for them because I'd rather just do bookwork in class. That's just the kind of person I am."

Physical activity for a lifetime. Students were then asked if they thought they would continue to be physically active after taking this class. Seven students directly stated yes, and two stated maybe. Reasons given typically centered on the outcome expectation of exercise. Reasons given were not wanting to get fat ("I don't wanna get fat," ID S18), not liking sitting around, playing a varsity sport, and

wanting to stay in shape for that varsity sport. Student ID S15, who works at a summer camp, said,

> This kind of gave me ideas for exercises that I can probably do in the mornings or when I have spare time. Quick exercises that could still keep me in shape as I was working out at a huge camp.

Students who said maybe thought their summer job would make them be active, and another said because she was currently taking another physical education class that included physical activity. A more value-attributed response was provided by student ID S27:

> I was never really in sports, but after, like, thinking about it, being in this class and having a family that's in the military, I always have to stay fit, and so it's kind of an inspiration to be more fit and sign up for more fit classes. I know I'm probably not going to do much at home, but I can change what I do here. It's easy.

Last, students were asked if they learned anything from the fitness content that may benefit them later. Responses included learning new exercises that could be done at home without weights, realizing only a little bit of time can make a big difference in regard to fitness, and learning the correct way to do exercises. Only one student said no because she had taken a physical conditioning class the first semester.

Discussion

The purpose of this study was to investigate changes in fitness levels, content knowledge, PA levels, and participants' perceptions following a season of the SEFM at the high school level. Participants significantly increased the number of PACER laps and the number of push-ups performed. These results correspond to the study conducted by Hastie et al. (2009) in which participants significantly increased the number of PACER laps. In this study, we also measured other fitness levels such as muscular strength/endurance and flexibility, whereas Hastie et al. only measured cardiovascular endurance via PACER laps.

The SEFM was based on improving all aspects of fitness levels, which is why number of PACER laps and push-ups increased significantly and flexibility improved. Other factors such as motivation, self-efficacy, and practice could have affected the fitness levels test (Hastie et al., 2009). Participants had experienced the Fitnessgram in previous years as middle school students. The state of Georgia has adopted the Fitnessgram test as a requirement; thus, all participants in this study had experienced the test prior to the study.

Researchers have studied the SEM in regard to student motivation and have found that students participating in the SEM have high levels of intrinsic motivation and low levels of motivation during practice tasks, game play, and officiating roles (Sinelnikov, Hastie, & Prusak, 2007). Students have reported increased perceived effort and more enjoyment when involved in a SEM curriculum compared to the multiactivity model (Wallhead, Garn, & Vidoni, 2014).

Participants in this study were motivated during the posttest because it was part of the SEFM season. Teams competed for team points during the season, and the team with the most points was declared the winner of the SEFM season. This motivation may have affected the effort of participants during posttesting. There were significant gains in the PACER laps and push-ups, but the number of curl-ups performed did not increase significantly and flexibility scores did not increase. This lack of improvement on the last two fitness tests was disappointing, but it could be due to the testing procedures. The curl-up test protocol requires participants to stop at 75 even though they may be able to continue. The flexibility test did not significantly improve based on the lack of significant static stretching during the SEFM season. There were only 35 to 40 min of PE time, so teams performed a quick 4- to 5-min warm-up that had dynamic stretches and one to two static stretches. The exercises at the stations were not intended to improve static stretching, but to increase muscular strength/endurance by working various muscle groups. This lack of static stretching could be the reason a significant improvement did not occur.

As for the significant increase in content knowledge, this finding is supported by other researchers in SEM who measured an increase in content knowledge (Pritchard et al., 2008). The significant increase in test scores can be attributed to the design of the SEFM in that content knowledge was constantly being given to the par-

ticipants. As part of the SEFM, participants had to conduct roles, with one of the roles being the coach. The coach was responsible for ensuring the teams were on task with peer teaching information from the coaching plan. The teacher provided the coaches with this plan. The coaching plan had pertinent information about the day's lesson in what exercises were being performed, what muscles were being activated, and health-related fitness terms participants needed to know. The information from the test was embedded in these coaching plans and on the task cards at each exercise station, and the teacher instructed on the material during the set induction. We were concerned about the motivation factor of participants taking the knowledge test based on past experiences. The participants asked if the test was part of their grade; the answer to the question was no. As the test was not part of their grade, some participants' motivation may have declined. A review of literature revealed that low student effort can occur on assessments that are low-stakes assessment tests, such as taking a test that does not count toward a student's grade (Wise & DeMars, 2005).

The PA levels during the SEFM exceeded the NASPE goal of having at least 50% MVPA during the PE lessons. The activity levels could have been higher based on the exercises chosen because the accelerometers may not have measured the activity levels. The accelerometers are worn on the right hip of participants, so for the accelerometer to measure activity, the hips must move. Some exercises required participants to keep their body steady, such as standing Dyna-Band curls. The participants stood on the Dyna-Band and performed biceps curls; thus, the accelerometer had little movement. In contrast, when participants performed mountain climbers, there was significant movement of the hips; thus, the accelerometers measured the activity. Because of this, we along with the teacher decided to have three high-intensity exercises and three lower intensity exercises with each alternating at the six stations (i.e., high intensity, low intensity, high intensity, low intensity, high intensity, low intensity). By alternating in this manner, participants were given a little bit of rest by going to a low-intensity station at which a particular muscle group (e.g., biceps curls) was isolated instead of performing a total body exercise, such as mountain climbers.

Focus group results demonstrate that not all students can be pleased all of the time. The dichotomy of like and dislike within simi-

lar themes was apparent. Team affiliation, variety, and class structure contained responses that could be considered contrary. A key component of the SEFM model is team affiliation, which received much positive feedback. Students enjoy being with friends and in teams, but if they are on the same team for extended periods, 8 weeks for this study, they appear to grow weary of some relationships. This weariness could be exasperated by students who do not try as hard. Students gave several suggestions for team selection. However, it may be wiser to use situations like this as teachable moments and award conscientious students who try to motivate peers and never quit working hard when other team members do not carry their weight.

Variety was viewed as good and bad and highlights the possible individual differences of students. Comments regarding class structure also indicate how students demonstrate their individual differences and needs and on what they want to work. Some may want to be faster, focus on endurance, work on strength, or only play sports. Although not all interests can be met, providing students the opportunity to give input at the beginning of the semester may help increase satisfaction. At minimum, a variety of choices should be provided and students should be allowed to help build the curriculum. Students' desire to play more sports is understandable as many only want to play sports; however, conceding to this suggestion would lead the class in the direction of a multiactivity model. Although students gain exposure to many sports, not enough time is spent on each to gain substantial knowledge and improvement of skills.

The SEM model is focused on providing students with the opportunity to gain comprehensive understanding of activities. Hence, it is important to provide rationale and explain teaching philosophy to students regarding how the curriculum is designed and why material is being taught. Providing rationale to students can help overcome challenges related to teaching philosophy and student desires. For example, one student wanted to incorporate more traditional weight training exercises, such as power clean and military press. The exercises that were used in the SEFM were chosen based on equipment availability, space, and number of students in the class. One goal of the SEFM was to provide students body conditioning exercises that can be used at home with little equipment. Dumbbell exercises were incorporated into the SEFM, but barbell exercises were not. The body conditioning room where the SEFM took place

had some weight training equipment, but not enough to provide an entire class the opportunity to participate in traditional weight training exercises (e.g., bench press, power clean).

Another curriculum concern revealed in the qualitative data was that it seemed students were doing the same warm-up or the same exercises for every lesson. For the SEFM season, each team performed a warm-up using a fitness card that the teacher provided to them in the team notebook. The fitness trainer led the team in performing the fitness card. At the beginning of the SEFM, some fitness trainers did not follow the fitness card correctly, so the teacher made the team do it again until it was correct. The warm-up was kept to less than 5 min because of limited class time. With only 35 to 40 min in PE class time, we along with the teacher wanted the majority of time spent on the body conditioning exercises. With transition time from health class to the gym for the warm-up followed by time to transition to body conditioning room, we felt a short fitness card would be the best in providing students a quick warm-up to prepare for the lesson's workout plan. The fitness cards were changed every 2 weeks (i.e., total of four fitness cards) to provide students with a variety of dynamic and static stretches that they could learn to perform for a quick warm-up when they execute their own exercise plan later in life.

As for performing the same exercises every SEFM lesson, this statement is misleading because the exercises chosen in the SEFM were also changed throughout the season. As stated in the Unit of Study and Method sections, the teacher introduced the exercises students would perform on form day. The next lesson was competition day, which had the same exercises for teams to compete against each other. The following lesson had different exercises for the students to perform using correct form. The next lesson was competition day with the same exercises and then students were taught different exercises in the next lesson. This format was followed throughout the preseason of the SEFM until the midseason when each team selected which exercises the class would perform. Exercises chosen were included to provide students a total body workout in the 35- to 40-min lesson. Unfortunately, the SEFM cannot please every student, so teachers should stick to components of the SEFM to motivate as many students as possible.

Earning points was liked because it increased competition; however, the process of rewarding points may need modified. Student perception of fairness is important. Despite extensive instructions in team notebooks and a slide lecture by the teacher on how points were earned, the perceived subjective nature of the award process clearly caused frustration. We recommend having a tangible way of showing how points are awarded. Tokens can be awarded to coaches immediately for effort, team colors, team cheer, and so forth and then totaled and cashed in at the end of class by the team statistician to reinforce how points are earned and to mitigate confusion. In addition, cheating was a concern, but it can be mitigated in the SEFM with the roles teams play. In traditional SEM, teams also officiate and can ensure others abide by the rules. In the SEFM, counting of repetitions during challenges can be difficult and is typically when students would have the opportunity to stretch their number of repetitions. A duty team that judges the repetition count and exercise form can be implemented in the SEFM to counteract cheating.

In conclusion, the SEFM was effective at improving fitness levels, content knowledge, and meeting the 50% MVPA goal during PE lessons. Overall students enjoyed the SEFM, but they had suggestions for improving the curriculum. With changes suggested by students and clarification by the teacher on how the SEFM is implemented in a PE setting, the SEFM can be effective in promoting PA and fitness to high school students.

References

American Alliance for Health, Physical Education, Recreation, and Dance. (2013). *Grade-level outcomes for K–12 physical education.* Reston, VA: Author.

Centers for Disease Control and Prevention. (2014). Youth Risk Behavior Surveillance—United States, 2013. *Morbidity and Mortality Weekly Report, 63*(4), 1–170.

Fairclough, S. J., & Stratton, G. (2005). Physical activity levels in middle and high school physical education: A review. *Pediatric Exercise Science, 17,* 217–236.

Freedson, P., Pober, D., & Janz, K. F. (2005). Calibration of accelerometer output for children. *Medicine & Science in Sports & Exercise, 37,* S523–S530.

French, K., Werner, P., Rink, J., Taylor, K., & Hussey, K. (1996). The effects of a 3-week unit of tactical, skill, or combined tactical and skill instruction on badminton performance of ninth-grade students. *Journal of Teaching in Physical Education, 15,* 418–438.

French, K., Werner, P., Taylor, K., Hussey, K., & Jones, J. (1996). The effects of a 6-week unit of tactical, skill, or combined tactical and skill instruction on badminton performance of ninth-grade students. *Journal of Teaching in Physical Education, 15,* 439–463.

Graves, M. A., & Townsend, J. S. (2000). Applying the sport education curriculum model to dance. *Journal of Physical Education, Recreation, and Dance, 71*(8), 50–54.

Hastie, P. (2011). A review of research on sport education: 2004 to the present. *Physical Education and Sport Pedagogy, 16,* 103–132.

Hastie, P. A., Sluder, J. B., Buchanan, A. M., & Wadsworth, D. D. (2009). The impact of an obstacle course sport education season on students' aerobic fitness levels. *Research Quarterly for Exercise and Sport, 80,* 788–791.

Krueger, R. A., & Casey, M. A. (2009). *Focus groups: A practical guide for applied research* (4th ed.). Thousand Oaks, CA: Sage.

McGee, R., & Farrow, A. (1987). *Test questions for physical education activities.* Champaign, IL: Human Kinetics.

Meredith, M. D., & Welk, G. J. (Eds.). (2007). *Fitnessgram/ Activitygram test administration manual* (4th ed.). Champaign, IL: Human Kinetics.

Metzler, M. (2011). *Instructional models for physical education* (3rd ed.). Scottsdale, AZ: Holcomb Hathaway.

National Association for Sport and Physical Education. (2009a). *Appropriate instructional practice guidelines for elementary physical education.* Reston, VA: Author.

National Association for Sport and Physical Education. (2009b). *Appropriate instructional practice guidelines for high school physical education.* Reston, VA: Author.

National Association for Sport and Physical Education. (2009c). *Appropriate instructional practice guidelines for middle school physical education.* Reston, VA: Author.

Placek, J. H., Griffin, L. L., Dodds, P., Raymond, C., Tremino, F., & James, A. (2001). Middle school students' conceptions of fitness: The long road to a healthy lifestyle. *Journal of Teaching in Physical Education, 20,* 314–323.

Pritchard, T., Hawkins, A., Wiegand, R., & Metzler, J. (2008). Effects of two instructional approaches on skill development, knowledge, and game performance. *Measurement in Physical Education and Exercise Science, 12,* 219–236.

Pritchard, T., & McCollum, S. (2008). Bowling for a lifetime using sport education. *Journal of Physical Education, Recreation, and Dance, 79*(3), 17–23.

Pritchard, T., McCollum, S., & Hansen, A. (2014). Want to add some pizazz to your weight training program? Try sport education! *The Physical Educator, 71*, 185–202.

Safrit, M., & Wood, T. (1995). *Introduction to measurement in physical education and exercise science.* St. Louis, MO: Mosby.

Sibley, B. A. (2012). Using sport education to implement a crossfit unit. *Journal of Physical Education, Recreation, and Dance, 83*(8), 42–48.

Siedentop, D., Hastie, P., & van der Mars, H. (2011). *Complete guide to sport education* (2nd ed.). Champaign, IL: Human Kinetics.

Sinelnikov, O. A., Hastie, P. A., & Prusak, K. A. (2007). Situational motivation during seasons of sport education. *ICHPER-SD Research Journal, 2*(1), 43–47.

Sweeney, J., Tannehill, D., & Teeters, L. (1992). Team up for fitness. *Strategies, 5*(6), 20–23.

Wallhead, T. L., Garn, A. C., & Vidoni, C. (2014). Effect of sport education program on motivation in physical education and leisure-time physical activity. *Research Quarterly for Exercise and Sport, 85,* 478–487.

Wallhead, T., & O'Sullivan, M. (2005). Sport education: Physical education for the new millennium? *Physical Education and Sport Pedagogy, 10,* 181–210.

Wise, S. L., & DeMars, C. E. (2005). Low examinee effort in low-stakes assessment: Problems and potential solutions. *Educational Assessment, 10*(1), 1–17.