

10-7-2013

Fitness and Enjoyment Outcomes of a Physical Education Fitness Conditioning Curriculum

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Abstract

Project: Health-related fitness and enjoyment outcomes were analyzed on a physical education program that adopted an exclusive fitness conditioning physical education curriculum. Means: Freshmen enrolled in physical education ($n = 228$; Mean age = 14.12 years \pm .91; Females = 117 (51%); Males = 111 (49%)) completed pre and post FitnessGram curl-ups, push-ups, and the PACER, height and weight measurements, a modified Physical Activity Enjoyment Scale (PACES), and two open-ended questions (likes and dislikes of PE). Pre and post assessments were analyzed using Paired t-tests, one-way ANOVAs, and qualitative categorizing. Outcome: Significant fitness improvements for females occurred in the push-ups ($F(1, 105) = -5.286, p < .000$), curl-ups ($F(1, 107) = -4.171, p < .000$), and the PACER ($F(1, 89) = -6.680, p < .000$) and for males in push-ups ($F(1, 98) = -2.939, p < .004$) and the PACER ($F(1, 80) = -6.196, p < .000$). Males reported significantly higher PACES enjoyment scores ($F(1, 184) = 19.843, p < .000$) compared to females. Four categories were formed that encompassed open-ended responses: teacher, social/friends, content/curriculum, and affect. Reflection: Although this fitness conditioning program enhanced health-related fitness levels, and many students perceived value and benefits of participating in such a program, males clearly enjoyed their physical education experience more than females.

Introduction

National attention has been dedicated to childhood obesity (CDC, 2010; Ogden, Carroll, Kit, & Flegal, 2012) and the need for physical education (PE) programs to support youth in becoming more physically active (NASPE, 2012). Consequently, the development of fitness-related PE curricula is increasingly significant. While some high school PE programs support traditional sports and activities as part of their curriculum, others favor a lifetime fitness curriculum, such as Fitness for Life (Corbin & Lindsey, 2007), which emphasizes health knowledge and individual and dual activities that students can engage in for a lifetime.

One physical education program has developed an abbreviated version of fitness education by focusing exclusively on physical conditioning and strength training exercises. The highlight of an exclusive fitness conditioning curriculum is to develop and enhance health-related fitness (cardiovascular endurance, muscular strength and endurance, flexibility, and body composition) and performance-related fitness (power, speed, agility, coordination, and balance) levels through the use of agility, cardiovascular, and strength training activities. This type of program mimics athletic/sports conditioning, where the objective is to focus on explosive power and strength in the weight room and quickness, agility, and cardiovascular skills in the gym or on the field.

Based on the structure and aim of a fitness conditioning PE program, one could assume that students would become more physically fit – a worthy endeavor in the eyes of PE teachers, administrators, and parents alike. In addition, however, it is also important to understand what impact this type of PE program has on affective factors, such as student enjoyment of physical activity. Enjoyment in physical activity settings can be described as deriving pleasure, joy, satisfaction, and/or fun from participation in the activity. Enjoyment, as a construct, has been linked to intrinsic motivation and has been positively associated with continued physical activity in youth (Chung & Phillips, 2002;

DiLorenzo, Stucky-Ropp, VanderWal, & Gotham, 1998; Dishman et al., 2005; Mott et al., 2001) and enjoyment in physical education (Bibik, Goodwin, and Omega-Smith, 2007; Prochaska, Sallis, Slymen, & McKenzie, 2003). It is due to this connection of enjoyment and physical activity that national PE standards emphasize the importance and promotion of enjoyment and positive attitudes towards physical activity (NASPE, 2004, 2013).

As part of a PE fitness regime, and without the addition of game play, skill development, and instructional content, would students enhance fitness levels and would they enjoy the fitness-only curriculum? To date, there are no studies that have investigated a fitness-only conditioning curriculum model. Hence, the purpose of this study was to examine enjoyment and fitness level outcomes of 9th grade PE students who participated in a fitness conditioning program.

Methods

Participants and School Program

This study included 9th-grade PE students from one area high school located in the northwest United States. The school was part of the largest school district in the state, which comprised approximately 34,581 K-12 students. The investigation was approved by the University's IRB, the school district's Board of Trustees, and school principal. High School A was chosen due to the uniqueness of its PE curriculum, which exclusively followed a health- and performance-related fitness conditioning routine (e.g., cardiovascular endurance, muscular strength, muscular endurance, flexibility, speed, power, and agility drills). No individual, dual, or team sports skills were taught, and no educational fitness-related content knowledge was included as part of the curriculum. The PE staff consisted of three males and one female teacher. Freshmen participated in physical education class two or three times per week for 90 minutes (block schedule). School A had an enrollment of 1,959 students, with 18.7% of the students receiving free or reduced lunches. Although fitness testing was required as part of the school district's PE requirements, student grades were not based on fitness testing outcomes.

As part of the fitness conditioning program, all 9th grade PE students would complete a 15-20 minute dynamic warm-up, followed by various combinations of agility, cone, line, and ladder drills, speed work, cardiovascular training (i.e., running; circuit training), and strength training activities for each class throughout the term. Because class sizes/class periods were often large (i.e., in excess of 220 students per 4 teachers), all students would complete 40-50 minutes of warm-ups, interval gym/field drills in waves and on commands from a teacher to help facilitate lesson flow. When classes were split into their respective work-out areas (i.e., weight room), this same procedure would be followed: in the weight room pairs of students would be positioned at bench racks, squat racks, and free-weight and body-weight stations. Repetitions and rotations would all be on the command of the teacher to help facilitate flow. The female teacher often utilized additional pieces of exercise equipment and training tasks with her students, such as exercise and Bosu balls, stretch cords, and various combinations of circuit training activities.

Instruments

Height and weight. Weight was measured to the nearest 0.1 kg on a digital scale (Tanita BWB800-S), while height was assessed to the nearest 0.1 cm using a Seca 214 Stadiometer. Students wore socks for all anthropometric measurements.

FitnessGram. FitnessGram testing protocol (Meredith & Welk, 2010) was followed for this study. School A was furnished with a complete FitnessGram/ActivityGram Test Kit, in addition to an extra CD and 30 curl-up strips. PE teachers were instructed on the testing protocol for the 20 meter PACER, curl-up, and push-up tests. Researchers were present for most class periods to help administer selected pre and post fitness tests. Fitness scores were recorded by a student assistant, a physical education teacher, or a researcher.

Enjoyment survey. The Physical Activity Enjoyment Scale (PACES) is a commonly used tool to measure enjoyment of physical activity (PA). PACES is an 18-item bipolar scale originally developed to measure exercise enjoyment in college-aged populations, but was modified to assess enjoyment in PA (Kendzierski & DeCarlo, 1991). A seven-point semantic differential scale was used to rate the feelings perceived when doing physical activities (i.e., I enjoy it versus I hate it; I find it energizing versus I find it tiring; I dislike it versus I like it). The initial scale (Kendzierski & DeCarlo,

1991) has demonstrated high internal consistency ($\alpha = .93$), and further studies have modified the PACES survey and validated the instrument with youth sports (Crocker, Bouffard, & Gessaroli, 1995), adolescent girls and high school students (Dunton, Tscherne, & Rodriguez, 2009; Molt et al., 2001), children (Moore et al., 2009), and older adults (Mullen et al., 2011).

A modified version of the Physical Activity Enjoyment Scale (PACES) was implemented in this study. The 18-item PACES (Kendzierski & DeCarlo, 1991) was revised using a six-point Likert scale (1 = *totally true* and 6 = *totally false*). Modification to the response options removed a midpoint choice and narrowed the span of option preferences (Heesch, Masse, & Dunn, 2006). In addition, students responded to the following open-ended questions at the end of the survey: (a) describe anything you like about your PE class and (b) describe anything you dislike about your PE class.

Procedures

At the start of fall term, parental consent forms were initially dispensed to all 9th grade students enrolled in PE ($n = 424$). Students were given one week to return the signed forms to their PE teachers. Those students who returned the forms also indicated their willingness to participate by signing an assent form. Height, weight, and physical fitness data were collected during PE classes three weeks into the fall semester, and again 1-2 weeks prior to the Christmas holiday using a station-type format (i.e., Station 1: height and weight; Station 2: curl-ups and push-ups). All fitness testing was completed in two class days. The PACES was also administered at the beginning and end of the term, although on separate days of fitness testing.

Statistical Analyses

Paired t-tests determined results of pre and post fitness scores, and one-way ANOVAs were used to compare pre and post enjoyment PACES outcomes among teachers and between females and males. Rasch Modeling analyzed best fit of the modified PACES and determined construct validity and reliability of the survey. Each dimension of the scale was assessed as to its contribution to the overall measure of the scale. Rasch analyses verified the relative proportion each response held on the scale's range of options, allowing results to be interpreted as interval-level measures (Bond & Fox, 2007). Significance for all analyses was set at $p < .05$. IBM SPSS Statistics 19 (SPSS, Inc., Chicago, IL) was used to perform fitness analyses, and construct validity and reliability was analyzed using Rasch partial credit model with Winsteps software. Analyses of the open-ended responses were first collated by gender, examined independently by four researchers, and then collectively discussed as a group to determine common themes (Kvaleh & Brinkman, 2008).

Results

Of the 424 9th-grade students enrolled in physical education, 266 (63%) returned the necessary parental consent form and agreed to participate in the study. Due to student absenteeism and incomplete fitness data, 228 (53.8%) students (mean age = 14.12 years \pm .909; females = 117 (51%); males = 111 (49%)) were used in final fitness data analyses. Overall, 80% of the students were Caucasian, followed by those who were of Hispanic (8%) origin.

Fitness Assessments

Females significantly improved on three fitness assessments: push-ups ($F(1, 105) = -5.286, p < .000$), curl-ups ($F(1, 107) = -4.171, p < .000$), and the PACER ($F(1, 89) = -6.680, p < .000$). Males demonstrated significant improvement in two fitness tests: push-ups ($F(1, 98) = -2.939, p < .004$) and the PACER ($F(1, 80) = -6.196, p < .000$) (see Table 1). Average post-fitness scores revealed both females and males clearly reached FitnessGram Healthy Fitness Zones (HFZ) for BMI, curl-ups, push-ups, and aerobic capacity (PACER laps) for 14 year-olds. Based on the number of PACER laps and BMI, females reported an estimated VO_2 max of 55.6 and the males acquired a VO_2 max of 52.5 (Cooper Institute, 2010).

Please see Table 1: Pre and Post Health-Related Fitness Assessment Scores.

Enjoyment Assessments

PACES. The construct validity of PACES was determined by examining dimensionality, item Infit and Outfit statistics, and person-item map. Reliability was evaluated by checking the Rasch separation indexes. Of the 18 PACES items, five (i.e., “I feel bored”, “It makes me depressed”, “It’s very invigorating”, “I am very frustrated by it”, and “It’s not at all stimulating”) were identified as misfit items (Infit and Outfit statistics < 0.75 or > 1.33 logits) and were removed from final analyses. The remaining 13 good-fit items (difficulty level ranged from .81 for Item “I feel good physically while doing it” to .66 logits for Item “I felt as though I would rather be doing something else”) demonstrated one dimension which accounted for 62.4% of the variance in the measure. The separation index for person measures was 3.01 logits, with a reliability of 0.90 (equivalent to traditional Cronbach’s Alpha), and the separation index for item measures was 6.12 logits with a reliability of 0.97. Over, the Rasch analysis supported the construct validity and reliability of the revised PACES to assess physical activity enjoyment among 9th grader students after removing five misfit items.

Based on survey analyses, no significant PACES differences were found among teachers; however, significance was found between females and males. Males reported higher pre ($F(1, 279) = 44.704, p < .000$) and post ($F(1, 184) = 19.843, p < .000$) enjoyment scores from participating in the fitness conditioning program than did females. Of the 13 items used in the final PACES, the lower scores represented higher levels of enjoyment. The average pre PACES score for males was 28.35 (± 11.15), followed by a post score of 28.31 (± 12.14), compared to female pre and post scores (37.80 ± 15.38 and 37.80 ± 16.29 , respectively). Based on the 6-point Likert scale of the survey (1 = *totally true* and 6 = *totally false*), average scores for males fell closer to *true*, while average female enjoyment PE scores were closer to *somewhat true*. There were no significant PACES score differences within gender from beginning to end of the study.

Open-ended Questions. Finally, 9th-graders responded to two open-ended questions as to what they liked and/or disliked about their physical education classes. Some students wrote comments to both questions, while others only responded to one or none of the statements. There were 245 post comments, with 151 (62%) likes and 94 (38% dislikes) for the final assessment. Females ($n = 138$) had the highest percentage (43.5%) of *dislike* responses while males had the highest *like* responses (68%). Four categories were formed that encompassed the responses which included teachers, social, curriculum/content, and affect.

Teachers. Both females and males liked the motivation, being pushed to do their best, and being complemented by teachers. Some of the student comments included: “They teach us hard work.” “They make me want to do my best.” “The teacher is cool, kind, understanding.” Only females responded to *dislikes* in this category. Some girls interpreted “pushing” and motivation as yelling and pressure. Some of the comments included “Sometimes I’m yelled at and forced to do stuff.” “[The teacher] makes me feel worthless if unable to complete the course.

Social. Both females and males liked that they were able to be with friends and work in groups. Limited *dislike* comments were made in this area. Some boys were discouraged when “others don’t work hard” or “have a mentality [bad attitude] toward the class.”

Curriculum/Content. Both females and males commented substantially on the positive nature of being able to lift weights and work out during class. Males tended to enjoy speed and agility activities, vigorous activities, difficulty, and “working very hard”. Females mentioned circuits, balance, and availability of lots of equipment as favorable aspects of the program. As for *dislikes*, there were a wide range of responses. The most frequently occurring *dislike* comment in this category involved the lack of playing fun games, sports, and activities. Other repeated general *dislike* comments included “not enough water breaks”, “class is too short - more time is needed in the weight room”, “class is too long”, “classes are too large/too many students”, “weight room is too small”, “gym is too hot”, “first period is too early to work out”. Both gender mentioned running, especially outside when the weather was hot, as a common dislike response. There were several comments from the males regarding doing the same thing all the time, boring activities, waiting in lines, and standing around. A few of the females commented that activities were unfair: “I can’t do some things.” “I don’t like doing stuff in front of others.” Finally, less favorable comments from both genders involved the intensity of the program: “I’m exhausted.” “It makes me too tired.” “Some activities are too fast.” “There is not enough rest.” “I get sore afterwards”. Perhaps the following response by one of the students sums up this area: “It’s really hard, but I can’t get fit any other way.”

Affect. Females repeatedly responded positively to this category. They liked feeling better afterwards. They felt “healthier”, “stronger”, “energized”, and “more fit.” They indicated that the workouts made them feel good about themselves (“pumps me up”) and accomplished (“I actually was able to do it”). Males’ comments were more specific, such as gaining muscle (“getting lots of muscle”), getting stronger (“I can see my muscles getting bigger”), and “I’m feeling changes.” As for the *dislikes* in this category, females did not like getting sweaty or stinky for the rest of the day, and did not like that there was limited time to dress for the next class.

Discussion

The current study measured pre and post health-related physical fitness outcomes and enjoyment levels of 9th grade students from one area high school. The school adopted an exclusive approach to improving student physical fitness levels through the implementation of what may be termed a fitness conditioning PE curriculum. This PE program did not include participation and instruction in any sports and game activities, skill development, or educational content.

As expected from a fitness-only program, both females and males in this study significantly improved their fitness scores over the course of 3 months (approximately 32-33 lessons; 48-50 contact hours). Although both gender met FitnessGram Healthy Fitness Zones (Cooper Institute, 2010), one may question why males didn’t significantly improve on curl-up scores. During pre- and post-fitness assessments, many of the boys (and some of the girls) maxed out at the 80 curl-ups allowance on the Fitnessgram program, which affected overall mean scores. The authors and PE teachers believed that many males could have completed more curl ups if the Fitnessgram CD included more repetitions in the test.

Despite the fact that some experts may question the likelihood of improving fitness levels in children due to genetic factors and environmental constraints (Pangrazi, 2010; Tomkinson & Olds, 2007), fitness results from this study support the premise that, overall, adolescents can improve their fitness levels with exercise training (Murray, Eldridge, Silviu, Silviu, & Squires, 2012). Though conscious debate exists on whether or not to concentrate on improving fitness levels or conduct regular fitness testing as part of a PE program (Lloyd, Colley, & Tremblay, 2010), there are clear supporting health benefits of physical activity and enhancing levels of fitness in children and adolescents that are linked to reducing cardiovascular disease, overweight and obesity rates, and type II diabetes, and enhancing bone health and psychosocial outcomes (Janssen & LeBlanc, 2010; Kim, 2012; Strong et al., 2005).

In addition to the health benefits associated with increased physical activity and fitness, recent research has also demonstrated a positive link between increased levels of fitness and academic performance, school attendance, and disciplinary problems (California Department of Education, 2005; Castelli et al., 2007; Cooper Institute, 2009). Although the current study did not address these additional benefits of fitness, anecdotally, the PE teachers at School A all indicated the positive reaction they have received from classroom teachers and administrators. Seemingly, a noticeable turnaround has been observed in the academic performance and behavior of freshman students since the inclusion of the fitness curriculum. This feedback, alone, has given credibility to the PE teachers and their fitness program.

While enhancing physical activity and fitness levels is one of the national PE standards (NASPE, 2004; NASPE 2013), another standard that warrants parallel consideration is that of enjoyment in physical activity participation. The affective attributes of participating in physical activity (i.e., enjoyment) are critical to the success any PE curriculum and may affect students’ motivation to further engage in additional physical activity (Yli-Piipari, Watt, Jaakkola, Liukkonen, & Nurmi, 2009). Results of this study indicated that males reported a higher level of enjoyment participating in a fitness-conditioning PE program than females. These findings are consistent with previous studies that have indicated significant differences in enjoyment in physical education between boys and girls (Coulter & Woods, 2011; Minjeong & Gill, 2011; Prochaska, Sallis, Slymen, & McKenzie, 2003). Nonetheless, while males in this study did report higher enjoyment scores, average scores for both gender were on the favorable side of the PACES scale, indicating that most 9th-grade students enjoyed their physical education experience at some level.

It was anticipated that students would miss the “fun factor” and enjoyment of a fitness-only conditioning PE program due to the omission of playing a variety of sports and games (Hannon & Pellet, 2005; Rice, 1988; Strand & Scantling, 1994; Tannehill & Zakrajsek, 1993); however, based on student responses to the *likes* and *dislikes* of PE, the lack of game play apparently played a small factor in the overall enjoyment experienced by most 9th-grade students. This outcome supports another study where fitness-type activities were favored over traditional sports and games. In a

study by Wilkinson and Bretzing (2011), 31% of girls' comments reflected the health benefits of fitness activities of their PE program and 74% of them preferred fitness units over sports units. Most notable responses from both gender in this study also included comments favoring the health benefits, challenges, and physical outcomes of such a fitness-based program.

Many students also made positive comments regarding their teachers and being able to work-out with friends. The motivation and support they received from their teachers, along with their peers, may have influenced their overall enjoyment of the conditioning PE program. These findings complement other studies that have found teacher (Cecchini et al., 2001) and peer influences (Carlson & Hasti, 1997) to be associated with PE enjoyment.

This study had limitations that warrant mentioning. First, this study did not measure participants' physical activity and exercise participation outside of PE class. It is possible that the significant increase in participants' health-related fitness levels could be attributed to their participation in interscholastic, intramural, recreational sport and activity programs, or other opportunities for physical activity. Therefore, it is difficult to determine if physical fitness levels increased solely as a result of student participation in PE. Second, issues conducting fitness testing (Martin, Ede, Morrow, & Jackson, 2010), especially with large numbers of participants, were not uncommon. Individual class sizes were often in excess of 50 students making it difficult to ensure all students completed fitness testing protocol correctly, particularly concerning curl-ups and push-ups. The bands used during curl-ups would often slip/move on the floor, affecting correct body position and successful attempts. In addition, sometimes lines on the floor had to be used when the number of students outnumbered the available bands. Observing correct body position during push-up testing, even when using peers to help, also posed a problem. Although physical education teachers and/or a researcher were present to administer the fitness tests, additional assistance is recommended to confirm that students understand and perform fitness tests appropriately.

Conclusion

Although the exclusive fitness conditioning PE program described in this study demonstrated enhanced health-related fitness levels by females and males, and students perceived value and benefits from participating in such a program, the males in this study enjoyed their physical education classes more than the females. Thus, this type of fitness conditioning climate appeared to be more supportive to males, which could positively impact their future physical activity behavior; the opposite could be argued for females (Pate, Dowda, O'Neill, & Ward, 2007; Wenthe, Janz, & Levy, 2009). Researchers have repeatedly found a significant relationship between student attitudes and enjoyment towards PE and student participation in physical activity and/or leisure time exercise outside of school (Coulter & Woods, 2011; Prochaska, Sallis, Slymen, & McKenzie, 2003; Sallis, Prochaska, & Taylor, 2000; Yli-Piipari et al., 2009). In addition, a lack of enjoyment in PE may contribute to the decline in physical activity, especially seen during the adolescent years (Prochaska, Sallis, Syment, & McKenzie, 2003; Sallis, Prochaska, & Taylor, 2000; Casperson, Pereira, & Curran, 2000).

While the PE teachers and administration at School A lend support and credence to the fitness and conditioning curriculum, the authors support the premise that the use of one particular physical education curriculum model (i.e., exclusive fitness conditioning) should not be assumed to provide all the benefits for student learning in PE (Culpepper, Tarr, & Killion, 2011). Because physical activity is at the center of our field (Corbin, 2012), it is important for curricular programs to have a foundation that includes fitness-related activities as well as fitness and wellness education. Programs that promote fitness knowledge, concepts, include participating in a variety of activities, and support health-related fitness can be effective in encouraging lifelong physical activity for everyone (Corbin, 2012; Corbin & Lindsey, 2004; Culpepper, Tarr, & Killion, 2011; NASPE, 2004).

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Table 1

Pre and Post Health-Related Fitness Assessment Scores

Assessment	n	PRE	POST
		Mean (SD)	Mean (SD)
BMI			
Female	98	20.72 (3.15)	20.99 (3.36)
Male	99	20.84 (3.49)	21.01 (3.23)
Push-ups			
Female	106	16.73 (7.34)	*20.57 (8.87)
Male	100	23.03 (11.38)	*25.25 (11.65)
Curl-ups			
Female	108	65.92 (19.01)	*71.93 (15.10)
Male	100	71.31 (17.51)	73.31 (15.46)
PACER LAPS			
Female	90	43.72 (20.25)	*56.07 (20.10)
Male	81	64.43 (30.23)	*76.53 (28.28)

* $p < .05$