Influence of Activity Mode on Feeling States of High School Physical Education Students

James C. Hannon and Tracy L. Pellet

Abstract

The purpose of this study was to determine if changes in positive well-being, psychological distress, fatigue, and enjoyment vary as a function of physical activity mode. Fifty-five senior high school students participated in one of four fitness activities including two defined as traditional (running and step-aerobics) and two defined as sport-related (ballistic basketball and ultimate indoor soccer). Participants engaged in the activities every other day at moderate exercise intensity for approximately 20 minutes. Measures of acute feeling states were obtained immediately prior to and following participation in each activity while enjoyment was assessed post-activity only. Participants reported increases in positive well-being and psychological distress and reductions in fatigue following acute exercise, regardless of activity mode. No significant differences were found as a function of activity mode for positive well-being, psychological distress, or fatigue. A significant main effect for activity mode was found, however, for post-activity perceptions of enjoyment. Specifically, participants enjoyed sport fitness activities more than traditional fitness activities. The results of this study suggest that physical education students experience (a) greater enjoyment from sport fitness activities than they do from traditional fitness activities, and (b) both traditional and sport fitness activities are associated with improvements in positive well-being and fatigue over time when performed at moderate exercise intensity.

Key Words: fitness, enjoyment, fatigue, psychological distress, positive well-being

The Surgeon General's Report highlighted the period of adolescence as a critical time for regulating and continuing to reinforce positive attitudes and behaviors towards regular physical activity and lifetime fitness (U.S. Department of Health and Human Services, 1996). In support of this, researchers have noted that the best opportunity for influencing adolescent fitness levels and habits is in physical education class (Sallis & McKenzie, 1991). Unfortunately, only 19 percent of high school students are active for 20 minutes or more during physical education class (U.S. Department of Health and Human Services, 1996). Underscoring this is the fact that high school students often report that they do not like what they are doing in physical education (Scantling, Strand, Lackey, & McAleese, 1995). Objective 22-10 of Healthy People 2010 (Public Health Service, 2000) is to increase the proportion of adolescents who spend at least 50 percent of school physical education class time being physically active. In order to successfully accomplish the goals of Healthy People 2010, traditional curricula must be modified so activities are enjoyable, thus motivating students to develop lifetime physical activity habits.

Although students tend to feel that fitness and lifetime sport development are the two most important objectives of physical education, they generally tend to favor participating in team sports as opposed to traditional fitness activities (Rice, 1988; Stewart, Green, & Huelskamp, 1991; Strand & Scantling, 1994; Tannehill & Zakrajsek, 1993). A study by Rice (1988) indicated that 73% of females and 78% of males favored team sports over traditional sports, and Tannehill and Zakrajsek (1993) found running to be the most

disliked activity with 17% of students responding negatively. Most importantly for the purpose of this paper, Strand and Scantling (1994) suggested that students valued fitness but preferred to get fit while participating in team sport activities as opposed to traditional fitness activities. In addressing this issue, researchers have begun to investigate the efficacy of integrating fitness into traditional sport activity (Arnett, 2001; Strand and Reeder, 1996; Thomson, McManama, & Shendell, 1998). To this end, Thomson et al. (1998) conducted a study to determine if infusing a fitness component hindered volleyball skill development. Two classes were studied including one using a traditional skill-based approach and another using a fitness-infusion approach. A skill test was given to each class pre- and post-intervention. Results indicated that neither group significantly outperformed the other, thus supporting a fitness infusion approach to sport skill development.

Strand and Reeder (1993a) conducted a study to determine if physical education students were working at a sufficient intensity (60-90 percent of maximum heart rate) and duration (at least 15 minutes) to attain cardiovascular fitness. Classes were 45 minutes in length and consisted of the students working on skills, playing a game, and engaging in some form of traditional cardiovascular fitness activity at the end of class (e.g., running). Data gathered via wireless heart rate monitors indicated students were physically active for only 34.63 minutes (76.95%) of the 45 allotted minutes for physical education. Of this time, 61.72% was spent below the subjects training zone, 35.31% was spent within the training zone, and 2.96% of the time was spent above the training zone. In addition, over 60 percent of the students failed to attain the 15-minute minimum at their training heart rate level.

Although the physiological aspects of physical education continue to be debated, little attention has been paid to the psychological correlates of activity during physical education. Researchers have proposed that students are not likely to enjoy an activity or pursue it outside of class if they do not feel positive about what they are doing (Carroll & Loumidis, 2001; Prochaska, Sallis, Slymen, & McKenzie, 2003; Tannehill & Zakrajsek, 1993). If one of the objectives of physical education is to promote lifetime sport and fitness habits, activities being taught in classes must instill feelings of positive well-being in the students. Running, for example, is an activity used in almost all physical education programs, yet it tends to produce negative feeling states in students (Labbe & Welsh, 1993). Based on findings such as this, Hardy and Rejeski (1998) have proposed that what students do (i.e., type or mode of activity) is not nearly as important as what they are thinking or feeling while they are doing it.

In order to ascertain whether or not selected physical activities are eliciting positive feeling states in adolescents, assessment tools validated for this population must be utilized. Unfortunately, studies of feeling states experienced during or following physical activity have predominantly employed individuals of college age or older. One notable exception is the work by Markland, Emberton, and Tallon (1997) who conducted an investigation of feeling states in adolescents. In this study, participants completed the Subjective Exercise Experiences Scale (SEES; McAuley & Courneya, 1994) prior to and following either a game of rounders or a 20-meter Multistage Shuttle Run Test. The results showed that shuttle run participants experienced significant reductions in mean positive well-being scores and significant increases in mean psychological distress and fatigue scores from pre- to post-activity. However, children who participated in the lower intensity activity of rounders reported no significant changes in mean positive well-being, psychological distress, or fatigue scores.

Adolescence is the time when fitness behaviors and attitudes are developed and begin to change drastically (Tannehill & Zakrajsek, 1993). Strategies are needed to enhance students' physical education enjoyment (Prochaska et al., 2003). The purpose of the present study was to investigate changes in senior high school students' perceptions of positive well-being, psy-

chological distress, and fatigue following engagement in moderate intensity traditional fitness or sport fitness activities. The secondary purpose was to assess differences in feelings of enjoyment across mode or type of activity. It was hypothesized that, compared to traditional fitness activities, sport fitness activities would induce greater feelings of positive well-being and enjoyment and greater reductions in psychological distress and fatigue.

Method

Participants

Study participants included 55 sophomores, juniors, and seniors enrolled in two physical education classes at a high school in the Midwest. The school was comprised of mostly middle to high socioeconomic status students. Participants ranged in age from 15- 18 years (M = 16.6, *SD* = .91) and were considered in the "healthy fitness zone" based on their scores from the 20-meter PACER Test (Prudential FITNESSGRAM, 1992). Permission to conduct the study was granted by the Institutional Review Board, the school district, administration, and teacher prior to the start of the study. The participants and parents provided written informed consent prior to participation in the study.

Measures

Exercise Intensity and Duration. Polar Accurex II heart rate monitors were used to monitor the intensity and duration of activity. Alarms were set at the high and low limits of the prescribed intensity level (140-180 bpm) for all participants throughout the course of the study. This moderate level of intensity has been shown to be appropriate for developing cardiovascular fitness in this age group (ACSM, 1990; Public Health Service, 1991; U.S. Department of Health and Human Services, 1996). In addition, heart rate assessments via telemetry have also previously been shown to be reliable in children (Strand & Reeder, 1993b).

Feeling States. The Subjective Exercise Experiences Scale (SEES; McAuley & Courneya, 1994) was used to assess participants' feeling states prior to and immediately following exercise. The SEES measures three distinct feeling states including positive well-being, psychological distress, and fatigue. The scale (see figure 1) is comprised of 12 items (four items per subscale), each scored on a 7-point Likert scale anchored by 1 (not at all) and 7 (very much so). All three subscales of the SEES have demonstrated acceptable internal consistency coefficients when used on both children and adults (Markland et al., 1997; McAuley & Courneya, 1994). Adequate reliability of the measure was also demonstrated in the present study with alpha coefficients ranging from .73 to .84.

Enjoyment. One item, assessed on a 7-point Likert scale ("I enjoyed this activity"), was used to measure enjoyment following each activity. Responses could range from a low of 1 ("did not enjoy this activity") to 7 ("enjoyed this activity very much"). This response format has been used frequently in previous research to assess participant levels of enjoyment towards physical activity (Aicinena, 1991; Rice, 1988; Stewart et al., 1991; Tannehill & Zakrajsek, 1993).

Procedure

Participants engaged in one of four fitness activities every other day (see Table 1). The same activity was not repeated on consecutive testing days. Participants completed each activity twice over a three week period. Two activities were classified for the purpose of this study as traditional fitness activities (running and step aerobics), while two were classified as sport fitness activities (ballistic basketball and ultimate indoor soccer). Concerning the two sport fitness activities, each was modified from its normal rule structure to ensure a high degree of constant movement in order to more closely correspond to the cardiovascular exertion experienced in the two traditional fitness activities indicated above. Ultimate Soccer was played indoors with small

Figure 1. Subjective Exercise Experiences Scales (SEES)

BY CIRCLING A NUMBER ON THE SCALE BELOW EACH OF THE FOLLOWING ITEMS, PLEASE INDICATE THE DEGREE TO WHICH YOU ARE EXPERIENCING EACH FEELING *NOW*, AT THIS POINT IN TIME, *AFTER EXERCISING*.

I FEEL:

1. GREAT

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

2. AWFUL

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

3. DRAINED

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

4. POSITIVE

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

5. CRUMMY

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

6. EXHAUSTED

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

7. STRONG

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

8. DISCOURAGED

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

9. FATIGUED

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

10. TERRIFIC

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

11. MISERABLE

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

12. TIRED

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

13. I ENJOYED THIS ACTIVITY

1	2	3	4	5	6	7
Not at all			Moderately		Very much so	

teams (5 vs.5), no stoppage of play, no set positions, and small goals. Ballistic Basketball was played with small teams (3 vs. 3), on a three-quarter sized court. All team members were required to pass half court before shooting, with three mandatory passes. Immediately prior to engaging in the day's activity, participants completed the SEES and put on heart rate monitors. Each activity lasted approximately thirty minutes and participants were required to remain within the moderate training zone for at least twenty minutes. When participants exceeded or dropped below their training zone, a heart rate monitor alarm sounded. Immediately following the activity, participants completed a second SEES questionnaire. Data from the heart rate monitors were recorded for each participant to validate that participants had indeed remained within the moderate training zone for twenty minutes (see Table 2). Four participants who did not remain in the training zone for the prescribed amount of time were omitted from the study.

Results

A preliminary series of one-way analysis of variance (ANOVA) procedures for each SEES factor over time (i.e. pre- and post-activity) revealed a significant increase in positive well-being [$F(1,140) = 21.13, p<.0001$], psychological distress [$F(1,140) = 6.35$, $p<.01$], and fatigue [$F(1,140) = 8.37$, $p<.01$] after collapsing across mode of activity. Specifically, pre- and post-activity means were as follows: 12.83 and 16.87 for positive well-being, 9.91 and 10.75 for psychological distress, and 16.34 and 13.84 for fatigue. In general, perceptions of positive well-being and psychological distress both increased while feelings of fatigue were reduced.

Participants' pre-activity feeling states were compared across activity mode via a series of ANOVAs. Results revealed significant differences between activities for positive well-being [$F(3,l38) = 4.10$, $p<.05$], fatigue [$F(3,138) = 10.39$, $p<.000l$] and psychological distress [$F(3,138) = 2.64, p<.05$]. Based on these findings, a series of ANCOVAs was then conducted for each SEES factor to compare the adjusted scores (post activity perceptions adjusted for initial pre-activity perception differences) for each activity (see Table 3). No significant differences were discovered between activities for any of the three factors. Nonetheless, in an effort to determine the degree to which various activities impacted pre- to post-activity changes in feeling states, effect sizes (ES) were calculated (see Table 4). Effect sizes were interpreted according to the guidelines proposed by Cohen (1977). Specifically, values less than .4 were classified as small effects, values between .41 and .70 were classified as moderate effects, and values above .70 were considered large effects. For positive well-being, large positive ESs were calculated for basketball, soccer, and step aerobics while a small positive ES was found for running. For psychological distress, very slight positive ESs were computed for all activity modes. Finally, for fatigue, large negative ESs were calculated for basketball and soccer while a moderate negative ES was found for step aerobics and a moderate positive ES was computed for running.

Finally, participants' post-activity perceptions of enjoyment were assessed across activity mode by means of an ANOVA. Results demonstrated significant differences based on mode of activity [$F(1,140) = 11.53$, $p<.0001$]. Tukey HSD post-hoc analysis revealed greater enjoyment for participants engaged in sport fitness as compared to traditional fitness activities. No differences were reported, however, in participant enjoyment when comparing within sport (basketball $M = 5.1$, $SD = 1.4$; soccer $M = 4.8$, $SD = 1.5$) or traditional fitness activities (step aerobics $M = 3.2$, $SD = 1.9$; running $M = 2.8$, $SD = 1.9$).

Discussion

The purpose of the present study was to compare perceptions of positive well-being, psychological distress, and fatigue prior to and following participation in traditional fitness and sport fitness activities. The secondary purpose was to examine differences in enjoyment based on the mode of activity. It was hypothesized that,

Table 1. Activity Sequence.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1:	Basketball		Running		Aerobics
Week 2:		Soccer		Running	
Week 3:	Basketball		Aerobics		Soccer

Table 2. Comparison of Heart Rate Average and Training Zone Time by Mode.

Mode	Heart Rate (BPM) Mean (SD)	Time Above Mean (SD)	Time In Mean (SD)	Time Below Mean (SD)
Basketball	145.4 (13.5)	1:06 (2:57)	20:20 (7:09)	8:42 (7:36)
Soccer	143.3 (11.2)	:53 (2:46)	20:29 (5:27)	8:46 (5:32)
Running	147.5 (10.3)	1:13 (3:19)	22:00 (4:38)	6:50 (4:24)
Aerobics	143.3 (6.8)	:15 (1:13)	21:45 (4:23)	7:59 (4:27)

Note: Times in minutes:seconds.

Table 3. Adjusted Post-Test Feeling Means and Standard Errors.

Mode	Positive Well-Being	Psychological Distress	Fatigue
Basketball	18.2 (.84)	10.1 (.62)	12.4 (.84)
Soccer	17.2 (.77)	10.6 (.56)	13.7 (.76)
Running	17.5 (.79)	10.6 (.57)	14.4 (.80)
Step Aerobics	15.4 (.83)	11.3 (.61)	14.2 (.81)

Table 4. Pre- and Post-Activity Means and Effect Sizes (ES) for each SEES Factor by Mode.

	Positive Well-Being			Psychological Distress			Fatigue		
Mode	Pre	Post	ES	Pre	Post	ES	Pre	Post	ES
Basketball	12.1	18.6	1.16	8.9	9.1	.05	18.6	11.5	-1.47
Soccer	11.5	17.9	1.30	9.5	10.1	.11	18.3	12.8	-1.16
Running	15.3	16.3	.17	11.6	11.6	.00	13.1	16.0	.53
Step A.	12.2	15.7	.74	10.8	11.7	.18	16.3	14.3	-.43

compared to traditional fitness activities, sport fitness activities would induce greater feelings of positive well-being and enjoyment, and greater reductions in psychological distress and fatigue. Contrary to our hypothesis, analyses failed to detect significant differences between activity modes over time in relation to the three feeling states. One explanation might be that each activity, regardless of mode, was conducted at the same intensity (140-180 bpm) and duration (30 minutes). Such a finding may indicate that either (a) activity mode is not as salient a predictor of feeling states as intensity or duration of activity, or (b) the activity modes used in the present study were not unique enough to illicit dissimilar changes in post-activity perceptions.

Results of the present study have also demonstrated that participants enjoyed sport fitness activities such as basketball and soccer more than they did traditional fitness activities such as running and step aerobics, a finding which supports previous research in the area of student preferences (Rice, 1988; Strand & Scantling, 1994; Tannehill & Zakrajsek, 1993). Tannehill and Zakrajsek (1993) found that 74% of respondents participating in fitness exercises reported negative experiences such as fatigue and soreness and that running was the most disliked activity.

Perhaps most important, feeling states were generally improved from pre- to post- activity, regardless of activity mode. Specifically, although participants reported unexpected increases in psychological distress, they also experienced improvements in positive well-being and fatigue. Thus, it appears that the inclusion of a fitness component in sport activity did not reduce the expected level of enjoyment. Such a finding would seem to imply that physical education curricula may benefit the student most by combining sport skill development with a cardiovascular fitness component. In this way, students will improve both their sport skills and cardiovascular health in an activity they enjoy. A recent study by Arnett (2001) support these statements. College-aged females, participating in two 20 minute sport-based soccer lessons, maintained MVPA 61% of class time as determined by Tritrac R3D activity monitors. Students' perceptions of enjoyment revealed that 92% of the students enjoyed the sport-based curriculum. Observational data indicated a 90% success rate for all ability levels.

The combined results of the present and previous investigations support the notion that physical education students prefer to participate in sport fitness activities more so than traditional fitness activities. It is also becoming increasingly clear that, regardless of the mode, moderate intensity activity is associated with increases in positive feeling states over time. Future research must continue to investigate the efficacy of different modes of activity, along with modifications in intensity and duration factors. Finally, researchers should continue to explore differences in feeling states as a function of participant fitness level, gender, and age.

REFERENCES

Aicinena, S. (1991). The teacher and student attitudes toward physical education. *The Physical Educator, 48,* 28-32.

American College of Sports Medicine (1990). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Medicine and Science in Sport and Exercise, 22,* 265-274.

Arnett, G. (2001). The effect of sport-based physical education lessons on physical activity. *Physical Educator, 58*(3), 158-169.

Carroll, B., & Loumidis, J. (2001). Children's perceived competence and enjoyment in physical education and physical activity outside school. *European Physical Education Review, 7*(1), 24-43.

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (rev.ed.) New York, NY: Academic Press.

Hardy, C.J., & Rejeski, W.J. (1989). Not what, but how one feels: The measurement of affect during exercise. *Journal of Sport and Exercise Psychology, 11,* 304-317.

Labbe, E.E. & Welsh, C. (1993). Children and running: Changes in physical fitness, self-efficacy, and health locus of control. *Journal of Sport Behavior, 16,* 85-97.

Markland, D., Emberton, M., & Tallon, R. (1997). Confirmatory factor analysis of the Subjective Exercise Experiences Scale among children. *Journal of Sport and Exercise Psychology, 19,* 418-433.

McAuley, E., & Courneya, K.S. (1994). The Subjective Exercise Experiences Scale (SEES): Development and preliminary validation. *Journal of Sport and Exercise Psychology, 16,* 163-177.

Prochaska, J., Sallis, J., Slymen, D., & McKenzie, T. (2003). A longitudinal study of children's enjoyment of physical education. *Pediatric Exercise Science, 15*(2), 170- 178.

Prudential FITNESSGRAM Test Administration Manual (1992). Dallas, TX: The Cooper Institute for Aerobic Research.

Public Health Service (2000). *Healthy People 2010: National health promotion and disease prevention objectives.* Full report, with commentary. Washington, D.C.: U.S. Department of Health and Human Services.

Rice, P.L. (1988). Attitudes of high school students towards physical education activities, teachers, and personal health. *Physical Educator, 45,* 94-99.

Sallis, J.F., & McKenzie, T.L. (1991). Physical educations role in public health. *Research Quarterly for Exercise and Sport, 62,* 124-137.

Scantling, E., Strand, B., Lackey, D., & McAleese, W. (1995). An analysis of physical education avoidance. *Physical Educator, 52,* 197-201.

Stewart, M.J., Green, S.R., & Huelskamp, J. (1991). Secondary student attitudes toward physical education. *Physical Educator, 48,* 72-79.

Strand, B., & Reeder, S. (1993a). Comparison of time in training zone from two independent studies involving middle school students in physical education. *Physical Educator, 50,* 180-186.

Strand, B., & Reeder, S. (1993b). Analysis of heart rate levels during middle school physical education activities. *Journal of Physical Education Recreation and Dance, 64*(3), 85-91.

Strand, B., & Reeder, S. (1996). Increasing physical activity through fitness integration. *Journal of Physical Education Recreation and Dance, 67*(3), 41-46.

Strand, B., & Scantling, E. (1994). An analysis of secondary student preferences towards physical education. *Physical Educator, 51,* 119-129.

Tannehill, D., & Zakrajsek, D. (1993). Student attitudes towards physical education: A multicultural study. *Journal of Teaching in Physical Education, 13,* 78-84.

Thomson, W., McManama, J., & Shendell, D. (1998). A comparison of volleyball skill performances between classes using two different methods of teaching. *Research Quarterly for Exercise and Sport, 69*(1), A104-Al05.

U.S. Department of Health and Human Services. (1996). Physical activity and health: A report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

Mr. Hannon is a member of the Exercise and Sport Science Department at the University of Utah and Dr. Pellett is at the Minnesota State University.