PJSS

ISSN: 1309-0356

Pamukkale Journal of Sport Sciences
2013, Vol.4, No.2, Pg:146-157

Received : 03.08.2012
Accepted : 23.02.2013

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ORIGINAL ARTICLE

THE EFFECTS OF FITNESS TESTING ON SOCIAL PHYSIQUE ANXIETY AND PHYSICAL SELF-ESTEEM

Abstract

Aim: This was a study of the effects of participation in fitness testing on physical self-esteem and social physique anxiety. Subjects & Instruments: Students in college fitness classes (*N* = 65) initially completed the Social Physique Anxiety Scale (SPAS) and the Physical Self-Perception Profile (PSPP). Method: Those who had been randomly assigned to an experimental group (EXP) were then fitness tested, while those assigned to a control group (CON) were told that their tests would be scheduled later. After EXP members' fitness tests were finished and interpreted, all EXP and CON participants completed the SPAS and PSPP again. Then, the CON members' fitness tests were conducted and interpreted. Before testing, all participants predicted their fitness ratings. Results: Most predictions were accurate (58%), but when inaccurate, participants received "good news" significantly more often than "bad news" (33% vs. 9% overall). There were no experimental effects on the SPAS or on the five PSPP scales, except that males scored higher than females on the general physical self-worth subscale. Also, there were no differences between the PSPP or SPAS scores of those participants who received "good news" compared with those who received "bad news" from their fitness score interpretations. Conclusions: Since participants' scores on SPAS and PSPP were typical of those reported in the literature, and because there were no effects from fitness testing, the results support the premise that fitness tests can be used for curricular purposes without causing adverse effects on physical self-esteem or social physique anxiety.

Keywords: Fitness tests, physical self-perceptions, self-worth, social physique anxiety, fitness education

INTRODUCTION

While concerns about the obesity epidemic have emerged over the last one or two decades, general disquiet about the physical fitness of young Americans emerged earlier (during the 1950's) after comparisons were made between American and European children (Whitehead et al., 1990). In 1956 a national conference was held to discuss ways to improve the fitness levels of American youth, and two groups--the President's Council on Physical Fitness and Sport (PCPFS) and the Fitness Task Force of the American Alliance for Health, Physical Education, Recreation, and Dance (AAPHERD), were formed as a result. Subsequently, with leadership from those and other groups, fitness test packages were developed as part of efforts to improve youth fitness.

Most of those testing packages evaluated performance related abilities (such as speed, power, agility, and reaction time), and students' scores were typically interpreted against normative standards. This focus led to some (often contentious) debate about the purpose of youth fitness testing (ostensibly to motivate increased physical activity and better fitness). By the early 1980's, health-related fitness testing packages had been developed, and the focus shifted to efforts to reduce the risk of premature development of hypokinetic diseases. There now seems to be general agreement that the primary focus should be on health-related aspects of fitness, and that testing should be part of a plan to encourage long-term healthful physical activity (see http://www.fitnessgram.net/home/ and http://www.fitness.gov/presidents-challenge/ for key examples).

Contemporaneously, as society became more conscious about body image, and as fitness testing became more common, other concerns emerged about possible negative consequences of fitness testing. For example, Fox and Biddle (1988) wrote that the effect of regular fitness testing on the fitness levels of our youth had yet to be tested. They stated that fitness testing could be both a positive and a negative experience for students depending upon the fitness level of the students, the way the fitness test is administered, and the type of fitness tests used. They also advocated for a health-related focus, de-emphasizing peer comparisons, and putting testing into an overall perspective of planning and monitoring progress towards personal fitness goals.

Whitehead et al., (1990) also recognized the double-edged sword of fitness testing. They predicted that fitness tests "administered in an insensitive, punitive fashion" will inevitably have negative consequences. They cautioned testers to keep the students' results private, confidential, and not to use them as a basis for academic evaluation. They also proposed that fitness testing could provide an opportunity for students to learn about health related concepts such as body fat percent, energy balance, and the role of exercise in promoting good health.

Riley (1990) was supportive of fitness testing in general, but took issue with skinfold testing to determine body fat percent. Riley (1990) argued that many students are "sensitive" about their body fat, and the student's right to keep their scores private could not be maintained due to peer pressure to tell each other their scores. Also, Riley (1990) stated that skinfold testing was not essential for teaching healthy lifestyles because overweight students are well aware of their condition and did not need scientific conformation of this fact.

In response, Going and Lohman (1990) countered that scientific conformation of a person's body composition was necessary and helpful because it reduces the subjectivity that assessment of one's body fat through physical appearance creates. Similarly, Thomas and Whitehead (1993) stated it was important for students to have accurate information about body fat because students with misinformation or a distorted body image may develop physiological and psychological problems such as eating disorders or body image disturbancies.

However, as more and more people were fitness tested in schools and other environments, it is clear that many of them remembered physical fitness testing as a negative experience. For example, in a survey, elementary teachers were asked to recall the activities they liked most and least from physical education class. Physical fitness testing topped the list of least liked activities (Bowyer, 1996). More recently, major reviews of youth fitness testing have noted the potential for both positive and negative outcomes from the testing experience (Harris & Cale, 2006; Silverman et al., 2008). Contemporaneously, it has also been pointed out that attention to appropriate instructional and psychological factors can enhance the positive aspects of the fitness test experience (Wiersma & Sherman, 2008).

However, not much direct empirical research seems to have been done on the topic over the last decade or two. Zabinski et al., (2001) noted that interventions designed to promote healthy physical activity in college seniors may increase concerns about thinness in women, and the authors recommended that such interventions should include assessments of potential negative side effects. In contrast, Huang et al. (2007) did not observe adverse psychological consequences from interventions targeting physical activity, sedentary, and dietary behaviors in a large cohort of adolescents. Some contrasting findings are similarly evident in studies that have addressed the accuracy versus inaccuracy of self-assessment of fitness in young people (which fitness test results could potentially correct). Standley et al. (2009) found that British teenagers were more likely to under-estimate than over-estimate overweight status, but Talamayan et al. (2006) found that a significant proportion of normal weight US High School students--especially females, misperceive themselves as overweight, and in turn, the misperceptions led to them engaging in unhealthy weight control behaviors such as fasting, using diet pills, or purging.

Thus, there is mixed data regarding the potential positive versus negative outcomes from fitness testing, and most of the data appears to be on school-aged children and youth. Whitehead et al. (2003) did find that skinfold calipers could be used to assess fatness and promote the learning of important body composition concepts in middle school students without damaging their self-esteem or causing anxiety. However, literature searches indicate that broader direct studies of the emotional effects of fitness testing are lacking, especially outside of school-aged children and youth. Thus, as an effort to address the dearth of data on the topic, and to ascertain if fitness testing could be conducted without causing harm, this study was an investigation of the effects of participation in fitness testing on physical self-esteem and social physique anxiety in college-aged students. Specifically, in the context of college students taking typical health-promoting physical activity classes, the study aimed to document the accuracy versus inaccuracy of participants' fitness self-assessments prior to fitness testing, and to assess positive versus negative effects on physical self-perceptions and social physique anxiety.

METHOD

Subjects

Sixty five participants (18 males and 47 females) were recruited from a U.S. Mid-western University population. Ages ranged from 18-24, with a mean age of 21 years. Ninety-five percent of the participants were Caucasians with the remaining five percent being African American, Native American, and Mexican. The procedures were approved by the university Institutional Review Board, and all participants provided written informed consent.

Instrumentation

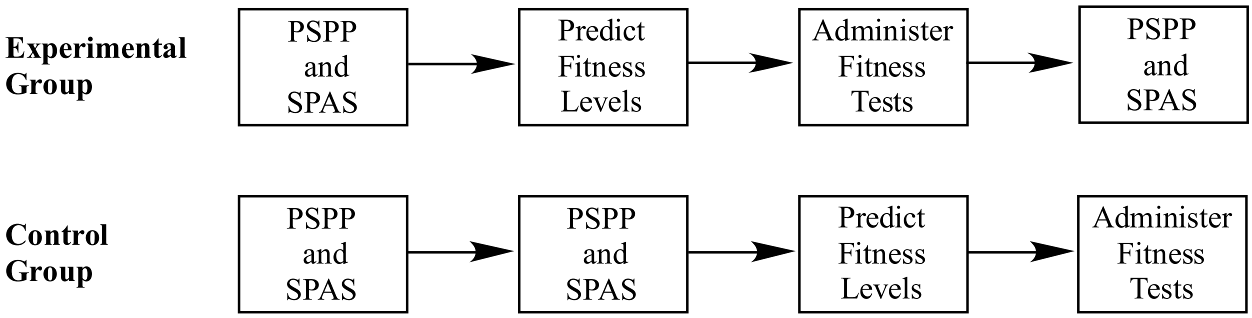
Social Physique Anxiety was measured using the Social Physique Anxiety Scale (SPAS; Hart et al., 1989). The SPAS is a 12-item self-report scale designed to assess the level of anxiety of people after observation or evaluation of their physiques. Participants are asked to respond to twelve items using a five-point Likert-type scale as follows: (1) not at all, (2) slightly, (3) moderately, (4) very, (5) extremely. Inter-item reliability for this scale using college students is reported to be .90, with a test-retest reliability of .82 after eight weeks (Frederick & Morrison, 1996). SPAS scores were reported as the mean of the 12 items.

Physical Self-Perceptions were measured using the Physical Self-Perception Profile (PSPP; Fox & Corbin, 1989). The PSPP identifies four subdomains of physical self-esteem; perceived bodily attractiveness, sports competence, physical strength, and physical conditioning. A fifth subscale assesses physical self-worth at a global domain level. Each subscale has six items written in a four-point structured alternative format designed to avoid socially desirable responses. Internal consistency for all subscales has been reported as stable across independent samples, ranging between .81 and .92. Test-retest reliability using college students ranged between .81 and .88 over a 23-day period (Fox, 1990). All subscale scores were reported as the mean of the six items of the subscale.

Procedures

Participants were recruited from five separate college fitness-related classes. The researcher explained to each class of participants that they would be asked to complete questionnaires on two separate occasions, and to undergo a battery of fitness tests if they chose to participate in the study. Students who agreed to participate in the study were given an identification number, and the PSPP and SPAS questionnaires were passed out and directions on how to complete each were given. While participants were completing the questionnaires, the researcher randomized the participants' identification numbers, dividing them into a control and an experimental group. As participants finished their questionnaires, those in the experimental group were asked to sign-up for fitness testing immediately, while those in the control group were told they would sign-up for fitness testing at a later date. After the experimental group had completed their fitness testing (approximately two weeks later), the PSPP and SPAS questionnaires were given to both groups again. This time, control group participants were instructed to sign-up for fitness testing. The sequence of events is diagramed in Figure 1 below.

Figure 1. Flow chart showing experimental design and sequence



Fitness testing was administered to individuals, or to groups of two. Before participants began fitness testing, they completed the Physical Activity Readiness Questionnaire (PAR-Q) to determine if they were at risk of medical complications during physical activity. Also, they were asked to predict their level of health-related fitness in each area of the test. For the areas of cardiovascular fitness, body composition, muscular strength, muscular endurance, and flexibility, participants were asked to circle the level of fitness they thought the fitness tests would reveal using the continuum displayed in Figure 2 below:

Figure 2. Fitness self-rating continuum.

Athletic Performance (CV, Muscle Fitness) or Too High (Body Fatness, Flexibility	Good Health	Too Low

The fitness testing battery assessed cardiovascular endurance, body composition, muscular strength/endurance, and flexibility. Cardiovascular endurance was tested on a stationary bicycle using the Åstrand-Rhyming (1954) protocol, and participants' heart rates were measured using heart rate monitors

Body composition was measured using the Jackson and Pollock (1985) three-site skinfold protocol. Men had measurements taken at the pectoral, abdominal, and thigh sites. Women had measurements taken at the triceps, suprailiac, and thigh sites.

Muscular endurance was measured by testing abdominal strength. Using the procedures described by Whitehead & Shorten (1998), participants were asked to perform bent-knee sit-ups until they began to feel fatigued, not until exhaustion. They were instructed to stop when they began to feel fatigued. Similarly, participants performed push-ups to determine muscular strength.

Also using the procedures described by Whitehead & Shorten (1998), hamstring and lower-back flexibility was assessed using a standard sit-and-reach box. Participants were instructed to keep their knees flat against the ground and stretch forward, hands together, as far as they could stretch. They were required to hold that position for three seconds, and no ballistic stretches were permitted. The best score of three tries was recorded.

After completion of fitness testing, students received an interpretation of their test results using a computer program *Fitsolve II* that was specifically designed to evaluate a person's fitness from a lifetime health-related fitness perspective, and to facilitate the teaching of important fitness concepts and skills in the process (Whitehead & Shorten, 1998).

Data Analysis

Descriptive statistics and intercorrelations between variables were computed. Chi square analyses were used to ascertain predicted versus actual fitness test score differences. ANOVA, ANCOVA, MANOVA and MANCOVA analyses were performed to test for experimental group differences on SPAS and PSPP.

RESULTS

Descriptive Statistics

The means and standard deviations for key variables are presented in Table 1. While both males and females in the experimental group had higher mean body fat percentages than their counterparts in the control group, the differences were not statistically significant. The means and standard deviations for both groups and sexes on the PSPP and SPAS appear typical of those reported in the literature (Fox & Corbin, 1989: Frederick & Morrison, 1996).

Table 1. Descriptive statistics

	Experimental Male (*n* = 11)		Control Male (*n* = 7)		Experimental Female (*n* = 23)		Control Female (*n* = 24)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age (yrs)	20.64	2.11	21.00	2.65	21.09	2.11	20.71	1.19
Weight (lbs)	189.18	29.14	175.00	14.91	150.22	26.06	139.19	34.39
Bodyfat (%)	14.14	7.56	11.60	6.47	24.87	5.82	21.60	7.03
PSW A	2.92	0.66	2.76	0.46	2.30	0.64	2.44	0.55
PSW B	3.03	0.41	2.93	0.55	2.28	0.54	2.42	0.58
Body A	2.85	0.47	2.64	0.56	2.07	0.65	2.35	0.64
Body B	2.82	0.47	2.71	0.51	2.17	0.48	2.40	0.58
Sport A	3.14	0.64	2.60	0.45	2.51	0.69	2.48	0.62
Sport B	3.09	0.55	2.57	0.52	2.56	0.67	2.53	0.62
Strength A	2.89	0.54	2.50	0.42	2.38	0.61	2.58	0.56
Strength B	2.74	0.50	2.60	0.40	2.37	0.59	2.53	0.53
Condition A	2.85	0.59	2.83	0.76	2.59	0.83	2.60	0.76
Condition B	2.80	0.48	2.98	0.70	2.75	0.59	2.52	0.74
SPAS A	2.18	0.64	2.37	0.82	3.24	0.82	3.24	0.76
SPAS B	2.11	0.51	2.39	0.84	3.12	0.85	3.23	0.75

Correlations

The intercorrelations between the PSPP and SPAS are shown in Table 2. The large correlations between body attractiveness and global physical self-esteem are notable, but not unusual in the literature. Similarly, the large correlation of SPAS with BODY and PSW is not unusual.

Table 2. Intercorrelations between SPAS and PSPP scales

	PSW	Body	Sport	Strength	Condition	SPAS
PSW	—	0.80***	0.54***	0.36**	0.47***	-0.74***
Body	0.82***	—	0.40**	0.29*	0.41**	-0.78***
Sport	0.57***	0.35*	—	0.54***	0.53***	-0.37**
Strength	0.44***	0.25*	0.64***	—	0.44***	-0.17
Condition	.54***	0.40**	0.64***	0.39**	—	-0.23
SPAS	-0.78***	-0.79***	-0.36**	-0.28*	-0.30	—

Note: Pretest *r*'s above the diagonal, posttest *r*'s below.

* = $p < .05$
** = $p < .005$
*** = $p < .001$

Predicted/Actual Differences

As can be seen from Figure 3 and Table 3, accurate predictions were more common than over, or underestimations of fitness test scores. However, when predictions were inaccurate Chi square analyses showed that in four of the five comparisons, under-predictions were statistically more common than over-predictions. This meant that getting “good news” from receiving fitness scores better than anticipated, was more common than getting “bad news” from receiving fitness scores worse than anticipated (by almost a four-to-one ratio).

Figure 3. Accuracy of participants’ fitness score predictions

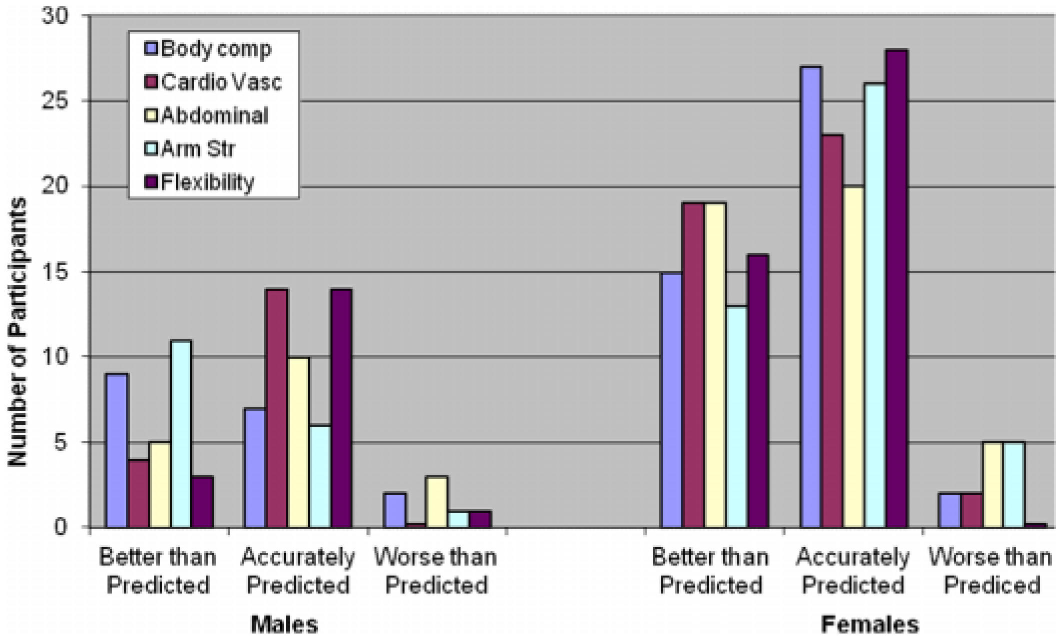


Table 3. Chi square analyses of predicted-actual fitness score differences

	Abdominal Strength			Arm Strength			CV Fitness			Body Fat Percent			Flexibility Rating		
Analysis A	GN	A	BN	GN	A	BN	GN	A	BN	GN	A	BN	GN	A	BN
Expected =	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7
Observed =	24	30	8	13	37	12	23	37	2	24	34	4	19	42	1
χ^2 (2df) =		12.52			19.39			30.03			22.58			40.87	
p =		< .005			< .001			< .001			< .001			< .001	
Analysis B	GN		BN	GN		BN	GN		BN	GN		BN	GN		BN
Expected =	16	16	12.5	12.5		12.5	12.5		14	14		10	10		
Observed =	24	8	13	12		23	2		24	4		19	1		
χ^2 (2df) =		8.00			0.04			17.64			14.29			16.20	
p =		< .005			NS			< .001			< .001			< .001	

Notes: GN = "Good News," A = "Accurate prediction," BN = "Bad News."

In Analysis A, an equal distribution between GN, A, and BN was expected.

In Analysis B, Accurate scores were ignored, and an equal distribution between GN and BN expected.

Effects of Fitness Testing

To test for the effects of sex and experimental groups on physical self-esteem, a 2 (sex) by 2 (experimental group) MANCOVA was computed with the post-test scores on the PSPP scales as dependent variables, and the pre-test PSPP scores as covariates. There was no significant interaction effect, no significant effect for experimental vs. control group, but there was an effect for sex (Pillais criterion = .19, F [5, 52] = 2.43, $p < .05$). Post hoc univariate analysis showed that males scored higher than females on PSW (F [1, 56] = 9.05, $p < .005$).

Similarly, to test for the effects of sex and experimental groups on social physique anxiety a 2 (sex) by 2 (experimental group) ANCOVA was computed with the post-test scores on the SPAS as a dependent variable, with the pre-test SPAS scores as covariates. There were no significant effects for group, sex, or group x sex interaction.

Finally, to ascertain if getting "good news" versus "bad news" on the body fatness estimation (body fat percent lower or higher than expected), those groups were contrasted to see if there were significant effects on physical self-esteem or social physique anxiety. Specifically, MANOVA and ANOVA analyses (respectively) were computed, but there were no significant effects in either analysis.

DISCUSSION

The results of this study show that health-related fitness testing had no significant effect on the perceptions that college students had about their perceived bodily attractiveness, sports competence, physical strength, and physical conditioning, physical self-worth, and social physique anxiety.

Although findings of improved self-esteem and decreased social physique anxiety after fitness testing would have been desirable, the lack of a negative psychological impact as a result of fitness testing—even for those participants who received "bad news" from their fitness scores—can be regarded as a positive result. As such, these data lend some support to the suggestion that fitness testing can be a positive, educational learning experience when done appropriately (Fox & Biddle, 1988; Whitehead et al., 1990). However, these results can only be taken as partial support for that view because cognitive outcomes were not assessed in this study.

Given the history of criticism of fitness testing, and noting the continuing salience of the obesity epidemic to fitness professionals, educators, and laypersons alike, it would seem that concerns about body fatness testing are at the heart of the ongoing debates. Perhaps Riley's (1990) criticisms—especially his assertion that students did not need to be tested because "most overfat students know they are fat," (p. 73) still epitomizes the points of contention. However, the finding that the participants in this study who misclassified themselves on body fatness received "good news" over "bad news" by a ratio of six-to-one provides an empirical challenge to Riley's claim. Our results also corroborate the data of Talamayan et al. (2006) who found similar misperceptions of overweight in normal weight youth. Moreover, because those researchers also found that unhealthy weight control behaviors were a consequence of such misperceptions, the case for helping young people obtain an accurate classification (via testing) is supported.

In fairness to critics like Riley (1990), it has to be noted that most of the debates have centered on school-aged children and youth, while this study was on college students. However, Riley's criticisms were largely addressed by Whitehead et al. (2003) in an experimental study of middle-school children that showed that skinfold caliper measurements could be used in lessons designed to promote cognitive learning of body fatness-related concepts without causing adverse affective consequences. Moreover, that study may have additional significance as a refutation of the criticisms of fitness testing since skinfold measurement is generally accepted as giving more accurate body fatness classifications than the more commonly used BMI technique (Freedman et al., 2009; Sardinha et al., 1999).

To put the results of this study in perspective we suggest that a clear focus should be maintained on the key issue—which is the promotion of long-term participation in healthful physical activity. Thus, we agree with Harris and Cale's (2006) view that fitness testing, if properly conducted, can help educate young people and promote physical activity, and we also endorse Silverman et al. (2008) in recommending that a good use of fitness testing is as a formative evaluation designed to further fitness education goals. We especially endorse Wiersma and Sherman's (2008) view that contemporary relevant psychological theories should be applied in order to provide an instructional climate that minimizes the potential for negative educational and emotional outcomes, and maximizes the acquisition of fitness knowledge, and motivation for participation in physical activity.

The bottom line is that physical fitness tests are "tools" that can be used for educational and motivational purposes (Whitehead et al., 2003). Like any other tools, fitness testing can be used in a positive way, or to inflict damage. The data from this study adds to the view that in the hands of qualified professionals, physical fitness testing can be used to aid achievement of physical education instructional goals without creating unnecessary physical or psychological harm in terms of social physique anxiety or reduced physical self-esteem. However, further research is clearly needed in a variety of circumstances, and with different age groups. In line with the recommendation of Wiersma and Sherman (2008), we also recommend that relevant psychological theories be applied—and tested—as part of the ongoing research efforts to find ways to optimize attainment of a key public health goal—lifetime participation in healthful physical activity.

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