Female Physical Estimation and Attraction to Physical Activity

Kenneth R. Fox and Charles B. Corbin
Arizona State University

William H. Couldry
Missouri Western State College

The Psychological Model for Physical Activity Participation and the Physical Estimation and Attraction Scales (PEAS) were developed by Sonstroem using adolescent male subjects. This study investigated the adequacy of the model and instrument for explaining the involvement of college-age females in physical activity. Results indicated that although the model worked similarly for both sexes, there were important differences. Attraction to physical activity, as measured by the Attraction scale, does not contribute to the model for the females in this study, but it does for males. Physical estimation emerged as a key factor, particularly for females, in its relationship with self-esteem, fitness, and physical activity levels. The Estimation Scale appears to be a reliable and powerful instrument for assessing this construct. Future application and development of the model and scales is discussed.

Sonstroem (1974, 1975, 1976, 1978) has developed a research model he calls the Psychological Model for Physical Activity Participation (see Figure 1). This model was designed "as an attempt to identify mechanisms of physical activity participation and the receipt of psychological benefits derived from activity" (Sonstroem & Kamper, 1980, p. 686). The Physical Estimation and Attraction Scales (PEAS) were developed in association with the model and constructed to assess two aspects of perceived orientation toward physical activity. Estimation (EST) measures an individual's self-rating of his/her capabilities in sport and vigorous activity. Attraction (ATTR) assesses liking for and interest in a wide range of physical pursuits. Using the model, Sonstroem hypothesized that a strong belief in personal physical competence (EST) and an attraction to physical activity (ATTR) would lead to higher levels of participation and a consequent increase in fitness and self-esteem.

The psychometric properties of the PEAS, and their construct validity, have been tested with adolescent male subjects (Sonstroem, 1974, 1975, 1976). For adult males, Morgan (1976) has reported good test-retest reliability for the scales. Subsequent research by Sonstroem (1976) with the estimation scale has shown its validity, though some defensiveness was identified for the responses of young males. Dishman (1980) investigated...
the sensitivity of the PEAS to response distortion among adult male and female subjects, revealing that only the attraction scale was subject to “faking good,” although to a lesser degree both scales could be “faked bad.”

Over the past decade, the PEAS battery has emerged as a viable and valuable instrument in a variety of research settings. It has been used to measure perceptions and their change over time (Dishman & Gettman, 1981; Morgan, 1976; Pollock, 1975), and more recently for prediction of exercise involvement or adherence (Dishman & Gettman, 1980; Dishman, Ickes, & Morgan, 1980; Morgan, 1977; Sonstroem & Kamper, 1980). Also, the model has been utilized to examine relationships between variables such as attraction to physical activity and fitness (Dishman, 1978; Morgan & Horstman, 1976; Morgan & Vogel, 1976), and fitness and self-esteem (Kowal, Patton, & Vogel, 1978; Sonstroem, 1975, 1976, 1978).

Unfortunately, research specifically designed to test the whole model has been limited to the earlier work of Sonstroem, which was totally dependent on a population of adolescent males. Although the bulk of demographic evidence indicates that the PEAS are generalizable to adult and college-age male populations, to date, the limited amount of data for young adult females has yielded equivocal results. In addition, there is no substantial evidence to show that the psychological model is appropriate for the explanation of adult male, or particularly adult female, involvement in physical activity. Sonstroem (1978),
however, suggested "a change in the wording of certain items would make the PEAS immediately available for use with females. There is little or no reason to doubt the present incomplete model to feminine participation" (p. 97). No psychometric data were or have since been provided to support this position, even though a number of studies have used the PEAS with female groups (Dishman, 1978; Dishman, 1980; Dishman et al., 1980; Kowal et al., 1978).

Many researchers (Berlin, 1974; Gilligan, 1982; Greendorfer, 1978) have expressed dissatisfaction with the use of male subjects for the generation of instruments, models and theory that are eventually applied to female behavior. Ironically, females are frequently excluded from studies in order to control for the confounding effects of gender differences. The outcome in some instances has been theory formulation that is inaccurate or irrelevant for females. Within the physical activity setting, research has already revealed gender differences concerning self-confidence and perceptions related to physical and motor tasks (Corbin, 1984; Corbin & Nix, 1979; Corbin, Stewart, & Blair, 1981). Before any further attempt is made to use the PEAS and model, we believe they should be thoroughly examined for their value with adult populations, both male and female. Sonstroem and Kampfer (1980), in their latest investigation using the model, concluded by suggesting that "the psychodynamics of exercise participation may vary with different populations and replication of the present study with females and the middle-aged, particularly, is encouraged" (p. 693).

The specific purpose of this investigation was to:

1. Assess the adequacy of the Psychological Model for Physical Activity Participation as an explanation for college-age female involvement,
2. Examine the properties of the Physical Estimation and Attraction Scales with a young adult female population, and
3. Compare the responses of college-age males with those previously found with adolescents. This was done in order to establish a sound base in this study for the examination of gender differences in a college-age population.

Method

Subjects

Subjects were 77 female and 94 male undergraduate students enrolled in required physical education classes. Each student agreed to complete the questionnaires and gave informed consent to participate in the health-related fitness test battery.

Questionnaires and Tests

The Psychological Model for Physical Activity Participation suggests relationships among physical estimation (EST), attraction to physical activity (ATTR), involvement in physical activity, physical fitness, and self-esteem. To study these relationships, the PEAS (Sonstroem, 1974) were administered to males and modified PEAS were administered to females (Morgan, 1977). A self-report of physical activity involvement questionnaire, similar to that described by Slava, Laurie, and Corbin (1984), the Rosenberg 10-item Self-Esteem Scale (Rosenberg, 1965), and a composite score from a health-related fitness test battery were used as measures of the remaining model variables.
Four tests were included in the fitness test battery: Body fatness was assessed using three skinfold measures, following procedures described by Pollock, Schmidt, and Jackson (1980). Aerobic power was measured by means of the Astrand-Ryhming 6-minute Bicycle Ride test which gave an estimated maximum \( \text{VO}_2 \) uptake, corrected for body weight, for each subject. Flexibility was assessed using a sit-and-reach test with a specially designed flexibility box. These last two procedures are fully described elsewhere (Corbin, Dowell, Lindsey, & Tolson, 1981). Finally, a left and right grip dynamometer score was used to estimate grip strength. These scores were corrected for body weight. The four fitness results for each subject were then, separately for each sex, converted to standardized T scores. In order to enable comparisons with previous studies that have used composite fitness ratings, a mean T score was also calculated for each subject and used as a fitness index when determining model relationships.

**Procedures**

Subjects reported to the fitness testing laboratory at the time appointed for their fitness evaluation. They completed the PEAS, the activity involvement questionnaire, and the self-esteem scale, respectively. The health-related fitness test battery was then administered with skinfolds being measured first, followed by the tests of aerobic power, flexibility, and strength.

**Data Analysis**

All data analysis was completed separately for male and female subjects to allow for examination of gender differences. The PEAS have in their construction seven subfactors representing different aspects of estimation and attraction. Means, variances, and standard deviations were calculated for all seven factors as well as for EST and ATTR. Product-moment correlation coefficients and selected partial correlation coefficients were then determined to examine relationships between the five model variables. Also, correlation coefficients were calculated for each of the individual health-related fitness measures with all other model variables in order to investigate any effect of their specificity. Stepwise multiple regression was utilized to investigate the predictive validity of the model and provide additional insight into relationships in the model. Three regression models were employed. The five model variables contained in Figure 1 were used as predictor variables for each of three criterion variables: activity levels, the fitness index, and self-esteem.

Two methods of questionnaire item analysis were conducted on both the EST and ATTR scales. Using the procedures described by Magnusson (1966), differences between extreme groups were examined to test the discriminatory power of each item. Item-total correlations were analyzed to determine how well each item contributed to the total score for each scale. Also, \( t \) tests were calculated to detect gender differences in the means of EST, ATTR, the seven PEAS subfactors, and individual questionnaire items. Kuder-Richardson (Formula 20) coefficients were computed for EST, ATTR, and the seven subfactors in order to examine their internal consistency.

**Results and Discussion**

Table 1 contains means and standard deviations for EST, ATTR, their seven subfactors, and the remaining model variables. Fitness scores were not included because
Table 1
Means and Standard Deviations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Females M</th>
<th>Females SD</th>
<th>Males M</th>
<th>Males SD</th>
<th>Adol. malesa M</th>
<th>Adol. malesa SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimationb</td>
<td>20.56</td>
<td>7.19</td>
<td>23.42</td>
<td>6.25</td>
<td>20.40</td>
<td>6.60</td>
</tr>
<tr>
<td>Attraction</td>
<td>36.03</td>
<td>8.27</td>
<td>38.03</td>
<td>8.46</td>
<td>35.52</td>
<td>8.99</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>31.34</td>
<td>3.93</td>
<td>32.13</td>
<td>4.04</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Activityb</td>
<td>266.75</td>
<td>268.88</td>
<td>411.04</td>
<td>321.17</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Factor 1</td>
<td>25.13</td>
<td>6.13</td>
<td>27.31</td>
<td>6.69</td>
<td>26.12</td>
<td>7.14</td>
</tr>
<tr>
<td>Factor 2</td>
<td>7.67</td>
<td>3.82</td>
<td>8.55</td>
<td>3.37</td>
<td>6.80</td>
<td>3.68</td>
</tr>
<tr>
<td>Factor 3b</td>
<td>10.00</td>
<td>3.07</td>
<td>11.48</td>
<td>2.75</td>
<td>10.52</td>
<td>2.91</td>
</tr>
<tr>
<td>Factor 4</td>
<td>7.14</td>
<td>2.32</td>
<td>7.10</td>
<td>2.65</td>
<td>6.42</td>
<td>2.61</td>
</tr>
<tr>
<td>Factor 5</td>
<td>4.51</td>
<td>2.83</td>
<td>5.18</td>
<td>2.58</td>
<td>4.73</td>
<td>2.65</td>
</tr>
<tr>
<td>Factor 6</td>
<td>1.87</td>
<td>0.92</td>
<td>2.04</td>
<td>0.95</td>
<td>2.03</td>
<td>0.92</td>
</tr>
<tr>
<td>Factor 7</td>
<td>1.95</td>
<td>0.91</td>
<td>1.47</td>
<td>0.83</td>
<td>1.44</td>
<td>0.95</td>
</tr>
</tbody>
</table>

aData provided by Sonstroem (1974).

bComparison between male and female means shows a significant gender difference at the 0.01 level.

they were standardized. Also presented for comparison are Sonstroem’s (1974) data for adolescent males. These data have recently been replicated by Sonstroem and Kampper (1980).

Examination of mean EST, ATTR, and subfactor scores for the college-age males and females in this study shows that they closely match those of previous findings with adolescent boys. They are also similar to other findings (Dishman, 1978, Study 2; Dishman, 1980) in which male and female college-age populations have been studied. However, the findings are not consistent with those in Study 1 of Dishman (1978). Kuder-Richardson coefficients for the scales and subfactors were also very similar to those reported by Sonstroem (1974). EST and ATTR coefficients ranged between .87 and .90 for both males and females.

These consistencies with data from the originating population of adolescent males lend confidence to the generalizability of the scales to a college-age population. This provides a sounder basis for gender comparisons. The only variables showing significant gender differences (p < .01) were mean EST, Factor 3 (a main subfactor of EST), and activity levels.

Attraction Scale

The item discrimination analysis of the 54-item ATTR revealed that 15 items (28%) for females and 10 items (18%) for males failed to give a discrimination index of greater than .2. Item-total correlations confirmed these findings. Many of the items failed because a high percentage of subjects scored positively. Also, gender comparisons of item mean scores revealed that 13 (24%) of ATTR items showed significant differences (p < .01) with 10 of these items originating from Factor 1 (Physical Activity Endorsement). These
results suggest that at least parts of ATTR function differently according to gender, and that the scale could be considerably shortened. Evidence to support these conclusions has been provided by Safrit, Wood, and Dishman (1985) in their recent factor analysis of the PEAS with college-age males and females. Different factor structures emerged for males and females and greatly shortened, gender-specific ATTR scales were suggested.

Estimation Scale

The EST item analysis revealed a more stable and discriminating scale. Only 5 out of 33 items failed to discriminate for females, and 4 for males. Noteworthy was the strength of all items in Factor 2 (Physical Ascendence), which is one of the main EST subfactors. Eleven of the 13 items in this factor gave discrimination indices ranging from .7 to .9 for females and from .4 to .7 for males. Factor 2 measures perceptions of physical endowments such as strength, fitness, athletic skills, natural athletic ability, and also leadership qualities in the sport setting. Many of the items elicit personal comparisons with peers, thus tapping the evaluative component of self in the environment of vigorous physical activity. According to Bandura (1981), expectations of personal efficacy are derived from these kinds of peer comparisons. Therefore it seems possible that Factor 2, which correlated .93 with EST in this data, may provide a short but powerful indicator of physical self-efficacy.

Safrit et al. (1985) have also proposed a condensed 12-item EST for both males and females, which reflects general physical competence and perceived strength. The area of perceived competence and efficacy in the physical setting has received increasing attention in the literature (Feltz, 1982; McAuley & Gill, 1983; Ryckman, Robbins, Thornton, & Cantrell, 1982; Weinberg, Gould, Yukelson, & Jackson, 1981). In addition, Sonstroem (1984) has called for the customary use of situation-specific self-concept scales in research concerning the exercise/self-esteem relationship. Further investigation is recommended into the qualities of these condensed EST scales as possible measures of physical self-efficacy in a physical activity setting.

The Model

The zero-order correlation coefficients for relationships between the five model variables can be examined in Table 2. Once again, results from this study can be compared with those reported by Sonstroem (1975, 1976). General observation shows that the relationships from this study exhibit the same patterns as those from young male subjects. Differences only appear in the strengths of relationships.

Attraction Relationships. The data show a typically strong relationship between EST and ATTR, with coefficients of .67 for females and .72 for males. Sonstroem (1978) found that the ATTR/self-esteem and the ATTR/fitness relationships were nonsignificant when the effect of EST was controlled by partial correlation. The only ATTR relationship to remain significant was with activity levels. Male subjects in this study reacted similarly to those in Sonstroem’s studies, but all female ATTR relationships failed when the effect of EST was removed.

Stepwise multiple regression analysis confirmed these findings, as ATTR was not selected as a significant predictor variable (p < .05) for female activity, fitness, or self-esteem but explained 17% of the activity variance for males. It appears, then, that the attraction to physical activity construct in this study does not independently contribute to the model for females.
FEMALE PHYSICAL ESTIMATION

Table 2
Correlation Matrix for Model Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subjects</th>
<th>EST</th>
<th>ATTR</th>
<th>Fitness</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>Females</td>
<td>.53*</td>
<td>.33*</td>
<td>.25*</td>
<td>−.08</td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>.30*</td>
<td>.15</td>
<td>.17</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Adolescents</td>
<td>.30*/.51*</td>
<td>ns.<em>/.36</em></td>
<td>.00*/.15</td>
<td>—</td>
</tr>
<tr>
<td>Estimation</td>
<td>Females</td>
<td>—</td>
<td>.67*</td>
<td>.52*</td>
<td>.36*</td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>—</td>
<td>.72*</td>
<td>.50*</td>
<td>.35*</td>
</tr>
<tr>
<td></td>
<td>Adolescents</td>
<td>—</td>
<td>.53*/.66*</td>
<td>.41*/.53*</td>
<td>—</td>
</tr>
<tr>
<td>Attraction</td>
<td>Females</td>
<td>—</td>
<td>—</td>
<td>.33*</td>
<td>.33*</td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>—</td>
<td>—</td>
<td>.34*</td>
<td>.42*</td>
</tr>
<tr>
<td></td>
<td>Adolescents</td>
<td>—</td>
<td>—</td>
<td>.41*</td>
<td>.46*</td>
</tr>
<tr>
<td>Fitness</td>
<td>Females</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.24*</td>
</tr>
<tr>
<td></td>
<td>Adolescents</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.24*</td>
</tr>
</tbody>
</table>

Data for adolescents provided by Sonstroem (1975, 1976).

*p < .01.

aData only reported as nonsignificant.

A possible explanation for this inadequacy may lie in the different gender responses to the ATTR, some of which have already been discussed. ATTR measures a very general interest in a variety of physical pursuits, including individual and team competitive sports and recreational activities. Also, some items only concern spectating. Males are more interested in sports and activities and take part in a wider range of sports than females (The Miller Lite Report, 1983). The gender differences in responses to ATTR may reflect a lesser general sports/activity interest factor for females. Females tend to be involved in a more limited range of activities, often with less participation in team sports and more involvement in activities that promote health-related fitness (The Perrier Study, 1979). In this sense, their participation is more activity-specific, which may make the more expansive ATTR less appropriate. In addition, the ATTR was designed with adolescent boys in mind, and it is probable that many of the activities and sports referred to are not those typically chosen by the adult female population for their mode of activity. In its present form, the ATTR does not appear to be a suitable measure for investigating female attitudes toward physical activity participation.

This evidence, however, does not rule out the possible contribution of an attraction to physical activity construct as an explanation of female behavior. It has been well established (Ajzen & Fishbein, 1977; Jaccard, King, & Pomazal, 1977) that in order to gain strong associations with behavior, attitude scales should include measures of intent toward, as well as interest in, the specific action of concern. In predicting initiation and adherence to activity in middle-school males with the PEAS, Sonstroem and Kamper (1980) concluded “in terms of optimally predicting exercise involvement by means of attitude, the development of newer scales is recommended. Scale construction should strive to incorporate attitudes more congruent to desired and specified behaviors” (p. 693). Dishman
(1983) found that variables measuring commitment and self-motivation were better predictors of exercise involvement than ATTR. The present investigation implies that this is particularly the case for female involvement in physical activity. An attraction inventory which taps attitude and intent toward health-related behavior might provide a useful start.

Estimation Relationships. The mean female EST score was significantly lower \((p < .01)\) than the mean for males. This would support previous reports (Corbin, 1984) of the lack of confidence in females in the physical setting. It is unlikely that this difference in mean score will influence model relationships. EST relationships were similar to those described previously among adolescent male subjects, although for females in this study associations tended to be stronger. Partial correlation coefficients and the stepwise regression analysis showed that EST plays a key role in the model, particularly for females. EST was the first predictor selected \((p < .05)\) for female self-esteem, fitness, and activity levels, explaining 29\%, 30\%, and 13\% of the variance, respectively. Male EST was not nearly as strong, explaining only 9\% of variance in self-esteem and 23\% of variance in fitness, and was not selected as a predictor of male activity levels.

Most of the previous research carried out by Sonstroem with the model has focused on the self-esteem/physical estimation/fitness relationship, as this was thought to reflect a mechanism by which psychological benefits might be gained from regular physical activity. A good deal of evidence has already established the importance of perceived physical ability (EST) as a mediator between fitness and self-esteem. The results of this study strongly support this hypothesis, particularly with female subjects. The correlation between EST and self-esteem for females was .53, and between EST and fitness, .52. As with Sonstroem’s findings, the direct association that might be expected between fitness and self-esteem was not significant when the effect of EST was controlled by a partial correlation technique. This finding reiterates recommendations (Sonstroem, 1984) that investigations involving exercise/self-esteem relationships should utilize scales such as EST, since they are specific to exercise and sport settings. This is more likely to give an accurate and sensitive indication of psychological restructuring than the use of global self-esteem scales.

The stronger association for females between EST and self-esteem (female = .53, male = .30) is surprising at first glance. Most of the abilities dealt with in the EST scale are those that typically have been perceived to be male in orientation (Corbin & Nix, 1979; Landers, 1969; Metheny, 1965; Spritzer, Snyder, & Kelvin, 1977). One possible explanation for this finding is the recent increase in female interest in sport and exercise. Their involvement has grown at a considerably greater rate than that of males (The Miller Lite Report 1983; The Perrier Study, 1979). Having a fit, strong, and active body appears to be increasingly valued among females. Although there is no research evidence to date, it could be argued that now more than ever, fitness and physical skill are associated with the female ideal. If this is true among college-age females, it would explain the inflated relationship between EST and self-esteem for females in this study.

Sonstroem used the terms physical ability and physical fitness interchangeably throughout the formulation of the model. The measures he used for this construct have been batteries assessing both health-related and skill-related performance. The present study included a battery of tests designed to assess the more health-related fitness aspects of performance as opposed to skill-related aspects, such as throwing ability and coordination. Moderately high correlation coefficients of .52 for females and .50 for males resulted for the EST/fitness index relationship. These results were similar to those reported in the past (Sonstroem, 1975, 1976). Correlation coefficients for individual aspects of health-related fitness with EST were all moderate and significant \((p < .01)\). Coefficients for aerobic
power, strength, flexibility, and body fatness were, in order, .29, .39, .30, .33 for males and .52, .38, .26, .30 for females. In the fitness/EST relationship, it appears that the aerobic power measure contributes least for males but relates as highly as the fitness index itself for females. This indicates that the other fitness measures for females in this study may have been redundant. Overall, these results suggest that EST is capable of relating to aspects of health-related fitness as well as those qualities that are more sports-skill oriented.

Recommendations for Future Research

The present investigation was cross-sectional in design and its limitations should be recognized. These preliminary data do provide support for the use of the psychological model as a tool for viewing the psychological mechanisms involved in physical activity participation for both college-age males and females. In order to gain further insight into some of the model relationships and improve the predictive validity of the model, a number of recommendations are offered.

1. Global self-esteem has been regarded as multidimensional in nature, with dimensions such as social, academic, and physical aspects being hierarchically structured (Shavelson, Hubner, & Stanton, 1976). Each of the dimensions is made up of situation-specific constructs, and the salience of these to global self-esteem is thought to be dependent upon their perceived importance by the individual. Harter’s (1984) work with global self-worth and perceived competence has found that an individual’s perceived importance of each category of competence plays a vital role as a mediating variable. She has developed a scale to measure subjective importance and incorporates this construct in a model of the relationship between perceived competence and global self-worth. Physical estimation may represent a situation-specific construct highly related to perceived physical competence or physical self-efficacy in the physical activity and sport setting. To achieve a better understanding of the EST/self-esteem relationship, it may be advantageous to consider an individual’s subjective rating of the importance of physical estimation to their total makeup. This could be achieved by creating a new scale that incorporates features similar to Harter’s (1984) scale. This would involve assessing each subject’s perception of the importance of the various physical skills and qualities that are incorporated in the EST scale.

2. There seems to be some indication from this study that perceived physical ability, as measured by EST, may be two-dimensional. It might be possible to measure perceived health-related fitness and perceived ability in sports skills on separate subscales of EST. This would enable some differentiation between those who feel competent at sport-related skills and those who feel that they have achieved health-related fitness. Some individuals may feel they lack competence in both aspects of physical ability, whereas others may feel capable in one or both categories. To this extent, specific measures may better reflect an individual’s decisions regarding the type and extent of physical activity involvement.

3. If prediction of involvement in physical activity is of interest, it is likely that scales designed to measure attraction to specific categories of activity will be more successful. The data from this study suggest that this is especially the case for females. The development of separate sport- or activity-specific, sport-related, or fitness-related attraction scales which incorporate statements of intent toward that particular activity may allow for better prediction of the type and degree of involvement. A factor that may be limiting
the prediction of activity in this study is the reliance upon self-report measures of physical activity levels. Future work designed to predict exercise involvement should take into account these limitations and develop more valid activity questionnaires, as well as attempt to employ methods of direct measurement.

References


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