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ABSTRACT

A method for self-appraisal of muscular strength and physical working capacity consisting of a simple 13-grade rating scale was applied in a study of the physical fitness of a group of 70 middle-aged men. The method functioned well as shown by the similarities in means and standard deviations between ratings and laboratory measurements of the "same" variables. Significant correlations of the size .30-.40 were obtained between self-ratings of fitness and measure fitness. The highest correlation, r = .52, was obtained between ratings of endurance fitness and preferred work load (for a moderate training session) for work on the tread-mill. The method is applicable in evaluating other personality characteristics of importance for the understanding of people and their adaptation to the demands of work, leisure time activities etc. By comparing the subjective ratings with "objective" test results, quantitative measuresments of an individual's "reality conception" can be obtained. (Author)

REPORTS FROM THE INSTITUTE OF APPLIED PSYCHOLOGY
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SELF-APPRAISAL OF PHYSICAL PERFORMANCE CAPACITY

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SELF-APPRAISAL OF PHYSICAL PERFORMANCE CAPACITY *

Borg, G., Skinner, J.S. & Bar-Or, O. Self-appraisal of physical performance capacity. Reports from the Institute of Applied Psychology, the University of Stockholm, No. 32, 1972. - A method for self-appraisal of muscular strength and physical working capacity consisting of a simple 13-grade rating scale was applied in a study of the physical fitness of a group of 70 middle-aged men. The method functioned well as shown by the similarities in means and standard deviations between ratings and laboratory measurements of the "same" variables. Significant correlations of the size .30 - .40 were obtained between self-ratings of fitness and measured fitness. The highest correlation, r = .52, was obtained between ratings of endurance fitness and preferred work load (for a moderate training session) for work on the tread-mill. The method is applicable in evaluating other personality characteristics of importance for the understanding of people and their adaptation to the demands of work, leisure time activities etc. By comparing the subjective ratings with "objective" test results, quantitative measurements of an individual's "reality conception" can be obtained.

The way a subject perceives himself and evaluates his "self" is an important personality characteristic. Many psychologists have been working with "self-concepts" and "self theories", e.g. Mead (1934), Snygg and Combs (1949), Horney (1953), Rogers (1951, 1959), Stephenson (1953) and Sullivan (1953). In the theories developed, personality disturbances are set in relation to the difference between the "self" as an individual sees it and his "ideal" self. The Q-sort technique, developed by Stephenson, is a method acquiring a discrepancy score of interest in this connection.

Another important comparison to make is between the "self" as perceived by the subject and his characteristics as described by ordi-

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* This is a part-study which was carried out in connection with another investigation at the Laboratory for Human Performance Research, the Pennsylvania State University, University Park (Head: Dr. E.R. Buskirk): (Bar-Or, O.[1], Skinner, J.S.[2], Buskirk, E.R., Borg, G.: "Physiological and perceptual indicators of physical stress in 41- to 60-year-old men who vary in conditioning level and in body fatness", Medicine and Science in Sports, 1972, 4, 2, pp. 96-100).

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nary test methods. This means an attempt to study the difference between the "self", evaluated by the individual ("subjectively") and the corresponding attributes as they "really are" ("objectively"). This is an important aspect that oddly enough seems to have been neglected and to our knowledge has rarely been studied quantitatively.

The concept of "reality conception" is now introduced in this connection and generally defined as the difference between "subjective" and "objective" measurements. In each case this is defined specifically; for example, the reality conception concerning personality characteristics is generally defined as the difference between "the perceived self" and "the real man".

A valid and accurate self-appraisal is of fundamental importance for a good adaptation in modern society; this is true for physical as well as mental attributes and capabilities. If a person believes that his weight is normal for his age and body composition, but the scales and the norms tell him that it is far above not only an "ideal" value but also the group mean, this is an important observation.

A bad conception of the actual capacity may cause maladjustments; this is true for both underestimations and overestimations. A person taking part in a training program, after a severe heart infarct or a minor sickness, may underestimate his actual capacity or the work intensity that is of a dangerous magnitude. As a result, he may avoid all kinds of strenuous activities and therefore become more and more unfit and unable to manage an occupation and take part in leisure time activities. On the other hand, he may overestimate his capacity and stress himself too much.

From clinical experience and some laboratory studies (Borg, 1962), there seems to be some general disagreement about the "perceived decrease" of physical working capacity and the "real decrease", so that a patient overestimates the decrease in relation to the test values. The relation between how a subject appraises his own muscular strength and endurance capacity ought to be studied more thoroughly and set in relation to his measured capacity. In a good exercise prescription this should be taken into account so that the right meaning of the prescription is given, and comprehended by the patient.

Problems concerning self-appraisal and reality conception are now being studied at the Institute of Applied Psychology, the University of Stockholm, both for mental and physical work and for performance capacity in connection with counselling problems. A simple rating method has been developed by Borg to get a rough measurement of a subject's self-appraisal of muscular strength and endurance capacity.

The question of how people rate their physical working capacity was first elucidated in a study on a group of middle-aged men taking part in a bigger investigation concerning "Physiological and perceptual indicators of physical stress in 41- to 60-year-old men who vary in conditioning level and in body fatness", Bar-Or et al. (1972).

This report is the first account of that study with the use of the method for self-appraisal of working capacity. The main question was

the general applicability of the rating method. If the method had a good discriminating power and reliability, the obtained mean value for the group studied should coincide with the theoretical mean for that group and the obtained standard deviation be of the same size as the theoretical dispersion. Differences in physical working capacity between various subgroups in the sample studied should appear in differences in the self-appraisals. This should also show up in a significant correlation between the objective measurements of working capacity and the subjective appraisals. Another question that we wanted to elucidate in this study was whether there was any correlation between the subjective appraisals of working capacity and measurements of physical working capacity determined from subjective ratings of perceived exertion during physical work (W_{R15}), as well as the intensity of exertion, in the form of a set work load, which each subject would prefer to adopt (W_{pref}), according to Borg (1962).

Methods

The experimental conditions and the methods used to determine physical working capacity etc. are described in detail in the above mentioned study by Bar-Or et al. (1972). One treadmill test and one bicycle ergometer test were performed with stepwise increases of the work load every second minute until a heart rate of 150 beats/min was reached or the subject rated the exertion as very hard. Submaximal measurements of physical working capacity were calculated from the individual relationship between heart rate and work load. A reference level of 150 beats/min (W_{150}) and 15 in perceived exertion (= hard in the rating scale by Borg) was used, giving W_{R15}. Individual values of preferred work level (W_{pref}), defined as the work load at which they would prefer to work in a 15-minute training programme, were determined from successive preference ratings according to a simple 5-grade scale.

Seventy subjects took part in the study. They constituted a subgroup of 167 male employees of the Pennsylvania State University, aged 41-60 years, who were participating in a study on the effects of training on factors associated with the development of coronary heart disease.

The subjects had no overt manifestations of disease but possessed two or more of the following characteristics: smoking one or more pack of cigarettes per day, diastolic blood pressure of 90-99 mmHg, serum cholesterol of 250-349 mg%, 25-39% overweight, and 1.0-1.5 mm ST segmental depression on an exercise electrocardiogram. The subjects consisted of two subgroups. The "active" group consisted of 51 men from an exercise group who had been exercising 2-3 times weekly during the last seven months. The "sedentary group" consisted of 19 men who had been assigned to the inactive regimen or who had been assigned to the exercise regimen but failed to exercise. The group was also divided into 3 subgroups according to percent body fat, as estimated by measuring skinfold thickness in the subscapular, triceps, and abdomen areas. The details of the group concerning physiological characteristics etc. are described in detail in the study by Bar-Or et al. (1972).

The rating method developed to obtain measurements of a subject's self-appraisal of his working capacity consisted of an increased stanine scale with M = 7 and the standard deviation about two units. The scale consisted of 13 grades, every second grade anchored with verbal expressions, denoting how much above or below the mean the grade was. The theoretical percentages in each class referring to the share of the normal distribution were also given, see appendix 1. The subjects had to estimate both their muscular strength for short-time work and their working capacity in the form of their endurance fitness for hard work of longer duration.

Results and discussion

The method of self-evaluations functioned very well. Only a few percent of the studied subjects had difficulties in understanding the rating method and had to be given the instruction twice.

In Table 1 the mean values and the standard deviations are given for the different subgroups. The means of the ratings obtained lie close to the theoretical mean of 7 and the dispersions close the theoretical standard deviation of 2.

Table 1. Mean values and standard deviations (SD) in self-appraisal (SA) of muscular strength and endurance capacity for different subgroups. N = 70. The values refer to a scale with $M \approx 7$ and $SD \approx 2$.

	I		II		
	Active n=51	Sedentary n=19	Lean n=24	Medium n=34	Heavy n=12
SA-strength	7.4 (1.8)	6.6 (2.0)	7.1 (1.8)	7.4 (1.7)	6.4 (2.4)
SA-endurance	7.6 (1.8)	6.4 (2.2)	7.3 (2.2)	7.1 (2.0)	6.7 (1.9)

No significant differences were found between ratings given by people of different body composition (lean-medium-heavy) but a difference was obtained ($p < 0.05$) between ratings of endurance capacity given by active and sedentary people. This result coincides very well with the objective differences in working capacity according to the laboratory tests. Thus, there was a small but significant difference in endurance capacity between the active and the sedentary subjects according to the W-measurements. In the groups of people of different body composition, there were hardly any objective differences in endurance capacity except that the lean subjects had higher values than the overweight subjects on the treadmill.

The correlations between the self-appraisals of muscular strength and endurance capacity and the measurements of working capacity are seen in Table 2.

Table 2. The table shows correlation coefficients between self-appraisals (SA) of muscular strength and endurance capacity and the measurements of working capacity according to the work load at HR of 150 (W_{150}) and according to the rating of perceived exertion "15" (W_{R15}) and according to a preferred work load (W_{pref}) for work both on the bicycle ergometer and on the treadmill. N = 70; x = $p \geq .05$; xx = $p \geq .01$.

Variable		W_{150}	W_{R15}	W_{pref}
Bic. erg.	SA-strength	$.34^{xx}$	$.24^{x}$	$.33^{x}$
	SA-endurance	.16	$.26^{x}$	$.41^{xx}$
Tread-mill	SA-strength	$.34^{xx}$	$.25^{x}$	$.29^{x}$
	SA-endurance	$.38^{xx}$	$.34^{xx}$	$.52^{xx}$

As can be seen from Table 2, most of the correlation coefficients are significant. The strength of the association, according to the correlations, was of the magnitude .30 - .40. The highest correlation coefficient was obtained between the self-appraisal of endurance capacity and the preferred work load (W_{pref}) for work on the treadmill, r = .52. A correlation coefficient of around .40 between appraisal of endurance fitness and the work load at a heart rate of 150 (W_{150}) from treadmill work might be a fairly representative correlation between such variables. In a more normal and representative group of the general population of a certain age, a slightly higher correlation might probably be obtained, especially if a better measurement of the endurance fitness than W_{150} was used.

From the subjective ratings and self-appraisals of working capacity and the corresponding objective measurements of the same capacity, quantitative measurements of an individual's "reality conception" can now be calculated. If both the subjective and the objective measurements are expressed in the same way, e.g. transformed to one and the same standard scale, the difference between the standard scores referring to the subjective ratings and the standard scores referring to the objective measurements should express the reality conception in question. Positive values of reality conception are then obtained when the subject overestimates his capacity and negative values when he underestimates it. High or low difference scores thus indicate a poor reality conception and certainly imply a lesser adaptation of the individual in his group or according to the norms of the society. Why some people overestimate and some underestimate their capacity is then another question which should be studied in an investigation concerning various personality characteristics of the individuals.

References

Bar-Or, O., Skinner, J.S., Buskirk, E.R., & Borg, G. Physiological and perceptual indicators of physical stress in 41- to 60-year-old men who vary in conditioning level and in body fatness. Medicine and Science in Sports, 1972, 4, 2, 96-100.

Borg, G. Physical Performance and Perceived Exertion. Lund: Gleerup, 1962.

Horney, K. Constructive forces in the therapeutic process: a round table discussion. American Journal of Psychoanalytics, 1953, 13, 4-19.

Mead, G.H. Mind, Self and Society. Chicago: University of Chicago Press, 1934.

Rogers, C.R. Client-centered Therapy. Boston: Houghton Mifflin, 1951.

Rogers, C.R. The concept of the fully functioning person (mimeographed) 1959.

Snygg, D. & Combs, A.W. Individual Behavior. New York: Harper, 1949.

Stephenson, W. The Study of Behavior; Q-technique and its Methodology. Chicago: University of Chicago Press, 1953.

Sullivan, H.S. The Interpersonal Theory of Psychiatry. New York: Norton, 1953.

RATINGS OF MUSCULAR STRENGTH AND ENDURANCE CAPACITY

This is a rating scale concerning your self-appraisal of your general muscular strength and physical endurance capacity. By general muscular strength is meant the ability to perform hard muscular work during short periods of time, e.g., strenuous leg, arm, hand, and back work involving strong and powerful movements. By physical endurance capacity is meant the ability to perform hard muscular work over a long period of time, e.g., running, walking up stairs or hills, skiing, swimming long distances, etc.

The rating scale consists of 13 steps ranging from extremely low to high capacity. Together with rating values from 1 to 13, you will find verbal expressions explaining the meaning of each value. You will also find percentages showing how many people ought to belong within each category.

If you think you belong to the average 20%, mark a 7. If you think your capacity is slightly below the average, choose 4, 5, or 6 according to how much below you think you are. If you think you are much below the average, use 2 or 3 according the given percentages. Mark a 1 if you think your capacity is extremely low. If you think your capacity is above average rate yourself in a corresponding way.

Rate yourself in relation to the age and sex group to which you belong. Try to appraise your capacity as objectively as possible. Do not underestimate or overestimate your ability. Check the appropiate spaces below:

RATING	PER CENT IN GROUP		RATING	MUSCULAR STRENGTH	ENDURANCE CAPACITY
1	≤. 5%	Extremely low	1		
2	1%		2		
3	3%	Much Below Average	3		
4	7%		4		
5	12%	Slightly Below Average	5		
6	17%		6		
7	20%	Average	7		
8	17%		8		
9	12%	Slightly Above Average	9		
10	7%		10		
11	3%	Much Above Average	11		
12	1%		12		
13	≤. 5%	Extremely High	13		

Abstract card

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Reference card

Borg, G., Skinner, J.S. & Bar-Or, O. Self-appraisal of physical performance capacity. Reports from the Institute of Applied Psychology, the University of Stockholm, No. 32, 1972.

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