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The Impact of Physical Fitness and Health-Age Appraisal upon Exercise Intentions and Behavior

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This study investigated the relative and combined effectiveness of the Canadian Home Fitness Test (CHFT) and Health Hazard Appraisal (HHA) to modify (1) intention to exercise with and without knowledge of the results and (2) intention and behavior to exercise over 3 months. The 200 subjects were randomly attributed to groups, either (1) physical-fitness evaluation (PF), (2) appraised health age (HA), (3) physical-fitness evaluation and health-hazard appraisal (PF-HA), or (4) control (C). The immediate impact on the intention to exercise of passing one and/or the other tests, without knowledge of the results, was not significant. With knowledge of the results, the intentions of the PF and PF-HA groups differed from those of the C group. This effect disappeared after 3 months. There was no significant impact on exercise behavior over 3 months. The results indicated a short-term motivational effect from being informed of CHFT results. Maintaining this effect might require intervention on a long-term basis.

KEY WORDS: physical fitness; health age; intention; behavior; exercise.

INTRODUCTION

Various approaches have been employed by health agencies to promote preventive health habits, such as the practice of regular physical activity. These

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approaches range from extensive mass media campaigns aimed at the general public to more personalized techniques, such as the use of the Canadian Home Fitness Test (CHFT) and the Health Hazard Appraisal (HHA). The rationale underlying this personalized motivational approach in using these two tests is based on the assumption that knowledge of ones own ratings of physical-fitness level (CHFT) and/or health age (HHA), with respect to those of other people of the same age and sex, will incite taking preventive action (Colburn and Baker, 1973; Shephard *et al.,* 1976).

The effectiveness of this type of approach has been supported with evidence provided by two different techniques: (1) assessment of physical fitness and (2) appraisal of health age. Regarding the assessment of physical fitness, Bruce and co-workers (1980) noted that 1 year after the assessment of physical fitness by means of a maximal treadmill test, 63% of the patients replying to a mailed questionnaire indicated that they modified one or more risk factors and health habits. Diggers and associates (1984) found that those subjects who had their fitness level appraised by means of a maximum-exercise stress test reported no change in terms of attitude or objective health parameters but an increased exercise level. However, Godin and co-workers (1983) found no short-term effects on initial leasure-time exercise intentions for people seeking an evaluation of their fitness level by means of the sub-maximal Canadian Home Fitness Test.

Many authors have reported that the Health Hazard Appraisal, which estimates health age, has a positive impact on health habits (Emory, 1974; Hsu and Milsum, 1978; Leppink and DeGrassi, 1977; Milsum *et al.,* 1977). Emory (1974) reported that of 50 patients who had their health age appraised, 30% indicated that they planned to modify their life-style accordingly, 62% indicated some change, and only 7% indicated no change in life-style. Similarly, Hsu and Milsum (1978) have observed that 65% of the males and 74% of the females indicated at least one change attributable to the Health Hazard Appraisal. Milsum and his colleagues (1977) have also found that 6 months after health age has been appraised, 80% of the respondents reported some change toward improved health habits and 65% indicated that the health-hazard appraisal provided them with a stimulus for such a change. Leppink and DeGrassi (1977) observed that of the 144 participants who responded 6 months after the Health Hazard Appraisal, 71% reported that they felt motivated by the appraisal to make life-style changes and 70% listed at least one change in health behavior. In terms of exercise, 37% increased exercise, 4% decreased exercise, and 59% indicated no change. In the 18-month post appraisal evaluation, 70% indicated that they felt motivated by the appraisal to make life-style changes and 71% listed at least one change in health behavior. With respect to physical activity, 34% increased exercise, 11% decreased exercise, and 55% indicated no change. However, lauzon

(1977) found that appraisal of health age had a different impact for different life-style behaviors and health indicators. Health-hazard appraisal stimulated reductions in alcohol consumption, had no effect on smoking and blood-pressure level, and had little effect on improving compliance to seat-belt use. In the area of exercise, he found a very positive effect in motivating subjects to increase their level of physical activity or improve their fitness rating, this being particularly effective with men rather than women and even more pronounced for high-risk as opposed to low-risk subjects. The latter aspect has also been noted by Desharnais and colleagues (1983), who demonstrated that the appraisal of health age to inform adults of their health-behavior risks was effective in positively influencing their intentions to engage in preventive health behavior such as exercising regularly.

In spite of all this research, unanimity does not prevail concerning the motivational impact of these two techniques. Various methodological weakness concerning the sample population studied (self-selected volunteers or specific populations) and the research design (descriptive approach, lack of a control group) are the main causes for this ambiguity. Furthermore, other relevant questions have still to be answered. For instance, although some studies have reported a positive impact on intentions, the measured effect was short-term. The long-term effect on intention has not been demonstrated, nor has its association with the initiation of taking preventive action. Also, we do not know the immediate impact on intentions and behavior of being tested in comparison to being tested and receiving relevant information concerning personal results. Finally, the combined effect of both techniques has never been explored.

Consequently, the aim of the present study is to palliate the deficiences of previous studies and, more specifically, to investigate the relative and combined effectiveness of these two persuasive techniques to modify (1) at short term, the intentions to exercise with and without knowledge of the results, and (2) at middle term, leisure-time exercise intentions and behavior, for a group of adults.

METHOD

Subjects and Design

Two hundred adults, aged 20 to 60 years, were randomly selected from the Quebec metropolitan telephone directory. Individuals were first contacted by phone by one of two research assistants and were invited to participate

in the study. This procedure was continued until the required number of 200 adults had been reached.[3]

The 200 solicited volunteers were first randomly assigned to one of the four following experimental conditions: (1) appraisal of physical fitness (PF), (2) appraisal of health age (HA), (3) appraisal of both physical fitness and health age (PF-HA), and (4) control (C). Subsequently, 50% of the subjects of each group were randomly assigned to conditions either (1) without knowledge of results or (2) with knowledge of results.

Independent Variables

Appraisal of the Techniques

Physical Fitness. Physical fitness was assessed by the laboratory version of the Canadian Home Fitness Test (CHFT) (Shephard, 1979). The CHFT is an indirect test which estimates cardiorespiratory fitness using postexercise heart rates. The test consists of a series of stepping sequences performed on double 20.3-cm steps to a six-count musical rhythm with a progressive increase in tempo. The person exercises at two (or three) levels of intensity, the initial level depending on age and sex (there are seven different intensity levels for men and six for women) (Jetté *et al.,* 1976).

Health Age. Health age was assessed by the Canadian version of the Health Hazard Appraisal (HHA), which was first formulated by Robbins and Hall (1970). The HHA uses information regarding a person's age, sex, medical history, and health risk to predict the probability of dying within the following 10 years from potentially preventable causes (Colburn and Baker, 1973). The predicted mortality of an individual is obtained by calculating a personal mortality ratio for each of the 12 leading causes of death for the appropriate 5-year age group and then multiplying this ratio by the expected average mortality for the population. This mortality risk is converted into an equivalent appraised age at which the average citizen of the given sex has the same risk (Emory, 1974). The HHA printout indicates the extent to which the appraised risks and age could theoretically be reduced by modifying behavior. The achievable age is based upon an appraised age which could be achieved by complying with certain prescriptions (Shephard *et al.,* 1982).

[3]Seven hundred twenty-two phone numbers were selected in order to obtain the desired number of subjects.

Knowledge of Results

Physical Fitness. The subjects were classified according to the Canadian percentile norms, which are standardized for both sex and age (Fitness Canada, 1984). All subjects received a personalized computer printout providing information on how to adjust to their personal exercise program.

Health Age. Each subject received a personalized computer printout indicating (a) calculated health age, (b) information concerning the status of each health habit, and (c) action recommended to maintain or improve the appraised health age.

Dependent Variables

Short Term

Intention. A methodology proposed by Ajzen and Fishbein (1980) was used to measure intention to exercise. The question asked was as follows: "At the present time, what is the probability out of 100 that you will participate regularly in one or more physical activities in your free time during the next 3 months?" Regular physical activity was defined as 20- to 30-min workout sessions, three times a week. The subject reported intention on a 10-point scale with 0 to 100% at opposite ends. The 2-week test–retest reliability with a subgroup of 29 subjects revealed a coefficient of 0.65.[4]

Middle Term

Intention. This measure of intention was identical to the short-term measure but realized 3 months later.

Behavior. The behavior measure was developed according to suggestions made by Godin and Shephard (1985) and by Godin and co-workers (1986). The question asked was the following: "How often have you participated in one or more physical activities, lasting 20 to 30 minutes per workout session, in your free time during the last 3 months?" The choices given were (1) never, (2) less than once a month, (3) about once a month,

[4]This value is not as high as one would expect for self-reported data, possibly due to the telephone methodology used to record the retest score. However, in a previous study, Godin and Shephard (1986) showed a 2-week test–retest of this type of question that had a reliability coefficient of 0.73 for an adult population.

(4) about two or three times a month, (5) about one or two times a week, and (6) three or more times per week. The 2-week test–retest reliability with a subgroup of 29 subjects showed a coefficient of 0.64.

Procedure for Data Collection

Subjects were not made aware of their assignment to different goups since they were all offered the possibility to have both physical fitness and health age appraised. Individuals of each group then performed various tests in a different sequence such that the construction of the four groups was respected. During the first visit to the laboratory, subjects of the PF, HA, and PF-HA groups completed their respective test(s) and questionnaire(s). However, the "intention" variable was measured for only 50% of the subjects, selected at random (without knowledge of results). During the second visit, 2 weeks later, individualized results were given to each subject, and the results were explained to them in subgroups of 10 to 15 individuals. These information sessions lasted between 30 and 60 min. At the end of each information session in which subjects were informed of their results, the intention variable was measured for the remaining half of the subjects in these three groups (with knowledge of results). Control-group measures of intention were obtained by mail as follows: (1) 50% of the subjects, selected at random from the entire control group, reported their intention during the period in which subjects of the PF, HA, and PF-HA groups were first visiting the laboratory; and (2) the other half of the subjects reported their intention during the period in which subjects in the other groups were coming for a second visit. This procedure was adopted to control for the time period elapsed between the two visits. Finally, 3 months after the statement of intentions, all subjects were contacted by phone for a self-report of behavior and a new statement of intentions.

Statistical Analysis

The impact of the persuasive techniques on intentions and behavior was verified with an analysis of variance (ANOVA). Concerning the intention variable, three analyses were performed: (1) the immediate impact of completing one or both tests has been verified with the subjects who reported their intention during the first visit, (2) the short-term effect of completing one or both tests and being informed of the results has been verified with the other half of the subjects who reported their intention at the end of the second visit, and (3) the middle-term effect of completing one or both tests and being informed of the results has been verified for the whole group of

Table I. Average Values for Intentions and Behavior

Variable	Group			
	PF	HA	PF-HA	C
Intention 1[a]	6.4	5.5	6.7	5.8
Without knowledge of results	(14)[b]	(17)	(17)	(18)
With knowledge of results	8.4**	6.6	7.4*	5.5
	(12)	(17)	(15)	(20)
Intention 2, after 3 months[a]	6.8	5.5	6.1*	5.7
	(26)	(34)	(32)	(38)
Behavior during the 3-month period[c]	4.8	4.2	4.4	4.2
	(26)	(34)	(32)	(38)

[a]The possible values of the measured scale were from 1 to 10.
[b]Numbers in parentheses indicate the number of subjects.
[c]The possible values of the measured scale were from 1 to 6.
*$P < 0.05$ between the PF-HA and the C groups.
**$P < 0.01$ between the PF and the C groups.

subjects after 3 months. With respect to behavior, its effect has been verified for the whole group by means of the ANOVA. Finally, paired comparisons between groups were performed with reference to the least-significant difference test of Fisher.

RESULTS

From the 200 selected individuals, 140 began the study and 130 completed all steps, this representing 65% of the initial sample.[5] The final numbers of subjects were 34 for the HA group, 26 for the PF group, 32 for the PF-HA group, and 38 for the C group. The final sample was formed of 112 males and 28 females, and the average age of the subjects was 39 ± 9 years.

The means for intention and behavior for the four groups are presented in Table I. To complete one or both tests had no significant immediate effect (without knowledge of results) on the intentions to exercise during the next 3 months ($F_{3,63} = 4.01$, $P < 0.01$). The aposteriori test of Fisher indicated that the PF ($P < 0.01$) and the PF-HA ($P < 0.05$) groups differed significantly from the C group. However, 3 months later, no significant difference in intentions remained between the groups ($F_{3,127} = 0.70$, ns). Finally, no significant effect regarding leisure-time exercise behavior over this 3-month period was recorded ($F_{3,126} = 0.87$, ns).

[5]All statistical analyses were performed only on subjects who completed each phase of the study.

DISCUSSION

Both the CHFT (Shephard *et al.,* 1976) and the HHA (Colburn and Baker, 1973) have been developed as prevention tools. However, the effectiveness of these two techniques in motivating individuals has not been clearly established, even though both instruments are used extensively. Concerning the CHFT, the results indicated that its use causes some short-term motivational effects that disappeared progressively over a period of 3 months. With regard to the HHA technique, no motivational effect was measured on leisure-time exercise intentions and behavior.

The absence of any immediate effect after completing one and/or both techniques without knowledge of the results in not surprising. Indeed, the observations of Leventhal and colleagues (1965) have documented the importance of providing relevant information in order to encourage preventive action. This is confirmed by evidence of a significant effect upon exercise intentions, following knowledge of the CHFT results. The absence of a similar impact for the HHA technique may be due to the specificity of the instrument. Indeed, the CHFT specifically deals with physical fitness and the practice of physical activities, whereas the HHA technique is more global and concerns all health habits. It thus appears that a positive impact on intention is measured when subjects are provided with relevant information that relates to a specific target behavior.

However, at middle term (3 months later) the impact on intentions decreases and does not lead to preventive action. This finding supports the literature in fear communication, which frequently has reported that short-term effects quickly disappear. Individuals have been found to rationalize their fear after an initial emotional response and do not consequently make behavior changes (Leventhal, 1965). In the present study, this observation is even more evident when no supportive follow-up is offered to the individual. It thus appears, that the influence of the CHFT, in particular, can be compared to that of a "pep talk."

The reported absence of a significant effect on leisure-time exercise behavior over a 3-month period is congruent with the evolution of intentions during the same period. The modification of behavior in the physical-activity sector requires major changes in the life-style of individuals (Dishman *et al.,* 1985). Therefore it is not surprising that a decline in the level of intentions has been associated with the absence of follow-up to encourage preventive health behavior.

In summary, the motivational effect of this type of technique is short-term (1) when there is a high specificity between the instrument and the target behavior and (2) when individuals are given relevant information concerning their results. In light of these results, the role of the health professional

in promoting support and relevant information appears necessary. One can also thus be skeptical of the motivational effectiveness of the CHFT when self-administered at home. Finally, the short-term effect decreasing with time suggests that such techniques should be integrated into a more global strategy rather than in isolation from other important factors. This would enhance the chances of maintaining short-term effects and maximizing the probability of undertaking preventive action.

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