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AEROBIC EXERCISE, SUBJECTIVE HEALTH AND PSYCHOLOGICAL WELL-BEING WITHIN AGE AND GENDER SUBGROUPS*

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Abstract—This research examines relationships between different forms of aerobic exercise (swim, walk, jog, dance) and two measures of health: subjective health and psychological well-being. We hypothesize that the relationship between aerobic exercise and subjective health/well-being will be notably stronger for older than younger persons and females than males. This prediction is based on Homans' exchange theory of investments and rewards. Since social norms concerning aerobic exercise are likely to be weaker among older (than younger) persons and among women than men, older persons and women who do exercise are making special investments and should expect greater rewards (good health). The concept of 'exercise norms' implies social comparisons with others. Accordingly, age comparative data were analyzed to see if older persons who exercise see themselves as more active than their age peers than do younger persons. Data come from a national probability sample of 3025 adults (National Survey of Personal Health Practices and Consequences). As predicted, exercise was much more strongly related to subjective health and well-being among older than younger respondents. In the main, the gender hypothesis was not supported. Copyright © 1996 Published by Elsevier Science Ltd

Key words—exercise, investments, age, health

Some research indicates that aerobic exercise has positive effects on physical health, self concept, and psychological well-being [1–10]. However, other research does not substantiate these findings [11, 12]. This study examines the relationships between different forms of aerobic exercise (swimming, walking, jogging and dancing) and two measures of health: subjective health and psychological well-being. The central question posed in this paper is whether these relationships between exercise and subjective health/well-being are more pronounced within age and gender subgroups.

THEORETICAL PERSPECTIVE

Subjective health definitions are in part determined by *social comparisons*. For example, the person who exercises is likely to compare his/her behaviour with certain reference groups (such as age or gender groups) and to define his/her physical activity as more frequent and intense than what is perceived as typical in these groups [13–15]. We reason that exercise will be more strongly related to positive definitions of health and well-being, when the individual is in a group in which exercise is perceived as less normative. Those from such groups who do exercise are likely to be aware that they are more active than their peers (social comparisons), feel a sense of achievement and accomplishment, and define their health in positive terms. This rationale is based on the exchange theory of Homans [16]. Positive definitions of health are conceptualized as profits resulting from exercise. If exercise were not profitable, individuals would seek alternative activities. Individuals who expend or 'invest' more of their resources or energy in exercise expect to have more profit (better health) than those who invest little in exercise or who do not exercise at all.

Norms concerning aerobic exercise are likely to be weaker among older persons [17]. Aerobic exercise is not seen, in our society, as part of the roles in which older people play. In a recent report on fitness in the U.S.A. [18], the following median ages are noted for different aerobic exercises: bicycling = 29.9; aerobic dance = 27.6; stair climbing machines = 31.1; swimming = 29.8. Only in the case of fitness walking is there a higher average age of 42.7. We maintain that those older persons who do exercise regularly are likely to see themselves as more physically active than their age peers and to perceive they have made a greater investment in the activity. Therefore, they are more likely to define themselves as being in good or excellent health.

In past generations, it was not normative for women to be engaged in sweaty aerobic exercise.

*This article was a joint effort. The authors contributed equally.

For example, Theberge notes that in the latter half of the nineteenth century the medical wisdom of the day viewed both physical and intellectual exercise as dangerous to women's health. "Women's smaller bodies, and their allegedly fragile structures and weak constitutions, were thought to make women unsuited for strenuous activity, including sports" [19] (p. 507). Cultural beliefs about physical activity for women have changed immensely [20]. The feminist movement has encouraged and legitimized the participation of women in all kinds of sport and exercise activities. Yet there may still be strong residues of earlier normative traditions in which men are expected to be more involved in exercise programs than women. Women who exercise on a regular basis may be more likely than men to feel that they are doing something different or special and are, therefore, making a greater investment. Given the old scripts and new images of women in exercise and sport, we approach this second gender hypothesis in a more exploratory vein. We predict that exercise will be more strongly related to subjective health and psychological well-being for women than men.

In this research, we have implied a temporal ordering of variables in which exercise precedes positive definitions of health. The reverse time order could also be argued. It is possible that individuals with positive definitions of health or well-being are especially health conscious and turn to exercise to further enhance their health. Further, individuals who are very sick or disabled (more likely older persons) may be unable to participate in certain forms of aerobic exercise. We are not ruling out these possibilities, but rather are emphasizing the exercise→perceived health relationship. Some experimental studies [2–4, 6–10] clearly support this temporal ordering of variables (higher self esteem and higher psychological well-being after the initiation of an exercise program).

In summary, our study design attempts to examine the relationships between aerobic exercise and two health measures (subjective health, psychological well-being) within age and gender subgroups. Age comparisons will also be explored. Do older persons who exercise regularly perceive themselves as more physically active than their age peers than do younger persons who exercise?

METHODS

Sample

Data for this study come from The National Survey of Personal Health Practices and Consequences [21]. The study was conducted in 1979 and 1980 by the National Center for Health Statistics. Data were collected in telephone interviews of people in a national probability sample. Using a random-digit dialling technique, two waves of interviews were conducted in the Spring of 1979 and the Spring of 1980. This study only makes use of the 1979 data because the sample size is larger (572 cases larger) which allowed for sufficient cases in subgroup analyses. The sample size for the 1979 survey is 3025 adult respondents 20–64 years of age. Although a more recent data base would have been preferable, the 1979 survey is unique in that it included measures of psychological well-being as well as physical health. We judged that the early stages of the fitness movement were well under way by 1979.

Measures

Subjective health was measured by the single item 'Would you say your health is excellent, good, fair, or poor?' Although we do not have reliability or validity estimates for this measure, it is widely used in national surveys.

Psychological well-being was measured by a 7-item scale. An example is the following: 'How often in the past month have you felt cheerful and lighthearted—very often_ sometimes_ rarely_ never_?' The α coefficient for the 7 items was 0.67, indicating an acceptable degree of internal consistency.

Aerobic exercise was measured by the following items: 'How often do you?':

(1) Go swimming in the Summer (often, sometimes, rarely, never)?;

(2) Take long walks?;

(3) Jog or run?;

(4) Work on a physically active hobby such as dancing or gardening?.

For brevity, the single word 'dance' will be used to summarize participation in a physically active hobby. For each age group (young, middle, older) there was a sufficient case base for analysis except one. There were only 28 older persons who jogged 'often'. Given the small N, we view the results for 'older joggers' as far less reliable.

The age variable was recoded into three subgroups: those 20–35 were classified 'young'; 36–50, 'middle aged'; and 51–64, 'older'. Note that the older group is actually late middle aged or 'young old' since the sample did not include those over 65. Education (used as a control variable) was coded less than high school, high school graduate, and some college or more. Education was included both as a measure of socioeconomic status and as an index of health information. Other research indicates that education relates strongly to health information and to involvement in health practices [22].

Age comparative activity was measured by the following question: 'How would you compare your level of physical activity with other people your age? Would you say you are much less active, somewhat less active, somewhat more active or much more physically active'.

Both crosstabular and regression analyses are utilized. For crosstabular presentations, γ is used as

an ordinal level measure of association. γ Coefficients are compared within different age and gender partials. To further test for statistical interaction, regression analyses are used with product terms.

RESULTS

We have argued that aerobic exercise will be more strongly related to subjective health and psychological well-being among older respondents than younger respondents and among women than men. The data in Table 1(a) are clearly in support of the age hypothesis. Relationships between exercise and subjective health are notably stronger among older and middle-aged respondents compared to younger respondents. For example, in the case of 'swim', note the γ of 0.41 and 0.33 for older and middle-aged respondents vs 0.16 for younger subjects.

An examination of the percentages in Table 1(a) is also instructive. The percentages reporting good or excellent health (combined) are shown. Note that among older respondents, the non-exercising group is much less likely to define their health as good or excellent than those who do exercise, this being true whether the exercise is done sometimes or often. On the other hand, young persons are more likely to define their health as good or excellent regardless of exercise involvement.

A further analysis was conducted to examine our argument that *social comparisons* are key to the exercise–health relationship (data not shown). Age was crosstabulated with peer comparisons for each of the aerobic activities. The overall pattern is that older persons who exercise 'often' perceive that they are more physically active than their age peers, whereas younger persons who exercise 'often' are less likely to have such a perception. 'Swim' provides the most striking instance of this pattern. Among those who swim often, 47% of older respondents, 30% of middle aged respondents and only 18% of younger respondents perceive they are much more active than their age peers. Three of the four relationships (swim, walk, dance) are statistically significant.

Table 1. Aerobic excercise (swim, walk, dance, jog) by subjective health

(a) Controlling for age

	Young (20–35)			Middle aged (36–50)			Older (51–64)		
	Never	Sometimes	Often	Never	Sometimes	Often	Never	Sometimes	Often
Swim	(184)	(720)	(478)	(257)	(458)	(192)	(399)	(238)	(87)
% Good or excellent health	74%	91%	91%	67%	88%	93%	59%	80%	81%
		$\gamma=0.16$			$\gamma=0.33$			$\gamma=0.41$	
		$P<0.01$			$P<0.01$			$P<0.01$	
Walk	(84)	(766)	(531)	(95)	(488)	(324)	(133)	(338)	(253)
% Good or excellent health	76%	89%	91%	69%	84%	86%	45%	68%	72%
		$\gamma=0.07$			$\gamma=0.08$			$\gamma=0.21$	
		$P<0.01$			$P<0.01$			$P<0.01$	
Dance	(160)	(624)	(598)	(112)	(382)	(413)	(177)	(243)	(304)
% Good or excellent health	81%	90%	90%	40%	72%	76%	67%	84%	86%
		$\gamma=0.11$			$\gamma=0.19$			$\gamma=0.35$	
		$P<0.01$			$P<0.01$			$P<0.01$	
Jog	(569)	(586)	(226)	(574)	(251)	(82)	(602)	(94)	(28)
% Good or excellent health	85%	92%	92%	78%	90%	95%	63%	83%	64%
		$\gamma=0.18$			$\gamma=0.23$			$\gamma=0.25$	
		$P<0.01$			$P<0.01$			$P<0.01$	

(b) Controlling for gender

	Male			Female		
	Never	Sometimes	Often	Never	Sometimes	Often
Swim	(232)	(623)	(312)	(608)	(793)	(445)
% Good or excellent health	60%	88%	89%	64%	88%	91%
		$\gamma=0.29$			$\gamma=0.38$	
		$P<0.01$			$P<0.01$	
Walk	(123)	(604)	(439)	(189)	(988)	(669)
% Good or excellent health	71%	84%	84%	54%	83%	86%
		$\gamma=0.04$			$\gamma=0.19$	
		$P<0.05$			$P<0.01$	
Dance	(175)	(473)	(519)	(274)	(776)	(796)
% Good or excellent health	68%	85%	86%	57%	85%	85%
		$\gamma=0.14$			$\gamma=0.24$	
		$P<0.01$			$P<0.01$	
Jog	(583)	(399)	(152)	(1162)	(532)	(152)
% Good or excellent health	75%	71%	92%	76%	90%	88%
		$\gamma=0.36$			$\gamma=0.23$	
		$P<0.01$			$P<0.01$	

Table 2. Regression of subjective health on aerobic exercise: education, sex, age and interaction terms

Exercise	B	β	Exercise	B	β
Walk	0.088	0.11**	Jog	0.098	0.13**
Age	−0.243	−0.24**	Age	−0.213	−0.17**
Sex	−0.054	−0.03	Sex	−0.026	−0.02
Education	−0.004	−0.04	Education	0.004	0.04
Walk × age	0.049	0.18**	Jog × age	0.050	0.12*
Walk × sex	0.090	0.25**	Jog × sex	−0.058	−0.13*
Walk × age × sex	0.017	0.12	Jog × age × sex	−0.010	−0.04
	$R_2=0.09$			$R_2=0.09$	
Swim	0.167	0.24**	Dance	0.140	0.19**
Age	−0.170	−0.17**	Age	−0.242	−0.24**
Sex	−0.015	−0.00	Sex	0.052	0.03
Education	0.002	0.02	Education	0.004	0.04
Swim × age	0.080	0.24**	Dance × age	0.079	0.31**
Swim × sex	0.019	0.05	Dance × sex	0.033	0.09
Swim × age × sex	0.023	0.12	Dance × age × sex	0.007	0.05
	$R_2=0.12$			$R_2=0.11$	

* = $P<0.05$.
** = $P<0.01$.
Significance determined by F test.

The patterns controlling for gender [see Table 1(b)] are less consistently in support of the hypothesis than those for age. The relationships between swim and health and dance and health are only slightly stronger for females than males. There is a more pronounced gender difference in the case of walk, however the associations for both men and women are rather weak in strength (a γ of 0.19 for females and 0.04 for males). For jog, the relationship is stronger for males than females, opposite to the predicted direction. Tables 1(a) and (b) have shown that the strength of the associations between aerobic exercise and subjective health vary notably according to age and slightly according to gender, and that the age pattern conforms most closely to our hypothesis of normative rarity. But are these differences in strength statistically significant? Table 2 presents a multiple regression analysis to detect possible interaction effects. As a first step, subjective health was regressed on aerobic activity, age, sex and education. As a second step, product terms were computed between each aerobic activity and age, and sex, to see if there were significant interaction effects. Three way interactions (exercise × age × sex) were also included as an exploration to see if exercise had pronounced effects within age–gender subgroups.

Table 2 shows that each of the aerobic activities is significantly related to subjective health. Moreover, there are significant interactions between age and each of the four aerobic activities. In other words, the strong age patterns observed in Table 1(a) (stronger associations between aerobic exercise and subjective health among older persons) are not due to chance, but are statistically significant. However, there are only two significant interactions for gender (walk × sex and jog × sex). Recall, too, that the jogging effect was in the reverse direction of the hypothesis. It is only in the case of walking that there is a significant gender interaction effect in support of the hypothesis—the relationship between walking and subjective health is significantly stronger for women than for men. There were no significant three way interactions.

The same format was repeated with psychological well-being as the dependent variable (results not shown). All of the relationships between aerobic exercise and psychological well-being are notably weaker than those for subjective health. Despite weaker associations, two of the interactions were statistically significant (walk × age and dance × age). That is, walking and dancing are more strongly related to well-being among older respondents than younger respondents. The gender results do not support the hypothesis that exercise will be more strongly related to well-being among women. None of the interactions was significant in the regression analysis.

DISCUSSION

The primary rationale of this study is that exercise will be most strongly related to health and well-being when individuals invest the most in their exercise. The findings conform to an investment pattern most closely among age subgroups—relationships between exercise and the health measures are strongest among older respondents and weakest among younger respondents. The age-comparative analysis also supports an investments logic. Older persons who exercise are more likely than younger persons to see themselves as more physically active than their age peers.

Older persons who exercise may feel greater health benefits not only because they invest more in the exercise, but because the involvement in exercise reduces their feelings of vulnerability to illness. Older persons are likely to be more aware of their mortality. Regardless of their own health status they are continually reminded of their vulnerability

to illness by the illness and death of other older people. For individuals who feel more vulnerable, exercise may bring special benefits in terms of perceived good health.

For gender subgroups, the investment pattern was supported in only one instance—women were significantly more likely than men to report better subjective health when they engaged in walking for exercise. The investments logic was not supported in the case of gender and psychological well-being. A caveat must be noted regarding the time period in which this data was gathered. We have maintained that norms emphasizing fitness and exercise were well established by 1979. Nevertheless, age cohort norms could have changed in the direction of greater exercise for all groups including the older group of this study. If norms toward greater health and fitness have encouraged exercise for all groups, the differences by age reported in this article (exercise especially related to subjective health among the older) could have attenuated in the mid 1990s. We suspect that there has not been a dramatic change in exercise frequency in the last 15 years. A report of a survey in 1993 indicates that only about 22% of the adult population today is following an exercise program involving a minimum of three 20–60 minute aerobic workouts a week [23]. Still, the question of changing cohort exercise norms is intriguing. For example, the baby boomers are about to hit 50. Is this a 'stairmaster' jogging generation very different from past 50–65 year old cohorts? Clearly, this study needs replication with more current data.

The unique contribution of our findings to exchange theory literature is in showing that social and physical investments which individuals make in their exercise affects their subjective health and well-being. This disagrees with some research which emphasizes that behaviour which is supported and rewarded by relevant social groups is most psychologically beneficial [1]. The implications of our findings for a general theory of behaviour is in suggesting that the psychological benefits of action often are the greatest when the individual distinguishes himself/herself from normative patterns. Behaviour which is easy because of social acceptance or approval is not necessarily the most profitable.

A final implication can be noted from our findings dealing with exercise and age. Just at the time when many individuals in late middle age or older categories are slowing down, exercise may be especially beneficial to maintain and boost their positive definitions of health.

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