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Physical Activity and Psychological Well-Being: Testing Alternative Sociological Interpretations

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This study examines the relationship between physical activity in sport and feelings of well-being, testing alternative interpretations of the relationship between these two variables. It was expected that there would be positive relationships between physical activity on the one hand and physical fitness, feelings of well-being, social interaction in the sport and exercise environment, and socioeconomic status on the other hand. It was also expected that physical fitness, social interaction, and socioeconomic status would be positively related to psychological well-being. Further, it was expected that any positive zero-order relationship of physical activity and well-being would be at least in part a result of the conjoint effects of the other variables. The analyses were conducted separately for the male and female subsamples of a large survey study of Canadian adults. The results, after controls, show a modest positive relationship of physical activity and well-being for males but no such relationship for females. The predicted independent effects of the control factors obtained for both males and females. Interpretations of the results are discussed.

Theoretical Arguments and Working Hypotheses

It is common to see, in the policy and applied health literature and in the general media, the proposition that involvement in physical activity leads to greater feelings of well-being. However, there is a paucity of detailed multivariate analyses bearing on this relationship (e.g., Bahrke & Morgan, 1978; Berger et al., 1980; Heaps, 1978; Hughes, 1984; Stephens, 1988). Statements concerning the relationship are based on research that seldom has involved a full set of relevant controls. Multivariate controlled analyses are sorely needed because, as we will show below, the independent and dependent variables may be expected to be related to still other variables in such a way that some of all of the activity/well-being relationship is accounted for by the confounding effects of these other variables. The case for a direct relationship of physical activity and feelings of well-being has yet to be made in a compelling fashion. This is the rationale for

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the present study. We examine the uncontrolled and controlled relationships between physical activity and feelings of well-being in secondary analyses of data from a large national adult survey.

What are the appropriate control factors for the study of physical activity and well-being? First, social background factors—the socioeconomic and demographic variables of education, income, occupation, region, ethnicity, age, and marital status—should be taken into account. Each of these factors has been found to play a role in feelings of well-being (Campbell, 1981; Doyle & Forehand, 1984; Edwards & Klemmack, 1973; Palmore & Luikart, 1972), and they are related to physical activity (for a review of the literature on social background predictors of activity, see Smith & Theberge, 1987, chapters 3 and 4). These patterns may help account for the relationship of physical activity and well-being. Second, another sociological alternative interpretation has to do with social interaction in physical activity. Research suggests that people's feelings of well-being are dependent on the quality and quantity of their social contacts (Campbell, 1981). It is therefore probable that social interaction in physical activity will contribute to well-being (Campbell, 1981; Tesch, Whitbourne, & Nehrke, 1981; Thoits, 1983; Turner, 1981).

Third, it has been suggested that improved physical fitness which is achieved through physical activity in leisure and work pursuits may be what accounts for the positive relationship of activity and well-being (Blumenthal, Schocken, Needels, & Hindle, 1982; Brown, Ramirez, & Taub, 1978; Eickhoff, Thorland, & Ansorge, 1983; McGowan, Jarman, & Pedersen, 1974; Morgan & Horstman, 1976; Pauley, Palmer, Wright, & Pfeiffer, 1982). That is, it may not be the extent of leisure physical activity but the fitness consequences that affect well-being. Or, finally, there may be a direct relationship for physical activity: participation in physical activity may lead to higher levels of well-being (Hughes, 1984; Morgan, 1985; Sime, 1984). As yet, because of the lack of multivariate analyses, we do not know which of these avenues of interpretation is accurate.

Ample justifications in terms of theoretical explanations have also been put forward in the literature for each line of interpretation just mentioned. Let us begin with the proposition that physical activity may have a direct positive relationship with well-being after controlling for other factors. It has been argued that this relationship will occur as a result of the fun and pleasure found in games and sport. Snyder and Spreitzer (1974) have put forward this theory, building on the work of Dunning (1967). They argue that "sports generate a tension-excitement that forms a pleasurable juxtaposition to the mundane and routinized aspects of everyday living" (1974, p. 37). This in turn is believed to increase feelings of well-being. Also, physical activity is a "time out" from the stresses of everyday life and, simply for this reason, participation in it may enhance well-being. In their physical activity, people can leave behind troublesome situations. Our analyses will suggest whether these are plausible interpretations of the consequences of leisure physical activity.

Campbell (1981), among others, has attempted to indicate why social involvement is a source of well-being, suggesting how this relationship may complicate any analysis of the effects of physical activity. He believes that people have a need to interact with others and that the absence of regular social interaction results in poor self-esteem and feelings of distress. Some physical activity will be done with others; it will involve social interaction, and it is likely that

the interaction will lead to feelings of well-being. Also, the social ties provided by physical activity may act as moderators of stress, by giving social support, and may contribute to positive feelings in this way (Cobb, 1976; Mueller, 1980). For each of these reasons we would expect a positive relationship of social interaction in the sport and exercise environment and psychological well-being.

The literature on social background and feelings of well-being shows, not surprisingly, that the higher the social status, the higher the well-being. This appears to occur because higher status confers greater feelings of self-worth and efficacy. Also, higher status generally means more opportunities for social participation and a higher standard of living. Each of these should contribute to feelings of well-being (Campbell, 1981; Smith & Theberge, 1987).

Concerning the possible positive effects of physical fitness upon well-being, several reasons have been given for why this is likely to occur. This may result from improvements in the self-concept of participants after they have achieved improved fitness (Hillyer & Mitchell, 1979; McGowan et al., 1974). Or, the improved self-concept and greater well-being may be outcomes of success in a physical challenge or mastery of one's physical environment (Higdon, 1978; Sachs, 1981). Also, physiological changes that occur as a result of the physical stress of activity may reduce the impact of other nonphysical stressors that might otherwise lower levels of well-being (Buffone, 1980; Ledwidge, 1980; McCann & Holmes, 1984; Mobily, 1982; Selye, 1976). In addition, physical activity may have a tranquilizing effect as a result of muscular relaxation following activity (De Vries, 1968). Or it may be that biochemicals released in the body during vigorous activity act as natural opiates and have a mood-altering effect on the individual (Allen, 1983; Stein & Belluzzi, 1978). Presumably, though, the latter two processes largely would have short-term effects and might not affect feelings of well-being during a survey interview that occurred some time after the most recent episode of physical activity.

As we have said, physical activity also may be expected to be positively related to physical fitness, social interaction, and social status factors. Therefore we must wonder whether any positive relationship of physical activity and well-being is a function, at least in part, of the relationships of fitness, social interaction, and social status factors with physical activity and well-being.

By way of summary, the different hypothesized relationships are portrayed in Figure 1. Because of the interrelated positive relationships, we can only begin to accurately estimate the effects of physical activity upon psychological well-being by controlling for the effects of the other factors. The working hypotheses for this study, then, are as follows:

1. There will be positive relationships between physical activity on the one hand and physical fitness, social interaction in the exercise environment, and socioeconomic status on the other hand.
2. Physical activity, physical fitness, social interaction, and socioeconomic status will be positively related to feelings of well-being.
3. The relationship of physical activity and well-being may be explained in part by the conjoint effects of the social background factors and the intervening variables of physical fitness and social interaction during physical activity.

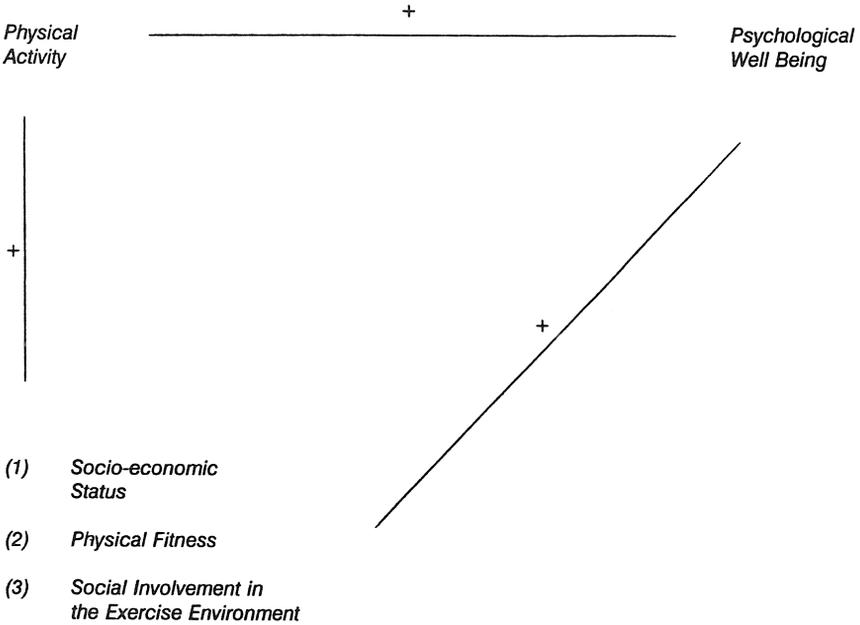


Figure 1 — Hypothesized relationships of the independent, control, and dependent variables.

In testing for the direct effect of physical activity, we control for the effects of socioeconomic status—measured as occupational status, income levels, and educational status—plus the potentially confounding effects of age, marital status, ethnicity, and region. The controls for the effects of occupational status, income, and educational status are necessary for the reasons of the confounds mentioned above. In addition, it is important to have these controls because our measure of physical activity is limited to *leisure* activities, as with much of the literature, but physical activity may take place at work (and varies across occupations) and in the home (White, Curtis, & Lambert, 1989). Use of the three socioeconomic status factors and of marital status and age allows rough controls for these dynamics. We will also be able to estimate the relative effects upon well-being of extent of participation in leisure physical activity, physical fitness, social interaction in physical activity, and the other control factors.

Data Source and Procedures

Data Source

A Canadian national survey, the Canada Fitness Survey, provides the data for our study. This survey was conducted in 1981 to obtain (a) fitness norms for the population, (b) baseline information on physical activity patterns, and (c) baseline information on factors influencing fitness and physical activity. A stratified, multistage cluster sample of households was used. The sample was chosen by dividing each province into separate geographical areas: major city, urban,

rural. Each area was further divided into smaller areas, or segments. A sample of the segments was selected and a list was compiled of all households within the segments. Several households were chosen from each segment, and data were collected on all members of the households over 6 years of age.¹

Three data collection methods were used: direct physical measurement, face-to-face interviews, and respondent's self-completed questionnaire. Of the 13,440 households selected, interviews and questionnaire responses were obtained from 11,884 households for 23,400 persons between 7 and 97 years of age. Of those respondents, 14,365 also participated in the physical measurements component of the study. For our present analyses, we considered only the 9,258 respondents who were 20 years of age and older and who participated in both the interviews and physical measurements.

We conducted separate analyses of the data for male and female respondents. This strategy was adopted because males' and females' experiences with physical activity and with competing activities for their time are likely to be significantly different and should not be assumed to be the same. For example, working women have less time for leisure physical activity than men because of the gendered division of labor (Armstrong & Armstrong, 1984; Gerber, 1974; Meissner, Humphreys, Meis, & Schea, 1975).

Independent Variables

Physical activity in a sport or exercise setting, the independent variable, was measured in the survey in terms of the frequency, duration, and intensity of participation in leisure-time activities of a physical nature.² From this information, the Fitness Survey's original researchers constructed a measure of energy expenditure per kilogram of body weight per day in leisure-time physical activity. The values for this variable were grouped into three categories: sedentary, minimally active, and adequately active. These distinctions were based on the amount of exercise required to achieve a cardiovascular health benefit. Those who are adequately active achieve this level whereas the sedentary do not, and the minimally active may receive some health benefits but not for the cardiovascular system.³ In all, 62% of the sample were adequately active, 16% were minimally active, and the remaining 22% were sedentary.

Control Variables

The intervening variable, physical fitness, was measured using the Canadian Standardized Test of Fitness, which is based on results from a step test. This procedure yields predicted scores for VO_2 , or the number of milliliters of oxygen a person can utilize in 1 minute of maximum physical work per kilogram of body weight. This test is generally considered to be the best available measure of cardiovascular endurance. Scores on the test ranged from 13 to 64 ml of oxygen per kg per minute.⁴ These were recoded into three categories for our analyses: 1–35, 36–45, and 46–64 ml/kg/min for males, and 1–29, 30–34, and 35–64 ml/kg/min for females.

Social involvement in the sport and exercise setting, the second intervening variable, was based on responses to this question: "With whom do you usually do your physical activities?" The respondents were given six answer options: no one, friends, immediate family or relatives, co-workers, classmates at school, or "others." These resulted in up to five different responses per respondent

because some cited multiple types of co-participants including all five types of partners listed above. Therefore the measure of social contact in physical activity was defined so that we could distinguish three types of respondents from each other: those who only did their physical activity alone, those whose activity was with one specific type of group, and those involved with more than one category of exercise partners. The control variables of occupational status, family income, educational level, age, marital status, and region were coded into the categories presented in Table 3.

Dependent Variable

The Canada Fitness Survey included the Bradburn Affect Balance Scale as a measure of psychological well-being. This scale is based on responses to 10 questions about positive and negative emotional status. The questions of the positive type are, "How often have you felt on top of the world?" "How often have you felt excited?" "How often have you felt accomplishment?" "How often have you felt proud?" "How often have you felt that things are going your way?" The questions on the negative side are, "How often have you felt lonely?" "How often have you felt depressed?" "How often have you felt bored?" "How often have you felt restless?" "How often have you felt upset?" The forced-choice answers to these questions of "often," "sometimes," or "never" were scored as 2, 1, and 0, respectively. The scores from the two separate categories of questions were combined to form the Affect Balance Scale, following the conventional procedure. The score for the negative items is subtracted from the score for the positive items and 11 is added to the result. This yields scores ranging from 1 to 21, with 1 being the most positive score and 21 being the highest negative score.⁵ For this study these scores were reversed such that 1 is the lowest negative score and 21 is the highest possible positive score.

Analysis Procedures

The analyses of the data involved multiple classification analysis (MCA), which is a variant of the analysis-of-variance procedure. This technique is well suited to the examination of relationships between several predictor variables and a dependent variable. The procedure shows how each predictor relates to the dependent variable, with the latter expressed as a mean score for each category of the predictor variables both before and after controlling for the effects of the remaining predictors. The program also gives beta coefficients which, when squared, roughly indicate the relative independent effect of the predictor. In addition, the program yields an R^2 measure of the amount of variance that is accounted for by all of the predictor variables taken together (see Andrews, Morgan, Sonquist, & Klem, 1967, for more details). We also present some results from supplemental analyses from stepwise discriminant analysis.

The analyses first examine the uncontrolled relationship between physical activity and well-being. Stage 2 of the analyses considers the relationship after controls for the effects of the social background variables, the socioeconomic and sociodemographic factors listed above. As we have indicated, it was expected that adding these controls would lessen the positive relationship between well-being and physical activity because many of these factors also have positive relationships with both well-being and physical activity. In Stage 3 the intervening variable of physical fitness is included in the analyses as an additional pre-

dictor or control. Then, in the fourth stage, social interaction in the sport and exercise environment is added to the predictors. It was anticipated that controls for the effects of each intervening factor would lead to further diminution of the physical activity/well-being relationship, if one remained, because of the positive relationships between these factors and physical activity and well-being. The analyses at Stage 4 also will allow an assessment of the relative effects of physical activity, physical fitness, and social involvement in physical activity, and their effects may be compared with the effects of the control factors.

Findings

Relationships Between the Independent and Control Variables

As expected, there was a significant relationship of physical activity with each of the other predictor variables for one or both of the male and female subsamples. Table 1 presents the results for social background factors and physical activity. The betas for the positive relationships of physical activity and physical fitness (not shown in Table 1) were .16 and .12 for males and females, respectively; both relationships were significant at $p < .001$. For social involvement in the exercise environment and physical activity level (also not shown), there were positive relationships as expected, with betas of .05 and .06, respectively, both significant at $p < .001$.

Effects of Physical Activity Before Controls

It was expected that participation in physical activity would be positively related to feelings of well-being, at least before controls. This was the case for males ($p < .01$), as can be seen in the first column of the first panel of Table 2. The adequately active group had by far the most positive well-being scores, well above the grand mean, while there was little difference between the sedentary category and the minimally active category. The findings for females for the same zero order (uncontrolled) relationship can be found in the lower panel of Table 2. In this instance too, the relationship is positive but not statistically significant. As with the males, the adequately active females had the highest scores on well-being, followed by the minimally active and then the sedentary. Thus the zero-order findings for the physical activity/well-being relationship, at least for males, are consistent with our expectations.

Effects of Physical Activity After Controls

We had hypothesized that the positive zero-order relationship between physical activity and well-being may be at least in part a function of the conjoint effects of socioeconomic and sociodemographic variables. However, the introduction of controls for the effects of these other factors had little consequence for the activity/well-being relationship, for either males or females, as the second column in Table 2 shows. The differences in levels of well-being across categories of physical activity remained very much the same after the introduction of controls as before. The relationship continues to be significant for males ($p < .01$), and it is not significant for females. The relationship of physical activity and well-being and the relationships of the socioeconomic and sociodemographic variables and well-being were independent of each other.

Table 1
Deviations From the Grand Mean of Physical Activity by Socioeconomic and Sociodemographic Variables With Multivariate Controls, National Adult Sample Data, Canada, 1981

Independent variables	Males			Females		
	<i>N</i>	Dev.	Beta	<i>N</i>	Dev.	Beta
Grand mean		2.38			1.79	
Region						
Atlantic	452	-.35		377	-.54	
Quebec	1363	-.30		1220	.15	
Ontario	1950	.13		1752	-.11	
Prairies	1056	.16		868	.05	
British Columbia	693	.21***	.06	634	.28*	.08
Age						
20-29	1559	.70		1480	.23	
30-39	1464	-.09		1292	-.12	
40-49	1006	-.46		854	-.11	
50 and over	1449	-.36*	.13	1226	-.08**	.06
Marital status						
Married	4062	-.25		3385	-.18	
Not married	1452	.70*	.11	1466	.42*	.11
Language						
English	4147	-.04		3643	.12	
French	1248	.14		1107	-.36	
Other	119	.04	.02	101	-.27**	.08
Education						
Elementary	561	-.47		406	-.56	
Secondary	2264	.01		2182	.03	
Postsecondary	2689	.09***	.04	2263	.13*	.07
Income						
<\$15,000	1173	-.08		1516	.05	
\$15,000-24,999	1686	-.42		1308	-.10	
\$25,000-34,999	1541	.25		1159	.02	
\$35,000 and over	1113	.37*	.09	869	.03	.02
Occupation						
Professional/managerial	1593	.02		1037	-.06	
Other white collar	1240	-.12		1407	-.27	
Blue collar	2016	-.24		154	-.10	
Retired	391	1.71		125	-.11	
Unemployed	253	-.09		84	.05	
Homemaker	21	1.18*	.13	2044	.23*	.08
Multiple <i>R</i>			.243			.182

*Significant at $p < .001$; ** at $p < .01$; *** at $p < .05$.

Table 2
Deviations From the Grand Mean of Psychological Well-Being by Physical Activity
With and Without Controls

Independent variable	N	Without controls	With controls for:		
			Seven socioeconomic and sociodemographic factors	Physical fitness added	Exercise environment added
<i>Male subsample</i> (Grand mean = 13.98)					
Physical activity level					
Sedentary	2244	-.08	-.10	-.10	-.10
Minimally active	646	-.12	-.08	-.09	-.11
Adequately active	1121	.24	.25	.25	.26
Eta/beta		.06**	.06/.06**	.06/.06**	.06/.06**
<i>Female subsample</i> (Grand mean = 13.92)					
Physical activity level					
Sedentary	2071	-.09	-.08	-.08	-.07
Minimally active	624	.07	.05	-.04	.03
Adequately active	682	.20	.20	.20	.18
Eta/beta		.04	.04/.04	.04/.04	.04/.04

**Significant at $p < .01$.

The third column of Table 2 shows the analyses with physical fitness added as a control. Here too, for the male subsample the physical activity/well-being relationship remains positive and significant. Parallel analyses for females also are presented in Table 2, where there continues not to be a significant relationship between physical activity and well-being.

The final column of Table 2 presents, for the male subsample, findings whereby types of social interactions in the sport and exercise environment are controlled for. This additional control also has a negligible consequence for the physical activity/well-being relationship ($p < .01$). The finding for the males of a persistent physical activity/well-being relationship after control for both interaction in the exercise environment and physical fitness suggests that physical activity leads to better feelings of well-being for them. The relationship for females is again not statistically significant (Table 2).

Patterns of Findings for the Control Factors

Details on findings for the socioeconomic and sociodemographic variables and psychological well-being, for the male and female subsamples, can be found in Table 3. Well-being varied across occupational categories, with high status (and retired) males and professional/managerial women showing more positive well-being scores than their counterparts from other occupational backgrounds. Surprisingly, level of education had a negative relationship with well-being for males; however, for females there was a positive relationship. Both sexes showed a positive relationship of income and well-being. Well-being also varied by region of the country for both males and females. In addition, the French Canadian respondents showed more positive feelings of well-being than their English Canadian counterparts, although this difference was more pronounced for males. Age made a difference too; well-being increased with age for both males and females. Finally, the sexes differed on the effect of being married: Married males were happier than single males after controls, while nonmarried females had the higher well-being scores.

Table 3 also shows the relationship of physical fitness and psychological well-being. For males there was a curvilinear relationship, with the moderately

Table 3
Deviations From the Grand Mean of Psychological Well-Being
by Various Factors With Multivariate Controls

Independent variables	Males			Females		
	N	Dev.	Beta	N	Dev.	Beta
Grand mean		13.98		13.92		
Physical activity level						
Sedentary	2244	-.10		2071	-.07	
Minimally active	646	-.11		624	.03	
Adequately active	1121	.26**	.06	682	.18	.04

(cont.)

Table 3 (cont.)

Independent variables	Males			Females		
	<i>N</i>	Dev.	Beta	<i>N</i>	Dev.	Beta
Predicted aerobic power						
1–35 ml/kg/min	1032	–.10		1324	–.11	
36–45 ml/kg/min	2074	.07		1080	.07	
46–64 ml/kg/min	905	–.05	.03	972	.08	.03
Activity environment						
Alone	908	–.22		765	.01	
With one other group	2335	.01		1941	–.09	
With > one other group	768	.22**	.05	670	.25***	.05
Region						
Atlantic	283	.08		230	–.02	
Quebec	973	–.02		802	.37	
Ontario	1433	.00		1297	–.19	
Prairies	803	–.03		622	–.10	
British Columbia	519	.03	.01	425	.03	.08
Language						
English	3091	–.12		2590	.00	
French	869	.50		728	.03	
Other	51	–1.09*	.11	59	–.40	.02
Age						
20–29	1372	–.28		1174	–.46	
30–39	1188	–.08		1001	–.07	
40–49	725	.00		568	.00	
50 and over	726	.65*	.12	633	.97*	.18
Marital status						
Married	2893	.02		2355	–.04	
Not married	1118	–.04	.01	1021	.08	.02
Occupation						
Professional/managerial	1245	–.03		809	.17	
Other white collar	956	.08		1041	.10	
Blue collar	1449	–.05		101	–.06	
Retired	157	1.15		47	–1.29	
Unemployed	189	–.83		57	–.22	
Homemaker	14	.38*	.11	1321	–.12**	.07
Education						
Elementary	269	.14		187	–.64	
Secondary	1593	.11		1441	–.05	
Postsecondary	2149	–.10	.04	1749	.11**	.06
Income						
<\$15,000	752	–.38		926	–.29	
\$15,000–24,999	1234	–.18		937	–.23	
\$25,000–34,999	1146	.12		845	.19	
\$35,000 and over	879	.43*	.11	668	.47*	.11
Multiple <i>R</i>			.245			.222

*Significant at $p < .001$; **at $p < .01$; ***at $p < .05$.

fit showing the highest well-being scores. Among females the relationship was positive after controls (Table 3). The relationships for interaction in the exercise environment can also be seen in Table 3. The findings for the males showed a positive relationship after controls, while for females there was a curvilinear relationship. Females who did their physical activity with more than one type of partner had the most positive well-being scores, followed by the solitary female participants, then by women who participated in physical activity with one other group.

Relative Effects of Physical Activity and the Control Factors

The betas in Table 3 show the rank order of importance of physical activity and the control variables in accounting for variance in psychological well-being. For males the predictors ranked as follows: age, family income, occupation, language, physical activity level, exercise environment, education, fitness level, region of the country, and marital status. For females there were some differences: age and income were first and second as with the males, followed by region of the country, occupation, education, exercise environment, physical activity level, physical fitness, marital status, and language.

Looking only at the three factors associated with the physical activity setting—extent of physical activity, physical fitness, and social interaction in the exercise environment—we find that activity ranks higher than social interaction and physical fitness in accounting for variance in well-being for males. For females, social interaction comes first, followed by activity level and then the level of fitness. Thus physical fitness levels are the least important of the three variables for both males and females; physical activity levels and social interaction in physical activity are comparatively important.

Further Results From Discriminant Analysis

It is a common practice to use ordinal level measures, such as the present dependent variable, with MCA. However, under some circumstances the coefficients can be depressed using this type of dependent measure with MCA. The procedure is more properly suited to normally distributed interval measures. For this reason we also replicated our analyses using stepwise discriminant analysis, with well-being coded into three categories of low, medium, and high for a criterion variable. We determined how well the three criterion groups helped discriminate on the independent measures.⁶

The results of these supplemental analyses were most consistent with the MCA results. For the male subsample, using discriminant analysis, physical activity levels had the fifth strongest relationship ($p < .05$) with well-being of the independent variables, compared with the fifth strongest ($p < .01$) for MCA; for the females, the comparable results were sixth strongest ($p < .05$), compared with seventh strongest (n.s.). Also, the strength, rank order, and significance levels for the control factors were very similar across the analyses. The supplemental analyses reinforced our conclusion that physical activity bore only a modest relationship, if a direct one, with well-being.

Discussion and Conclusions

The hypothesis that there is a positive relationship between physical activity and psychological well-being received limited support in these analyses. Feelings of well-being improved as levels of physical activity increased, but this was significant for men only. This relationship persisted, however, after the introduction of relevant controls for the effects of socioeconomic and sociodemographic factors. The ability of physical activity to account for variance in well-being remained almost unchanged after these control variables were taken into account. Indeed, the same was true after controls for physical fitness and interaction patterns around physical activity which, as we argued, might be said to help account for any physical activity/well-being relationship. Thus the physical activity/well-being relationship is largely a direct relationship.

At the same time, we must emphasize that the amount of variance in well-being, which physical activity accounted for, was small. For males, the socioeconomic and sociodemographic factors yielded an R^2 value of .054, which increased only to .057 with the addition of physical activity as a predictor. For the data on females the comparable R^2 values were .045 and .047. Of course some of the effects of the socioeconomic and sociodemographic factors upon well-being probably operated *through* physical activity. Nonetheless, if we look at the physical activity/well-being relationship before controls, we find only the very modest relationships of $\eta = .06$ for males, and $\eta = .04$ for females. Physical activity apparently has limited impact upon well-being *before or after controls*. These findings call into question the conventional wisdom that an active lifestyle will result in substantially improved feelings of well-being.

Social interaction in physical activity proved to be one of the more important predictors of well-being. This likely is due to the reasons we mentioned earlier. People are socialized to be *social* beings. This involves both learning to interact with others and acquiring a desire for social interaction, as social support and as a venue for affirmations of the social self. For these reasons, most people tend to be more satisfied the more social contacts they have, such as in leisure activities. This image of the individual is of course at least as old as the best of our classical sociological theory in Durkheim, Simmel, and Mead, among others. From this theoretical approach, we would have to expect that the need for social interaction would be partially met in physical activities where others were present, and this is true of most such activities.

It is not surprising to find that those who had better physical fitness (which has only a modest positive relationship with leisure physical activity) felt better psychologically. This likely occurs for one or more of the reasons we have cited from the literature.

There was some support for the proposition that the higher the status that individuals have, the greater their positive feelings of well-being, but the findings were not consistent for all social status measures. The results certainly suggest that income and occupational status can help provide some of the circumstances that lead to feelings of well-being. Education too was a contributor to greater feelings of well-being, at least among women, perhaps because it confers other

positive feelings of status, self-worth, and efficacy. Marriage also tended to have a positive effect, probably because it is a social support system. Well-being also improved with age, even into the oldest age category, which would not be expected from the general prediction of a positive relationship of social status and well-being. This may have occurred because increasing age brings with it a greater acceptance of one's lot in life. It is unclear why people from the minority status group in Canada, French-speaking Canadians, had a somewhat more positive outlook on life than their English counterparts, and why the regions of the country differed on levels of well-being after controls. The regional differences did not closely follow a pattern of the most economically advantaged regions having the highest reports of positive well-being.

Given the other stronger predictors of well-being, and the weak effects for physical activity, we might ask whether it is worthwhile to have efforts to promote physical activity as a means of improving well-being. The findings might be seen to suggest that we would be better off to ignore physical activity and instead to put more effort into other approaches such as promoting more social interaction or improvements in social status. These latter strategies are indeed well worth entertaining, but we should not lose sight of the fact that physical activity affects both social interaction and fitness.

The activity environment is one of the places where social interaction occurs, whether it is during the activity or prior to or after it (e.g., on the way to the activity or in the locker room, snack bar, or home). Thus the activity can be manipulated to provide greater social interaction and, presumably, greater feelings of well-being. Also, physical activity, provided that it is at a high enough level, can help to reduce or maintain body weight, keep muscles and joints strong and flexible, and promote a sound cardiovascular system. We know that many of the so-called lifestyle diseases may be resisted by regular participation in vigorous physical activity. Thus physical activity is well worth promoting for its social interaction, physical fitness, and physical health consequences. Physical activity cannot be said to have strong direct consequences for psychological well-being. It is not to be valued for this reason, but for others.

The findings do suggest that changes in income (and presumably changes in the economic opportunity structure) can have stronger consequences for psychological well-being, compared to changes in physical activity. Yet there is much greater attention in the applied health and social policy literatures to the activity/well-being relationship versus the income/well-being relationship. Our results suggest the opposite for the importance of these predictors. However, the opportunity structure for physical activity is easier to alter than are opportunities for income. This fact, and perhaps the ideology of many practitioners, accounts for the selective attention in the literature.

The finding that there is only a modest relationship between physical activity and psychological well-being is better understood when we consider how little time each day is devoted to physical activity in comparison to other aspects of social life that seem to affect well-being. The effects upon well-being from circumstances concerning work (e.g., stress, alienation, unemployment) and the family (e.g., the burdens of domestic and paid work, parent/child conflict, or parental discord over child-rearing and household duties), as well as economic

circumstances (e.g., debts or difficulties in buying a home or providing for children's needs), probably all have far more *persistent* effects upon one's psychological state than does a relatively brief bout with sport or exercise, even if the latter occurs every day. The individual carries the troubles of work and family through the day and weeks because these are not easily resolved. An episode of physical activity may help one forget one's troubles briefly, but they are not eliminated. For this reason, there is more explanatory potential for feelings of well-being in these troublesome aspects of life than in the effects of physical activity. This probably explains the relative effects of the socioeconomic factors versus physical activity in the present analyses.

These interpretations perhaps also suggest why there was stronger evidence for the activity/well-being relationship for men than for women. The other predictors (other than physical activity) had comparatively stronger effects upon psychological well-being for women. This suggests that the burdens and joys of work and/or family have more impact upon well-being levels for women than for men. This may result because (a) physical activity is less easily pursued as an avenue of stress release by women, (b) women are less intensely involved in physical activity and therefore are not as likely to realize benefits from it, or (c) the burdens of family/work are greater for women and can less easily be lifted by sessions of physical activity. Further research should focus on such interpretations of the effects of physical activity across the sexes.

Positive relationships between other leisure activities and psychological well-being and life satisfaction variously measured have also been reported in the literature (Smith & Theberge, 1987, chapters 6-7). One of the important things to note is that these studies too have generally not involved tightly controlled analyses of the type we have recommended. Certainly, until the controlled comparisons are made we will not have a clear estimate of any effects of leisure activities outside of effects from social interaction. When such studies are conducted, we should discover that part of the leisure activities effect is attributable to the effects of social interaction. In addition, we should find that the direct effects of leisure activities, but excluding physical activities, are greater than those from physical activities because greater amounts of most people's days and weeks will be given over to the former. Also, the trouble/joys of work and family may still account for more variance in well-being, for the reasons mentioned above.

If this pattern of relative effects of physical activity and other factors is borne out in further studies, using other measures of the independent and dependent variables, we would do well to feature this fact in our sociology of sport and physical activity. This would call for a corrective to the thrust of the applied health and policy literature on physical activity.

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Notes

¹For a more detailed discussion of the methods of the study, see Canada Fitness Survey (1981).

²These questions were asked about physical activity: "In each of the past 12 months, how many times did you participate in . . . ?" (a list of 41 activities was presented). "What was the average time in minutes per occasion?" "At what level of intensity did you participate in this activity (light, medium, heavy)?"

³For a more detailed discussion, see Stephens, Craig, and Ferris (1986).

⁴The Canadian Standardized Test of Fitness is described more fully in Jette (1983).

⁵For a more detailed description of the Affect Balance Scale, see Bradburn (1969).

⁶One of the reviewers for this paper expressed concern that there was not a stronger direct activity/well-being relationship and recommended such further analyses.

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