

# Predictors of Participation in a Peer-Led Exercise Program for Senior Women

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Cette étude examine les variables sélectionnées en utilisant le modèle d'interaction des comportements de la santé du client (Cox, 1982), et leur poids dans la décision des personnes âgées à se joindre à un groupe d'exercice. L'échantillon ( $N = 75$ ) a été obtenu à partir de deux immeubles semblables pour personnes âgées. L'âge des sujets allait de 65 à 88 ans ( $M = 75,91$ ). Nous avons utilisé l'analyse de fonction discriminante pour tester le rapport entre les sept variables démographiques et de motivation et la décision de se joindre à un groupe d'exercice. D'après les hypothèses formulées, les éléments de prédiction importants pour toutes les femmes dans les deux immeubles étaient les suivants : le degré de compétence, le niveau de scolarité, le nombre de médicaments consommés, le bâtiment et l'âge. Deux variables, soit le revenu et la situation de famille, ne sont pas ressorties comme étant des éléments de prédiction. Le fait d'avoir une bonne compétence sur les questions de santé, niveau élevé de scolarité, une consommation peu élevée de médicaments, de vivre dans le bâtiment B et d'être moins âgées indiquait que les femmes avaient davantage de chances de se joindre à un groupe d'exercice. Dans leur interaction avec les personnes âgées, les infirmières animant les groupes d'exercice devraient être conscientes de l'impact possible de ces variables sur la décision de se joindre à ces groupes d'exercice.

This study explored variables selected using the Interaction Model of Client Health Behavior (Cox, 1982) and their relationship to exercise group participation in seniors. Seventy-five women were surveyed from from two similar senior apartment buildings. Subjects' ages ranged from 65 to 88 years ( $M = 75.91$ ,  $SD = 6.12$ ). Discriminant function analysis was used to test the relationship of seven demographic and motivational variables to choice of exercise group participation. As hypothesized, significant predictors for all the women in both buildings were: a measure of competence, education, number of medications, building, and age. Two variables, income and marital status, did not emerge as significant predictors. Women more likely to attend an exercise group had greater competence in health matters, higher education, a lower number of medications, were living in building B, and were lower in age. Nurses who facilitate exercise groups for seniors in the community should be aware of the impact these variables could have on attendance.

Exercise is recognized as a method of improving health status for seniors (Shephard, 1987), and health professionals often recommend that seniors increase their exercise level. Some communities have ongoing exercise programs, and exercise classes are now available in many senior apartment buildings, but not everyone chooses to attend. Nurses can encourage the establishment of an exercise class in a building and promote the benefits of exercise; however, many variables may impinge on the decision to follow this recommended activity.

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### Literature Review

Much of the existing exercise research has focused on physiological or psychological changes during participation in an experimental exercise group. Substantial literature exists on the physical effects of exercise in older people. The cardiorespiratory benefits include an increase in maximum oxygen consumption (Adams & de Vries, 1973; Blumenthal et al., 1989; Dustman et al., 1984; Sidney & Shephard, 1978; Stevenson & Topp, 1990), improved efficiency of oxygen transport, lowering of systolic blood pressure (Amundsen, Devahl, & Ellingham (1989), and lowering diastolic blood pressure (Blumenthal et al., 1989; Emery & Gatz, 1990; McMurdo & Burnett 1992). Exercise in older adults was found to decrease total cholesterol levels (Blumenthal et al., 1989; Morey et al., 1989), promote weight loss (Blumenthal et al., 1989; Morey et al., 1989; Sidney, Shephard & Harrison, 1977), and increase bone mineral content in women (Chow, Harrison, & Notarius, 1987; Rundgren, Aniansson, Ljungberg, Wetterqvist, 1984). Flexibility has been shown to improve after exercise, including shoulder-hip-knee (Bassett, McClamrock, & Schmelzer, 1982), hip (Morey et al., 1989), knee and spine flexibility (McMurdo & Burnett, 1992), as well as general flexibility and balance (Stacey, Kozma, & Stones, 1985).

Cognitive benefits that have been shown after an exercise program include improved reaction time and digit symbol performance (Dustman et al., 1984; Stacey et al., 1985). Logical memory test score and Mini-Mental State Examination improved after an exercise intervention study (Molloy, Beerschoten, Borrie, Crilly & Cape, 1988). Exercise was also shown to have a significant effect on short term memory function, attention-concentration, and cognitive function (Stevenson & Topp, 1990).

Other psychological effects that have been identified include improvements in mood, life satisfaction (Blumenthal et al., 1989; McMurdo & Burnett, 1992), self-concept (Perri & Templer, 1984-5), happiness, and decreased levels of trait anxiety (Stacey, et al., 1985). Stevenson and Topp (1990) reported that exercise group participants had less bedtime sleep latency and less trouble returning to sleep when awakened during the night. Exercise has been identified as having a positive effect on mood and has been used as a therapeutic treatment in depressed elderly individuals (Simons, McGowan, Epstein, Kupfer, & Robertson, 1985).

Personal and demographic factors can reduce the likelihood of participation in exercise. In general, activity decreases with age, which supports the disengagement theory of aging (Cumming & Henry, 1961), or activity may be limited by a chronic condition that restricts function. The older one gets the less likely one is to participate in exercise (McPhillips, Pellettera, Barrett-

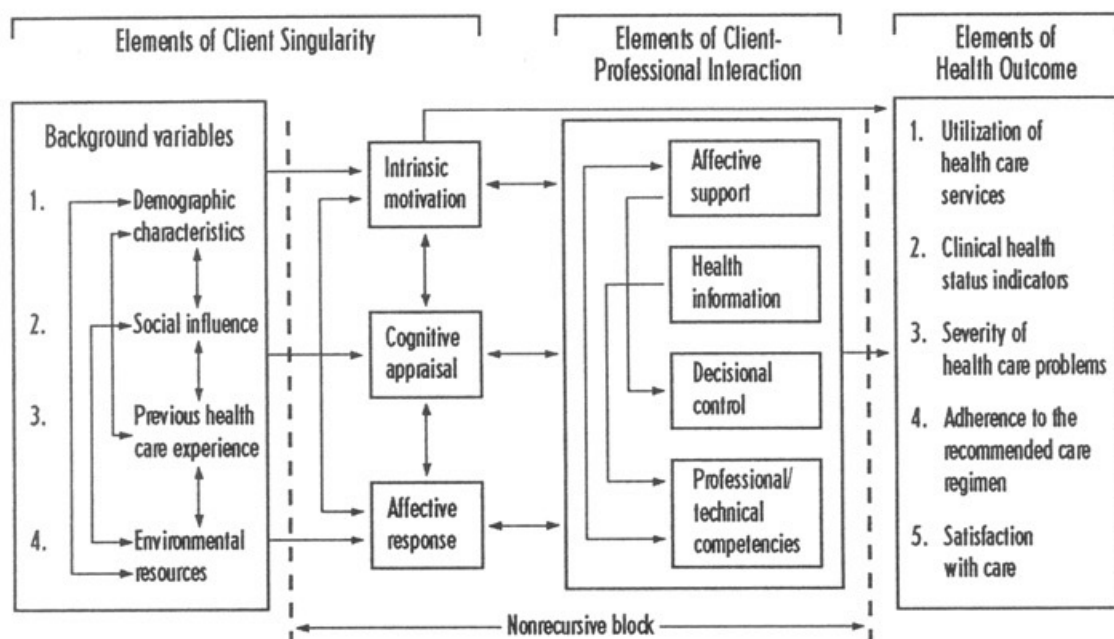
Connor, Wingard, & Criqui, 1989). The link between socioeconomic status and education is well established: higher education is generally associated with higher income (Gunderson, 1989), and also with higher levels of physical activity (McPherson & Kozlik, 1987). The opportunity to socialize and be part of a group can promote participation; nonmarried seniors reported more involvement in physical activity than did married seniors (McPherson & Kozlik, 1987). The social support derived from a group positively affects health status (Minkler, & Langhauser, 1988; Schank & Lough, 1989). Women and men may exercise for different reasons. Certainly gender differences have been found in self-reported regular exercise (Firebaugh, 1989), and in self-perceived fitness level (McPherson & Kozlik, 1987). The examination of variables that relate to choice of exercise group activity could provide direction to facilitate participation and contribute to program design. The aim of the current study was to explore the relationship of selected variables to exercise group participation in senior apartment buildings with an established peer-led exercise group.

### **Conceptual Framework**

Health behaviour is peculiar to the individual and therefore complex to study. Nurses purport to have influence on health behaviour and, thus, health outcome. The framework chosen for this study was the Interaction Model of Client Health Behaviour (Cox, 1982), which comprises aspects that are unique to each client, acknowledges interaction between nurse and client, and includes health outcome (Figure 1). This model has been used to examine acceptance or rejection of a recommended medical procedure (Cox, Sullivan & Roughmann, 1984), to study community-based seniors and their health, well-being, and self-care (Cox, 1986), to examine relationships of client singularity variables in a weight control program (Troumbley, & Lenz, 1992), and to study client-nurse interaction (Brown, 1992). According to Cox (1986) the model can be operationalized using one or more of the major elements. All factors within the elements may be operationalized or, depending on the study, one or more of the factors can be applied.

Within the model, intrinsic motivation is a key factor in determining behaviour. The theoretical underpinning of intrinsic motivation, as used by Cox (1982), is Deci's (1975) cognitive evaluation theory which comprises two motivational subsystems: intrinsic (depends on active choices) and extrinsic (individual exerts little decisional control). The intrinsic reward for behaviour is the feeling of competence and mastery as a direct result of a choice in conduct. Health promoting behaviour is dependent on choice so that an indication of the strength of the intrinsic motivation could be useful in the prediction of health actions. Motivation is viewed as situation-specific and not static so that intervention is possible in certain contexts.

Figure 1

**Interaction model of client health behaviour**

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Based on the Client Singularity element of the Cox model and the literature review, variables were selected for the present study as possible predictors of residents' choice for exercise participation in ongoing peer-led groups in two similar apartment buildings for seniors.

### Hypotheses

The following hypotheses were tested:

1. Participation in an exercise group is associated with younger age, higher socioeconomic status, higher education level, living alone, higher intrinsic motivation (as measured by the competency subscale of the HSDI) and fewer medications.
2. There is no difference in participation in an exercise group between women who live in building A and those who live in building B.

### Method

Hypotheses were tested in a multivariate design using interview data from seniors surveyed in two senior housing apartment dwellings in a city of approximately 180,000. Building A consisted of 147 units; 21 (14%) were subsidized and 70 (48%) were nonprofit rental units. A nurse was available for consultation once a week. Building B consisted of 108 units, 35 (32%) of



which were subsidized. Part-time staff in the building included an activity director and a nurse. Both complexes were less than five years old, had large meeting areas, and kitchen facilities for complete meals. There were numerous interest groups functioning in both facilities.

The Canadian Red Cross Society's Fun and Fitness program for seniors operated in both locations. The programs were led by building residents who had been trained by the Red Cross Society's Fun and Fitness teacher trainers. Low-intensity aerobic exercises were emphasized with concentration on stretching, flexibility, and general mobility (Myers & Hamilton, 1985).

### **Sample**

Using systematic random sampling, 75 female subjects, aged 65 to 88 ( $M = 75.91$ ,  $SD = 6.12$ ), agreed to participate in the study. To increase the accessible sample, the occupants of two buildings that were similar in design and programming were included. Of the 75 subjects, 30 were participants in a peer-led Fun and Fitness group and 45 were not. Inclusion criteria were: age 65 or more in the year of the study, able to speak and read English, achieved a score of 24 or more on the Mini-Mental State (Teng & Chui, 1987) and attended the exercise class 20 times in 10 weeks. The males were excluded because one building did not include them in their exercise class. The proposal met the standards of a University Ethics Committee and the approval of the building managers.

### **Instrumentation**

Cox (1985) developed the 17-item Health Self Determinism Index (HSDI) to measure intrinsic motivation toward health behaviour in the model (Figure 1). The HSDI addresses the multidimensional aspect of motivation with four subscales (self-determined health judgments, self-determined health behaviour, perceived competency in health matters, and internal-external cue responsiveness). Cox, Miller, and Mull (1987) found a four-factor solution, whereas Dukes (1990) reported factorial validity for the first three subscales only. Furthermore, Dukes found that only the competency subscale emerged as a significant discriminator of health in a survey of 331 well and ill subjects. The coefficient alpha for the total HSDI has been reported as between .78 and .87; and for the competency subscale, between .67 and .71.

For the current study, the three-item competency subscale of the HSDI was selected because it has both acceptable reliability and validity. A sample item is "I feel good about how I take care of my health," with responses on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree".

### **Procedure**

The interview took place in the subjects' apartments at the beginning of the study. Demographic information was collected on age, income, living by self or other, education level, total number of medications, and prescription and nonprescription drugs currently taken. The HSDI was administered. For analysis, income level was categorized from one (lowest) to six (highest) according to reported level. The four levels of education were: (1) partial completion of primary school; partial completion of secondary school; trade school; and university.

### **Analysis**

The seven potential predictors of exercise group participation were examined using discriminant function analysis so that all seven could be tested with one multivariate analysis. Univariate descriptive statistics were performed on the data before conducting the multivariate statistical procedure (SPSS-X, 1988). Prior to analysis, dichotomous dummy variables were created for isolation and building. One missing value for education and the five missing values for income were replaced with the mean of that variable for the respective building (Tabachnick & Fidell, 1989). A search for multivariate outliers was done by computing Mahalanobis distance for each case and no cases were dropped. A tolerance test was performed so that redundant predictors were not entered in the discriminant function analysis. There was no violation of the assumption of homogeneity of group variance-covariance matrices (Box's  $M = 34.5$ , NS).

### **Results**

Discriminant function analysis was performed to distinguish between individuals who chose exercise group participation and those who did not based on the seven variables. One discriminant function was calculated  $X^2 (df=7) = 25.06$ ,  $p < .01$ . The canonical correlation was .55, indicating that the proportion of variance shared between the groups and predictors on this function is .30 (Tabachnick & Fidell, 1989). Seventy-three percent of the grouped cases were correctly classified using this function. The relative importance of the individual variables are reported by the standardized canonical discriminant function coefficients (Table 1). Any variable greater than .30 in the pooled within-groups correlations between discriminant variables and canonical discriminant functions is meaningful (Tabachnick & Fidell, 1989).

As hypothesized, exercise group participation was related to intrinsic motivation (competency subscale of the HSDI), education, medications, and age. The exercise group participants reported greater competency ( $M = 11.90$

**Table 1**

**Predictors of participation of senior women in an exercise program:  
Standardized canonical discriminant function coefficients and correlations  
between variables and discriminant function (structure coefficients)  
and univariate F ratios**

Predictor variables	Standardized Coefficients	Structure Coefficients	Univariate F (df 1, 73)
Competency	-0.45	-0.51	8.29*
Education	-0.41	-0.45	6.35*
Medications	0.57	0.45	6.20*
Building	-0.35	-0.43	6.10*
Age	0.31	0.39	4.94*
Living Alone	0.34	0.27	2.29
Income	0.16	-0.19	1.16

\* $p < 0.05$

vs. 10.84), a higher education level ( $M = 2.57$  vs. 1.96), took fewer medications ( $M = 1.20$  vs. 1.98), and were younger ( $M = 74.03$  vs. 77.16). There was no support found for the predictions that income or living alone would be related to participation in an exercise group. Contrary to expectation, it was found that building was a significant predictor of participation; women in building B chose to take part in the exercise program more than women in building A.

Although the two buildings were selected for similarity, there were differences in the characteristics of the senior population in each building which had not been apparent at the onset of the study. The subjects in building A had a lower income ( $M = 2.23$ ,  $SD .93$ ) than did subjects in building B ( $M = 3.11$ ,  $SD 1.13$ ,  $t(73) = 3.52$ ,  $p < .01$ ); a lower level of education ( $M = 1.53$ ,  $SD .57$  versus  $M = 2.64$ ,  $SD 1.09$ ,  $t(73) = 5.12$ ,  $p < .01$ ); and attended fewer group activities ( $M = 2.60$ ,  $SD 1.77$  versus  $M = 4.96$ ,  $SD 1.65$ ,  $t(73) = 5.88$ ,  $p < .01$ ).

## Discussion

### *Intrinsic Motivation*

Competency was the best predictor of exercise group participation (structure coefficient of .51 in Table 1). This measure is a subscale of intrinsic motivation (the HSDI). Competency and self-determinism are integral to intrinsic motivation in Deci's theory of motivation (Deci, 1975). An examination of the items in the competency subscale shows that feeling positive about

one's ability, and taking responsibility for managing one's own health contribute to competence. It would seem plausible to suggest that exercise group participation was an indicator of accepting responsibility for one's health.

A recent study by Mobily et al. (1993) examined competence as one predictor of exercise and physical activity in an elderly sample. They found that those in the sample who participated in more physical activities with a cardiovascular or musculoskeletal potential benefit perceived themselves as more competent. A competent older person is more willing to consider engaging in a variety of activities.

### ***Client Singularity***

Elsewhere it has been reported that education is positively related to physical activity and exercise (Dishman, Sallis & Orenstein, 1985). Thus, in the current study since the women from building B had a higher education level than did those from building A, the difference in choice of exercise group participation may have been partially due to the between-building differences in educational level. None of the other significant predictors were related to differences between the buildings.

The exercise group took fewer medications than did the no-exercise group. If medications are taken *a priori* as an indication of poor health, this supports data from the Canada Fitness Survey (Canada Fitness Survey, 1983) which showed a positive correlation between health and activity. Increasing age as a predictor of declining exercise group participation is in keeping with the observation that activity declines with age (Harvey & Singleton, 1989; McPhillips, et al., 1989). Although exercise differs from activity in that it is planned and has some structure (Caspersen, Powell & Christenson, 1985), both involve choice and can be affected by health and age.

Isolation (living alone) and income were not significant predictors of exercise group participation. The income variable was chosen to examine whether or not those with subsidized housing were choosing their activities differently than those who had more income. Results indicated, however, that those who lived in subsidized housing attended the exercise group as often as those who did not live in subsidized housing.

### ***Theoretical Issues***

The Interaction Model of Client Health Behaviour was useful for guiding selection of variables and examining their relationship to exercise group participation. The model supports client control and includes antecedent conditions, human response, and interactions. However, the very complexity of the



model, which is justified given the factors that impinge on health behaviour, makes it more difficult to test. This study lends support for elements of the client singularity section of the model, but other studies will be necessary to test the complete model.

The Health Self Determinism Index was developed to fit the theory of the Interaction Model of Client Health Behaviour. The results of the current study suggest that intrinsic motivation may be a valuable concept for future study in this population.

### ***Methodological Issues***

The results of this study might not be applicable to all seniors because individuals who choose to live in a segregated building might not be representative of the total senior population. As well, differences between the leaders of the exercise groups in the two buildings could affect attendance, and differences between the people in the two buildings may have been reflected in the leaders because they were volunteers from within each building.

Of all the variables in the discriminant function analysis, the competence subscale of the HSDI provided the best separation of those who chose to attend the exercise group from those who did not. The subscale was small, and perhaps expansion of this portion of the scale should be considered.

Those who participate in an exercise program may also feel more able to manage their health matters because of the exercise program. A measure of competence before and after an exercise program could test this concept further (i.e., a pretest/posttest control group design).

### ***Implications for Nursing Practice***

The results of the current study suggest that there are a number of important background variables for nurses to consider when interacting with clients who make choices about exercise groups. Since increasing age was a significant predictor of decreasing participation in a peer-led exercise program, perhaps a distinct exercise group for those over 75 could be established to accommodate their physical limitations. Choosing an exercise group option would be in keeping with self-determining action, and theoretically linked to intrinsic motivation.

Medications, which could be an indicator of health limitations, were also a significant predictor of exercise group participation; the more medications a subject took, the less likely they were to participate. In an independently-living population, there are very few health conditions that prevent participa-

tion in all forms of exercise. Therefore, medications and health status should be carefully reviewed by the nurse to help the client choose the appropriate exercise options.

Culture and education are two confounding variables that could have contributed to the observed difference between residents of building A and building B in exercise group participation. Most of the subjects in one building were from a Mennonite background and had either immigrated to Canada with some education or attended German schools in Canada. Consequently, many had not had the opportunity to be educated in English or to attend school long enough to attain a high school level. Health behaviour is based on a synthesis of all the contributors, including culture, to the singularity of the client. Therefore, program planners working with people from either diverse backgrounds or a dominant other culture must acknowledge the influence this variable might have on willingness to participate in programs.

Nursing actions which support self-determining behaviour and feelings of competency encourage active choice. It has been shown that clients who feel good about how they are managing their health and take unilateral action to decide on a health behaviour are more likely to join an exercise group. Nurses can therefore help other clients to adopt this outlook.

Hawkes and Holm (1993) found that male gender, social influences to exercise, and health self-determinism were significant predictors of leisure time physical activity. The sample they used had a wider age span than did the sample in the current study; this could account for the observed differences in predictors of physical activity.

Information from the Canada Health Promotion Survey showed that more than one in three adults over 65 believed that additional exercise would not improve their health (Health and Welfare Canada, 1989). In the current study women with more education were more willing to participate in an exercise group. Nurses may have to, therefore, educate clients as to the benefits of physical activity.

Activity and exercise can have a beneficial effect at any age. Exercise as a form of treatment is recommended to seniors for such reasons as cardiovascular function, nutritional status, functional status, or to aid sleep. Involvement in exercise groups also provides opportunity for social interaction. It is important to recognize the special needs of women, different age groups, and cultural variations (O'Brien & Vertinsky, 1991). The accessibility of an exercise group is an important first step in encouraging exercise, but other variables that improve attendance are important for nurse-client interactions and for program planning.

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