Objective. In this retrospective study of an elderly population cohort living in a defined Swedish rural area, the relationship between occupation and survival as a measure of objective health was investigated. The cohort has been followed for 25 years.

Method. On the basis of the baseline socioeconomic interview from assessments performed when the participants were 67 years of age, an index of active participation in daily occupation was devised. The index was used to investigate the covariation between generic everyday occupation and long-time survival.

Results. For the female participants, Kaplan-Meier curves demonstrated differences in survival between the "less active" and "more active," and Cox regression survival analyses resulted in a significant covariance between occupation and survival. For the male participants, no such differences were found.

Conclusion. The significant results for the women implied support for the core assumption of occupational therapy that a relationship exists between occupation and health. The lack of differences in survival among more active and less active men demonstrates the complexity of studying occupation.

The use of occupation to improve health status is the basic dynamic of occupational therapy (Yerxa et al., 1990). Active participation in occupation is assumed to affect health and is believed to be essential to the person's well-being (Kielhofner, 1992; Miller, Sieg, Ludwig, Shortridge, & Van Deusen, 1988). Through their practical experiences, occupational therapists are convinced that engagement in purposeful and meaningful occupation promotes health, but these beliefs have hardly been researched (Trombly, 1995).

Occupations are the ordinary and familiar things that people do every day (American Occupational Therapy Association [AOTA], 1995). Throughout the profession's history, the term occupation has referred to a person's active participation in everyday life (i.e., self-maintenance, work, leisure, play) (AOTA, 1993; Meyer, 1922), but, still, different conceptualizations of the term, as well as of its different dimensions, exist (Trombly, 1995). For this article, the inclusive occupational science definition was adopted: the generic, complex category of occupation that includes all kinds of human activity (Clark et al., 1991; Zemke & Clark, 1996). We defined the term occupational performance as the dimension of how a person performs an occupation and its inherent activities, whereas the term occupational behavior was used to represent
what the person does. The person's occupational performance and occupational behavior are outcomes resulting from his or her physical, psychological, intellectual and social capacities, and the positive and negative demands and other influences of the environment (Guralnik & Kaplan, 1989; Kielhofner, 1992).

Many definitions of health exist, but the most well-known and widespread is the World Health Organization's (WHO's) official definition: "Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" (as cited in Downie, Fyfe, & Tannahill, 1990, p. 2). Levels of public health have conventionally been measured with objective indicators, such as biochemical and microbiological tests, blood pressure, mortality or survival, and service utilization (Downie et al., 1990). Within the field of public health, average length of life has traditionally been used as an important health indicator, reflecting the state of health in a certain population, whereas other health indicators measure the occurrence of events such as disease or death per unit time (Murray, 1994). Increasingly, subjective indicators of health, such as well-being, pain, health-related quality of life (Downie et al., 1990), or adjustment for time lived with disability (Murray, 1994), are being included in comprehensive evaluations of health.

Therefore, a comprehensive evaluation is essential to understanding health conditions in older persons (Samuelsson, Hagberg, Dehlin, & Lindberg, 1994). A common research approach within gerontology has been to investigate how various factors covary with survival as an operationalization of objective health on the group level. For example, performance areas of personal activities of daily living (PADL) and instrumental activities of daily living (IADL) have been reported as independent, significant predictors of survival in aged populations (Keller & Potter, 1994; Parker, Thorslund, & Nordström, 1992; Reuben, Rubenstein, Hirsch, & Hays, 1992; Sonn, Grimby, & Svanborg, 1996), superior to physiological risk factors (Manton, Woodbury, & Stallard, 1995).

The International Classification of Impairments, Disabilities and Handicaps (ICIDH) (WHO, 1980), describes four conceptual levels within the complex of disability: disease or injury, impairment, disability, and handicap. Impairment reflects disturbances at the organ level and is defined as any loss or abnormality of psychological, physiological, or anatomical structure or function, whereas disability is defined as the restriction of the person's performance of everyday activities. These concepts could be worded in positive valence instead (Verbrugge & Jette, 1994), with the organ level representing different performance components or capacities and the ability level representing participation in daily occupations as described within occupational therapy (Kielhofner, 1992) and occupational science (Clark et al., 1991).

When adopting the ICIDH taxonomy in research designs or in clinical evaluations, the conceptual levels should not be mixed (Wade, 1994). This practice is congruent with the occupational therapy viewpoint that occupation in different performance areas is an outcome that depends on a variety of underlying performance components and the performance context (Guralnik & Kaplan, 1989; Kielhofner, 1992). Thus, the variable of occupation summarizes a majority of the medical, sociological, psychological, and environmental variables that have previously been used in gerontological multivariate survival analyses, and it would not be appropriate to mix occupation with variables of performance components in the same analytical model. We suggest that the person's level of active participation in daily occupations in different performance areas can be used as a generic independent variable in univariate survival analyses.

The fact that ADL, which represent the ICIDH disability level, has been reported as an independent, strong and significant predictor of survival (Keller & Potter, 1994; Parker et al., 1992; Reuben et al., 1992; Sonn et al., 1996) also supports the covariation between occupation and objective health—a relationship of vital importance for further occupational therapy and occupational science research. However, the relationship between generic daily occupation and whether occupation influences survival remains to be investigated. Therefore, the purpose of this study was to explore the covariation between generic daily occupation and long-term survival in order to generate knowledge related to the occupational therapy core assumption that active participation in occupation affects health (Meyer, 1922).

Method

Study Population

The study analyzed existing data generated from a 25-year longitudinal investigation of a total elderly population cohort living in a defined rural health care district in Sweden (Samuelsson et al., 1994). The cohort has been followed since 1969/1970, when the 192 subjects (113 men, 79 women) were 67 years of age, until today. The preponderance of men is a common pattern in older populations living in the Swedish countryside. Nearly all the participants (98%) lived at home, and 15% lived alone. The men had been engaged largely in laboring occupations, whereas a majority of the women had been housewives. The population's general level of education was the same as, or slightly lower than, that for a corresponding age group for the country as a whole. Because the population lived in a well-defined geographic area, the subjects' access to medical care and social services was equal.
Successive medical, psychological, and socioeconomic assessments had been administered during the longitudinal study, but only the data from the socioeconomic part were used for the current study. These data were available for 150 (78%) participants (88 men, 62 women).

**Instrument**

To calculate the degree of performance in daily occupations, an index of active participation in daily occupation was derived from the socioeconomic interview instrument used at the longitudinal study's baseline. The socioeconomic interview was composed of 134 questions on current housing conditions, communications and societal services, functional status, social relations, economy, working conditions, and attitudes toward public services for elderly persons (Samuelsson et al., 1994). Two occupational therapists with substantial clinical experience in primary health care and psychiatry independently searched the socioeconomic interview for occupation-related questions, such as PADL, IADL, work, societal activities, fitness exercises, and social activities with neighbors and relatives. Of the 134 questions, 33 were identified as related to occupation. The therapists then independently ranked the possible response alternatives for these questions from “less active participation in daily occupation” to “more active participation in daily occupation.” They reached total agreement, suggesting that the index had face and content validity.

According to how the questions and their response alternatives were worded, ordinal scores 0, 1, or 2 were assigned to the different response alternatives (see Table 1). The total possible score for the index ranged from 0 to 58. Higher scores indicated more active performance of daily occupation.

**Procedure**

The index was used to calculate each participant’s degree of participation in daily occupation on the basis of the raw data collected in the baseline socioeconomic interview. Unfortunately, data on 2 questions related to leisure activities were missing from the 33 occupation-related questions; therefore, it was not possible for the participants to obtain the maximum score.

During the longitudinal study, data on participants’ deaths were registered and stored. For the current study, survival was computed from entrance to the study at 67 years of age (range = 66.82–68.05 years; SD = .27) to February 1995. One hundred thirty-four (89%) of the 150 participants had died by that date.

**Statistical Analysis**

Kaplan-Meier curves (Altman, 1991; Burns, 1984) were used for graphical displays of survival that compared the “more active” and “less active” groups by gender. The more active and less active groups were separated by the median score of the index of active participation in daily occupations for each gender.

The Cox regression model (Christensen, 1987; Cox, 1972; Statistical Package for the Social Sciences, 1992) was used to analyze the covariation between active participation in daily occupation and survival. Separate analyses were made for men, women, and the total group. Results with \( p < .05 \) were considered significant.

**Results**

The individual total scores of the index of active participation in daily occupation ranged from 13 to 39 (see Table 2). The Kaplan-Meier curves for the women showed differences in survival between the more active and less active groups for the entire 25-year study period (see Figure 1). For the men, no such differences were demonstrated (see Figure 2).

The results from the Cox regression model, with the total score of the index as an explanatory variable, were significant for women, \( p = .025 \) (see Table 3). The negative sign of the regression coefficient \( (B = -.087) \) indicates that a high score on the index was associated with increased survival. The results from the Cox regression model for both the men and the total group were nonsignificant.

**Discussion**

Retrospective studies, in principle, are never causal; nevertheless, our finding of significant differences in survival over 25 years between more active and less active women demonstrates the usefulness of daily occupation as a generic independent variable related to survival. The mother’s age at death was the only other single variable among 22 possible medical, sociological, and psychological factors found to predict survival over 20 years in this same group of women (Samuelsson et al., 1994). The significant relationship demonstrated between occupation and survival in the current study is of importance for occupational therapy because it supports the profession’s basic theoretical assumption that active participation in daily occupation promotes health.

The results of this study were generated from aggregated data from an aging population, producing epidemiological knowledge of importance for occupational therapy and occupational science. Hitherto, few studies combining the perspectives of public health science and occupational therapy theory have been published, but this novel approach produces knowledge that supplements and enriches our usual perspective that more often has been based on individual patient data.

The finding of no significant difference in survival
Table 1
Development of the Index of Active Participation in Daily Occupation

<table>
<thead>
<tr>
<th>Example of Interview Question</th>
<th>Rationalea</th>
<th>Response Alternative</th>
<th>Ordinal Scoreb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who is cooking for you?</td>
<td>This question reflected an occupation within the performance area of instrumental activities of daily living. The only response alternative clearly reflecting active participation was &quot;myself.&quot;</td>
<td>Myself</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>My wife or husband</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>My children</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other relatives</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neighbors</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home helper</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
<td>0</td>
</tr>
<tr>
<td>When was your latest contact with your children?</td>
<td>Social activities are included in the definition of occupation adopted for this study, and contact with children was defined as a social activity.</td>
<td>Not more than 2 days ago</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not more than 14 days ago</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than 1 month ago</td>
<td>0</td>
</tr>
<tr>
<td>Who owns your residence?</td>
<td>This question did not reflect active participation in daily occupations, thus, it was not chosen for the index.</td>
<td>Myself</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A tenant-owner's society</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The local authorities or others</td>
<td>0</td>
</tr>
<tr>
<td>Are you a member of any social club?</td>
<td>Membership in a society club indicates social activity, which we defined as an occupation.</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>If you are a member of a club do you also hold a commission of trust?</td>
<td>If a person has been entrusted with certain tasks within a club, he or she is likely to be most actively involved. Thus, we assigned an additional score of 1 if the answer was yes.</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>0</td>
</tr>
</tbody>
</table>

aRationale provided for why the question was or was not chosen for the index. bWe decided to operationalize the measurement of active participation in daily occupations by developing a single-scale measuring instrument. The 3-point scale was fixed to three ordered categories (0, 1, 2). We followed the principle of assigning a 2 to the response alternative indicating more active participation in daily occupation, even if there were only two response alternatives to a question. We used a 1 only in questions that had a response alternative indicating an intermediate level of active participation. Consequently, higher values indicated a more active participation in occupation.

for the men was intriguing. This difference in results between men and women could be explained by the fact that 10 points of the index of active participation in daily occupation (17% of the maximum total score obtainable) were derived from IADL questions related to activities such as cooking (see Table 1) and other kinds of household work. Our results confirm well-known traditional patterns of daily occupation commonly performed by women and men, especially in rural areas of Sweden 25 years ago. Men born at the turn of the century do not commonly participate in household work. Perhaps the results would have been different with participants born in the 1940s or 1950s. In occupational science research, sociocultural environmental influences, such as differences in the social construct of gender, must be taken into account, especially when assessing IADL (Lawton & Brody, 1969; Sonn et al., 1996).

Additionally, in Samuelsson et al.'s (1994) study of this population, gender differences related to survival were reported. The authors found that accuracy in predicting health of women was greater than that of men, and they identified different "threats" to health between men and women. Therefore, Samuelsson et al. concluded that it is of general importance in gerontological research to analyze men and women separately. Gender differences in survival were also found in multivariate studies from other regions of Sweden (Ljungquist, 1996; Parker, 1994) as well as from the United States (Manton, 1988; Reuben et al., 1992). Although the important predictive value of IADL for survival has been widely reported (Keller & Potter, 1993; Parker, 1994; Reuben et al., 1992; Sonn et al., 1996), information about gender differences is not consistent in these reports. For example, Keller and Potter (1994) and Manton (1988) found that IADL were equally predictive of survival in women and men, but Manton questioned whether certain IADL limitations were gender biased. He also reported significant gender differences in the risk of functional decline over the years. The lower female mortality at a given age and disability state imply a longer life expectancy and, therefore, longer duration of time spent by women in impaired conditions. The causes of female disability tended to be less lethal than those of male disability. In another study, Gurubhik and Kaplan (1989) stated that gender did not predict high function because of the counterbalancing effects of higher survival in women, but it did predict greater likelihood of high function among surviving men.

Table 2
Total Score Ranges and Median Values

<table>
<thead>
<tr>
<th>Subject Group</th>
<th>Minimum</th>
<th>Median</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (n = 88)</td>
<td>17</td>
<td>29</td>
<td>39</td>
</tr>
<tr>
<td>Women (n = 62)</td>
<td>13</td>
<td>33</td>
<td>38</td>
</tr>
<tr>
<td>Total (N = 151)</td>
<td>12</td>
<td>30</td>
<td>3</td>
</tr>
</tbody>
</table>
Does gender also bias the meaning given to different daily occupations? If so, what configuration of daily occupations represents a balance that is optimal for health (Zemke & Clark, 1996)? To answer these questions, knowledge that is based on group data could be combined with data from different persons' patterns of daily occupations. Occupation is highly individualized; that is, the person attaches meaning, or lack of meaning, to an occupation, even if it is routine and similar to that of most people (e.g., as in several PADL and IADL) (Clark et al., 1996). To study occupation, then, the person's interests and goals are central (Yerxa et al., 1990).

Perhaps a description of the changing pattern of daily occupation of the surviving participants over the 25-year period would help identify which occupations are sustainable for aging persons. This description would use the available socioeconomic data. We know that outcomes associated with additional activities, such as hobbies and leisure activities, can affect the older adult's well-being (Reitzes, Mutran, & Verrill, 1995; Wood, Rhodes, & Whelan, 1989) and health (Clark et al., 1996), but, unfortunately, data about this variable were not available for this cohort.

To capture the full range of the health-promotive dimension of aging persons' occupational behavior, intrinsic values, such as importance, meaning, and other more symbolic evaluative aspects, also have to be probed (Clark et al., 1996; Clark & Larson, 1993). Statistical analyses like those performed in the current study have their obvious limitations with regard to qualitative and individual aspects of phenomena; furthermore, the general, summarized total score of daily occupation in this study disguised such individual patterns of occupational behavior that are of interest for occupational science research.

Limitations

One limitation of the study might be that only an objective measure of health—survival—was used. Subjective measures or indicators of health are gaining focus in both public health science (Downie et al., 1990; Murray, 1994) and occupational science (Zemke & Clark, 1996) research. To get a more complete picture of the complex covariation between activity and health, the daily occupation variable developed in the current study could be used in future studies together with the variables previously developed by Samuelsson et al. (1994).

There are methodological shortcomings in creating an index of active participation in daily occupation from an old interview. First, we had to adopt the most generic definition of the concept of daily occupation possible, making more specific analyses impossible. Second, there is the general weakness inherent in using summed ordinal scales (Svensson, 1993). Nonetheless, we believe that our approach was justified by the unique possibility given to investigate survival in an entire population cohort from a defined geographic area during a very long period.

Conclusion

To our knowledge, this is the first empirical study to focus on the covariation between daily occupation and long-term survival, generating knowledge of importance for occupational science and occupational therapy. Significant differences in survival among more active and less
active women imply that the core assumption of occupational therapy (i.e., the relationship between occupation and health) is substantial. The fact that no differences in survival among more active and less active men were confirmed only demonstrates the complexity of studying occupation. ▲

Acknowledgments

We thank G. Samuelsson, PhD, who conducted the original study and generously helped us find the data we needed. We also thank J. Lanke, PhD, for statistical advice and comments and B. Slaug, BS, for helping with statistical computations and graphical display.

References


