Giving Up and Replacing Activities in Response to Illness

Jennifer Duke,1 Howard Leventhal,1 Susan Brownlee,2 and Elaine A. Leventhal3

1Institute for Health, Health Care Policy, and Research, Rutgers, The State University of New Jersey.
2Center for State Health Policy, Rutgers, The State University of New Jersey.
3Department of Medicine, Robert Wood Johnson School of Medicine, University of Medicine and Dentistry of New Jersey, New Brunswick.

Data from a longitudinal study of 250 older adults were used to examine activity loss and replacement as a consequence of an important illness episode. Multiple regression analyses revealed that reductions in activity were predicted by physical factors, specifically illness chronicity and severity. In contrast, replacing lost activities was facilitated by social support and optimism and inhibited by a belief in the need to conserve physical resources. An examination of the long-term benefits of replacing activities revealed that older adults who replaced a lost activity had higher positive affect levels 1 year after illness onset than those who did not replace activities. Continuing activity during illness episodes can help maintain positive well-being over time.

ADJUSTMENT to illness is a major problem for many older adults. Whether it is an illness episode with a finite timeline, such as an acute illness, injury, or surgery, or a more chronic problem, such as arthritis or long-term physical disability, older adults are often faced with the challenge of maintaining activity and well-being under difficult circumstances. Studies show that depressive symptoms and general emotional disturbance are related to disabling health problems (Parkes, 1964; Sinnott, 1984–1985), and older adults with physical health problems have been estimated to have twice the likelihood of developing clinical depression compared with those without such problems (Gurland et al., 1983; Prince, Harwood, Thomas, & Mann, 1998).

These negative outcomes appear to be mediated by functional impairment and the consequences of this impairment in disrupting participation in everyday physical and social activities. For example, Berkman and colleagues (1986), Mirowsky and Ross (1992), and Zeiss, Lewinsohn, Rohde, and Seeley (1996) found that functional impairment accounted for the effect of physical disease on depression. Additionally, a study of both recently bereaved and recently disabled individuals found that disabled individuals showed greater psychological distress, lower self-esteem, and lower positive well-being over a 10-month period relative to the bereaved group and an age-matched control group (Reich, Zautra, & Guarnaccia, 1989).

It has been shown that participation in valued activities is a critical component of well-being (Brickman & Coates, 1987; Egan, 1984; Williamson, 2000) and that illness resulting in changes to or reductions in valued activities can contribute to declines in well-being. The present study uses longitudinal data from a sample of older adults to test hypotheses about the effects of illness and social and personal resources on three outcomes: (a) the giving up of valued activities, (b) the replacement of valued activities, and (c) the effect of failure to replace activities on well-being. If the failure to replace valued physical or social activities that have been reduced or lost is responsible for the deleterious effects of illness on emotional well-being, individuals who find replacements for such losses should show less disturbances in adjustment (e.g., less reduction in positive affect) than do those older adults who fail to generate adequate replacements.

Theoretical Background

The developmental changes associated with aging and coping with age-related losses have been described by activity theory (Havighurst, 1963) and continuity theory (Atchley, 1987), though empirical support for these early gerontological theories is limited (Fox, 1981–1982; Zimmer, Hickey, & Searle, 1995). Among more recent efforts to address how older adults cope with personal losses across various life domains (e.g., Baltes & Baltes, 1990; Heckhausen & Schultz, 1993), Brandstädter and colleagues (Brandstädter & Greve, 1994; Brandstädter & Renner, 1990) have proposed that older adults use a combination of active, assimilative strategies and passive, accommodative strategies. Their dual process model, which is similar to early models by Neugarten (1973) and Lazarus and DeLongis (1983), posits that advancing age results in a shift away from the active adjustment of life situations to meet personal preferences (i.e., assimilation) and a parallel shift to the accommodation or adjustment of personal preferences to fit situational constraints, which makes fewer physical and psychological demands on the individual’s resources (Brandstädter, Wenta, & Rothermund, 1999). Older adults who replace lost activities may be viewed as successfully using an accommodative strategy for coping with losses, a strategy marked by the ability to shift from one blocked goal or activity to another (Brandstädter et al., 1999). If activity levels become unfeasible as a result of illness, accommodative strategies should allow individuals to reallocate attentional resources to alternative options. In this article, we explore the determinants of an accommodative strategy of replacement and its effects on subsequent well-being.
**Hypotheses**

The current study replicates and extends prior investigations on the role of illness factors and social–psychological factors on the reduction and loss and the replacement of physical and social activities. A prior study by Zimmer, Hickey, and Searle (1997) found that the severity of arthritis was related to losses and reduction in activities but was unrelated to replacement with new activities in a sample of older adults. Participants who failed to find replacements were older, less educated, unmarried, and had smaller and less intimate social networks than those who ceased an activity but started a new one within the prior year. Although the Zimmer and colleagues (1997) data are important and provocative, they call for replication and extension, as they were cross-sectional. Prior studies also suggest that reductions in activity level are related to depressed affect (Williamson, 2000; Zeiss et al., 1996) and, conversely, that increases are related to positive affect (Holahan, 1988). In the present, longitudinal study, our hypotheses focused on (a) illness factors involved in the reduction or loss of valued activities, (b) illness factors involved in replacing valued activities, (c) social and personal resources involved in replacing valued activities, and (d) the emotional benefits (i.e., impact on positive affect) of replacing activities over time.

**Illness factors affecting activity reduction and loss.**—Participants were asked to report on their single most important illness during the prior 6 years of our longitudinal study, to allow for the replication of the Zimmer and colleagues (1997) finding that the reduction and loss of activity was determined by illness severity. Therefore, Hypothesis 1 was chronic rather than acute illnesses, higher ratings of illness severity and functional impairment, and lower self-rated assessments of general health are related to a reduction in valued activities.

**Illness factors affecting activity replacement.**—The second focus of our study was the identification of factors affecting activity replacement. Additionally, study participants with less severe illnesses and better general health should have the energy to search for and find replacements. Thus our second hypothesis was chronic rather than acute illnesses, lower ratings of illness severity, and higher self-rated assessments of general health are related to finding replacements for valued activities.

**Social and personal resources affecting activity replacement.**—We also expected an association between replacing lost activities and the social and personal resources that allow older adults to re-engage with their environments. Higher levels of social support provide access to possible replacement activities, opportunities for engaging in activities with other people and social pressure to do so; data show that support has positive effects on health and wellbeing (Broadhead et al., 1983; Diener, 1984; Minkler, 1985; Okun, Stock, Haring, & Witter, 1984).

The value of social support for generating replacements should be moderated by the chronicity of an illness. Family and friends may be most willing and able to offer support for acute illness and/or for the acute, onset phase of chronic illness. For example, social support has been found to be particularly helpful in generating positive health outcomes immediately following hospitalizations for coronary heart disease; its benefits diminish, however, over time (Fontana, Kerns, Rosenberg, & Colonee, 1989). As members of the support network are less likely to provide the same level of aid over the longer term, successful adaptation to chronic illnesses depends on an increasing degree of the individual’s internal resources. Thus, high levels of social support should facilitate replacement during acute illness episodes, thereby buffering the effects of the severity and the length of illness episodes that caused the loss of valued activities.

As social support is expected to be of value over the short term, we examined the value of two personal resources expected to affect replacement over the longer term: optimism and conservation of energy. Optimism has been shown to influence persistence toward goal attainment (e.g., Carver, Blaney, & Scheier, 1979), and it has been proposed that optimistic individuals cope more effectively with distress and disease (Carver et al., 1993; Friedman et al., 1992). The psychological and health benefits of dispositional optimism have been shown across a wide array of situations (Carver & Gaines, 1987; Carver, Scheier, & Weintraub, 1989; Litt, Tenn, Aflleck, & Klock, 1992; Scheier et al., 1989; Strack, Carver, & Blaney, 1987). Replacing activities may be one mechanism by which optimists successfully maintain well-being during and after an illness. Replacing activities may also be affected by the belief that conserving energy is critical for sustaining physical well-being. Conservation beliefs appear to be associated with the need to optimize adaptation by minimizing effort during the later years of life (Baltes & Baltes, 1990; Carstensen, 1992) and affect readiness to seek medical care during illness episodes (E. Leventhal & Crouch, 1997; Prohaska, Leventhal, Leventhal, & Keller, 1985). Therefore, we hypothesized that a self-regulation strategy of conserving energy serves as a barrier to accommodation to lost activities, such that those high in conservation are less likely to find replacements.

With regard to replacement, we tested Hypothesis 3:

**Benefits of activity replacement over time.**—Although older adults are often forced to reduce or give up valued activities, those who find replacements may show less emotional disturbance over time. The maintenance of physical and social activities likely serves as an important buffer against the negative effects that often accompany illness. Physical activity has been shown to improve mood, well-being, and self-efficacy, and social activities have been linked to the absence of depression (Strawbridge, Cohen, Sherma, & George, 1996), increased longevity (Berkman & Syme, 1979), and positive well-being (Lomranz, Bergman, Eyal, & Shmotkin, 1988; Mancini, 1978; Reich & Zautra, 1981;...
Russell, 1990; Steinkamp & Kelly, 1987; Zimmer et al., 1995). The role of physical and social activities in maintaining positive well-being during illness episodes has not been explored in prospective studies. We attempted to fill that gap in research by testing Hypothesis 4:

positive affect levels 1 year postillness are higher among individuals who find replacements as compared with those unable to find activity replacements.

**Methods**

**Participants and Procedures**

This research used data from a longitudinal survey of community-dwelling older adults, the Rutgers Aging and Health Study, that examined the relationship of psychological factors to future illness and mortality. In-depth interviews approximately 2 hr in length were conducted annually from 1991 to 1999. Interviews were conducted in participants’ private dwellings (95%) or in private rooms in the community’s clubhouse (5%). The interviewers, advanced psychology, sociology, or premedical students, recorded participant responses on laptop computers using CASES software (Shanks, 1983).

Of the 851 participants entering the study, 459 remained at the seventh wave (1997) of data collection. Participant loss averaged 9.75% per year because of death, moving from the community, and withdrawal. The 392 participants no longer in the sample both were older (M = 74.6 and M = 71.8 respectively), t(849) = 5.52, p < .001, and reported poorer self-assessments of health at baseline (M = 3.4 and M = 3.6), t(849) = 6.80, p < .001. There were 286 (62%) women and 173 (38%) men with 76% of the women and 85% of the men having had more than 12 years of education. Half of the sample was married and 34% was widowed. The sample was made up of upper-middle class, non-Hispanic White participants (99.3%). With regard to religious affiliation, 39% of the sample was Protestant, 26% Catholic, 27% Jewish, and 8% reported “other” for religion. Participants reported an average of 16 diseases or health conditions during their adult lifetime (SD = 7.66).

**Design**

At the seventh wave (1997) of this longitudinal study, participants were asked whether they had experienced an illness episode in the previous 6 years that resulted in the loss or reduction of valued activities. At this time they also reported whether the illness was chronic or acute. The major dependent variable, the replacement of reduced or lost activities, was also reported on at Wave 7. The severity of the illness episode was assessed the year of onset (all illnesses were reported annually and rated for severity), and the illness as reported at the year of onset was rated for severity and functional impairment by physician judges. To examine changes in well-being, we assessed positive and negative affect annually. Illness episodes reported at Wave 1 were excluded from analyses because a pre-episode measure of positive affect was unavailable for these illnesses.

The use of retrospective Wave-7 data rather than year-of-onset data to determine whether an illness did or did not disrupt life activities seemed the most reasonable way to proceed, as the severity ratings at point of onset can be deceptive indicators of long-term impact if all illnesses are included in the sampling frame. For example, high severity ratings are likely for acute, painful head or stomach viruses or painful toothaches that last for a few days but are mostly irrelevant as disruptions of life activities. By contrast, chronic conditions that are less painful and “severe” at onset and longer-lasting or repetitive acute conditions that may be less responsive to treatment (e.g., bladder infections), can require extensive adjustments in living patterns over long time frames. The Wave-7 question was worded to restrict our focus to that set of illnesses that was considered to have an important impact. The Wave-7 reports were then validated by matching each reported illness with the reports made on the medical history updates that was taken at each annual interview. Of the 250 illnesses reported at Wave 7, 212 matched by label and year to the appropriate annual interview: The 38 cases that could not be matched were not used to test our hypotheses.

The major predictors of adaptation, social and personal resources, were assessed prior to Wave 7, the point at which the illness episode, activity reductions, and replacements were reported. As social resources, supports and demands, were recorded annually, we used the reports at the year of illness onset to predict activity loss and replacement. Of the two personal resources, optimism was measured at Wave 1, prior to all other measures, and conservation of energy, the second, was assessed at Wave 3 prior in time to 65% of the reported illness episodes and prior to the report of activity loss and replacement given at Wave 7. Self-assessments of health and negative affects were assessed annually, and the measures taken at the year of illness onset were used as controls in the main analyses. Table 1 displays the means for the items and scales.

![Table 1. Means, Standard Deviations, and Ranges of Variables](https://academic.oup.com/psychsocgerontology/article-abstract/57/4/P367/593414/593414)

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Time of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of activity scale (2)</td>
<td>2.35</td>
<td>1.11</td>
<td>1.00–5.00</td>
<td>Wave 7</td>
</tr>
<tr>
<td>Replacement of activity</td>
<td>2.25</td>
<td>1.39</td>
<td>1.00–5.00</td>
<td>Wave 7</td>
</tr>
<tr>
<td>Physician-rated illness assessments</td>
<td>3.62</td>
<td>26.27</td>
<td>1.00–95.00</td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional impairment</td>
<td>41.85</td>
<td>24.72</td>
<td>1.00–90.00</td>
<td></td>
</tr>
<tr>
<td>Self-rated illness severity</td>
<td>3.40</td>
<td>1.15</td>
<td>1.00–5.00</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Self-assessed health</td>
<td>3.09</td>
<td>0.87</td>
<td>1.00–5.00</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Social support (7)</td>
<td>4.28</td>
<td>0.57</td>
<td>1.78–5.00</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Social demands (3)</td>
<td>1.92</td>
<td>0.81</td>
<td>1.00–5.00</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Optimism (8)</td>
<td>3.72</td>
<td>0.51</td>
<td>2.25–5.00</td>
<td>Wave 1</td>
</tr>
<tr>
<td>Conservation of energy (3)</td>
<td>2.58</td>
<td>1.09</td>
<td>1.00–5.00</td>
<td>Wave 3</td>
</tr>
<tr>
<td>Negative affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression (5)</td>
<td>1.58</td>
<td>0.60</td>
<td>1.00–3.80</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Anxiety (5)</td>
<td>1.82</td>
<td>0.65</td>
<td>1.00–4.00</td>
<td>Year of onset</td>
</tr>
<tr>
<td>Positive affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preillness (5)</td>
<td>3.75</td>
<td>0.64</td>
<td>1.50–5.00</td>
<td>Year before onset</td>
</tr>
<tr>
<td>Postillness (5)</td>
<td>3.70</td>
<td>0.66</td>
<td>1.50–5.00</td>
<td>Year after onset</td>
</tr>
</tbody>
</table>

*Notes: If information is for more than one item, the number of items in the scale is listed in parentheses. All items are on a 5-point scale unless otherwise noted. Time of measurement is listed by either wave of interview or in relation to the onset of the illness episode.*

Scale = 1–100, 1 = least life-threatening, debilitating, 100 = most life-threatening, debilitating.
Assessments of Illness

Most important illness.—To identify the illness that most affected life over the prior 6 years, we asked participants at Wave 7 (1997), “What new condition or illness have you had since 1991 that has affected your life the most?” Of the 459 participants, 250 (54%) reported a new illness that began after the Wave 1 interview in 1991. The most common types of illnesses included bone or joint conditions (23%), cardiovascular disease (21%), cancer (12%), sensory problems (8%), gastrointestinal problems (7%), prostate or bladder problems (6%), and infections (6%). Other illnesses made up the remaining 17%. The vast majority of these conditions (joint conditions, cancers, sensory problems, prostate and bladder problems, and most cardiovascular conditions) are chronic and slow to change, only gradually affecting function. Participants reporting an illness were asked the following set of questions: “When did the condition or illness begin?” “Is it still ongoing, or are you currently receiving treatment for this condition?” and “When did it end, or when did you stop receiving treatment for it?”

Illness severity self-assessed.—Participants reported on the severity of the illness that affected their life the most the year of illness onset. The rating was made on a 5-point scale (not at all, a little bit, moderately, quite a bit, very much) in response to the question, “How severe is it?”

Illness severity and impairment: physician-rated.—Each reported illness was rated by two academic, board-certified internists on “the amount of functional impairment caused by the illness or condition” and “the life-threateningness of the illness or condition.” The raters examined each participant’s Wave-7 description of his or her illness, classified it by organ system and International Classification of Diseases-9 category, and rated the report on the basis of its categorization. The two ratings, one of life-threateningness and the other of the amount of functional impairment expected with such conditions, were made on 1–100-point scales (1 = least functional impairment/least life-threatening and 100 = most functional impairment/most life-threatening). The ratings were averaged across the two physicians; alphas for such ratings typically exceed .95 (see ratings of illness burden).

Illness chronicity.—Participants’ illnesses were categorized as either chronic (n = 173) or acute (n = 77). The acute illness group reported that their illness had ended before the Wave-7 interview, and the chronic illness group reported their illness as ongoing. Twelve participants with ongoing illnesses beginning within the year of the Wave-6 interview were placed in the acute illness group because their illnesses could not be considered chronic (e.g., a broken leg, viral infection, etc.).

Activity Reduction and Replacement

The reduction of activity scale.—At Wave 7, participants were asked a set of items regarding any changes in physical activities caused by their illness. A parallel set of items assessed changes in social activities. Because the reported physical and social activities overlapped, the physical or social activity rated as the most important was used in all analyses. Of the 250 participants reporting an illness, 157 gave a higher importance rating to a physical activity and 20 gave a higher rating to a social activity; 73 did not give up any activities. All of the participants reported that the reduction or change to activities was unfavorable.

The Wave-7 question asked, “How much has the condition forced you to change or give up any physical/social activities?” Participants identified a single activity in 85.5% of the cases. In cases in which more than one activity was identified (14%), participants indicated which was the most important. The amount of interference with activities reported to this question was averaged with the mean of the two questions assessing interference with activities at the year of illness onset (the two were averaged, as they were highly correlated: r = .91). The two questions were “On an average day, how much does the condition interfere with things you need to do?” and “On an average day, how much does the condition interfere with things you like to do?”

All questions used a 5-point scale (not at all, a little bit, moderately, quite a bit, very much; scale α = .80).

Replacement of activity.—The Wave-7 question assessing the replacement of activities was, “How much have you been able to find replacements for what you lost or gave up?” (not at all, a little bit, moderately, quite a bit, very much). An open-ended question, “What are the replacements?” identified the type of replacements.

Predictors Testing Hypotheses for Activity Reduction and Replacement

Measures of general health.—Self-assessed health was examined at the year of illness onset using the single item, “In general, would you say your health is . . .” (poor, fair, good, very good, excellent).

In addition to self-assessed health, a measure of lifetime illness burden prior to entering the study was assessed at Wave 1. The burden measure was designed to control for the degree to which previous illnesses affect activity loss and replacement. This measure was derived from a detailed medical history that allowed for the reporting of approximately 400 diseases experienced during the adult years. Each of the diseases reported was weighted by the ratings of six academic physicians for life-threateningness and functional impairment on a scale of 1 to 100. Physician agreement, computed for six raters across all diseases, was extremely high (Chronbach’s α = .97), but to obtain the most stable measure for each reported disease, we decided to drop the ratings of two physicians whose ratings were often significantly higher or lower than those of the other four. The final rating of each disease’s severity was an average of the remaining four scores.

Personal resources.—Optimism was assessed at Wave 1, prior to the onset of illness for all participants, using the eight-item Life Orientation Test (Scheier & Carver, 1985). Responses were made on a 5-point scale (disagree strongly,
disagree, neither agree nor disagree, agree, agree strongly; α = .82).

Three items assessed conservation of energy at Wave 3, prior to the illness reports for 65% of the participants. The items were “Do you feel you will live longer if you conserve your store of energy?” “Are you careful to conserve your energy?” and “Do you feel that as you get older you should take more care to conserve your energy?” (α = .82). Responses were on a 5-point scale (never, rarely, sometimes, often, always).

Social support and demands.—The measure of social support that was used was taken the year of illness onset. Items included a measure of overall satisfaction with social support (“Overall, how satisfied are you with your social support?” assessed on a 5-point scale: not at all, a little bit, moderately, quite a bit, very much), two items assessing companionate support (e.g., “Is there someone with whom you can do enjoyable things?”), and two items assessing tangible support (e.g., “Is there someone who will help you with daily tasks when you are ill?”) each item assessed on a 5-point scale: never, rarely, sometimes, often, always; (α = .81).

A social demands scale was assessed the year of illness onset. The three items (“How often is there someone who makes you feel burdened?” “How often is there someone who makes too many demands on you?” and “How often is there someone who makes you feel obligated to help them?”) also used 5-point scales (never, rarely, sometimes, often, always; α = .71). All of the measures of social support and demands were adapted from items in the Social Networks in Adult Life Questionnaire (Antonacci & Akiyama, 1987; Kahn & Antonucci, 1980) and the Yale Health and Aging Project (Seeman & Berkman, 1988). The items are representative of those used in the social support literature (e.g., House, 1981; Rook, 1987; Wills, 1985).

Negative and Positive Affect Measures

Negative and positive affect were assessed at each of the annual interviews. To assess the possible contribution of negative affect to activity reduction and replacement, we used the participants’ report of negative affect at the year of illness onset. To assess the possible effects of activity replacement on positive affect, we used the measures of positive affect taken 1 year before illness onset and 1 year after it. Depression (α = .90), anxiety (α = .89), and positive affect (α = .88) were each measured on a 5-point scale (not at all, a little bit, moderately, quite a bit, very much). The five items used for each of the three scales had the highest loadings on two prior confirmatory factor analyses (Usala & Hertzog, 1989). The complete set of items was selected from the Profile of Mood States (McNair, Lorr, & Droppelman, 1971).

RESULTS

Predicting the Reduction of Activity

There were no differences in age, gender, marital status, religion, education, self-assessed health, or lifetime illness burden between those who reported a new illness since 1991 (n = 250) and those who did not (n = 209). The 250 participants experiencing a new illness reported the following levels of activity reduction: 24 (10%) very much, 59 (24%) quite a bit, 36 (14%) moderate, 58 (23%) a little bit, and 73 (29%) no reduction. Except for age, which was correlated with the reduction of activity scale (r = .15, p < .05), activity reduction was unrelated to participant variables of gender, marital status, religion, education, the type of the most important illness reported, or lifetime illness burden. Therefore, only age was controlled in analyses of reductions in activity. Table 2 gives the distribution of the most important activities given up or reduced and their replacements. Although 14% of the participants reported a reduction in more than one activity, only the most important for each participant is listed.

The sample to test hypotheses was reduced from 250 to 212 participants because 22 participants reported multiple illnesses at an annual interview, and we were unable to determine which of those reported was the most important at Wave 7. Sixteen other participants reported a surgery as their most important illness, and they were dropped from the sample as there were no severity ratings for surgeries at each of the annual interviews.

Illness factors.—Hierarchical multiple linear regression tested whether illness factors accounted for variance in the reduction of activity. Because the items assessing activity reduction were assessed at both the year of illness onset and at Wave 7, as were the predictors, these analyses are essentially cross-sectional. Age, illness chronicity, and physician-ratings of both illness severity and functional impairment were entered, followed by self-reported illness severity and self-assessed health both measured at year of onset (Table 3). Thirty-three percent of the variance in the reduction of activity scale was accounted for by age, illness chronicity, self-rated illness severity (year of onset), and self-assessed health (year of onset). Poor self-assessed health, the presence of a chronic rather than an acute illness, and advanced age and high levels of illness severity were related to a greater reduction in activity. Reduction of activity was unre-

<table>
<thead>
<tr>
<th>Reduced or Lost Activities</th>
<th>%</th>
<th>Replacement Activities</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise, golf, swimming, tennis, biking, running, dancing</td>
<td>28</td>
<td>Listening to music, reading, writing</td>
<td>33</td>
</tr>
<tr>
<td>Walking</td>
<td>22</td>
<td>Visiting others, socializing, playing games</td>
<td>27</td>
</tr>
<tr>
<td>Social outings, traveling, long outings</td>
<td>10</td>
<td>Golf, swimming, bicycling, walking, dancing</td>
<td>16</td>
</tr>
<tr>
<td>Gardening, housework</td>
<td>9</td>
<td>Aid from others</td>
<td>8</td>
</tr>
<tr>
<td>Activities with minimal physical activity (e.g., ping pong, sewing)</td>
<td>7</td>
<td>Watching television</td>
<td>6</td>
</tr>
<tr>
<td>Driving</td>
<td>7</td>
<td>Art, singing, playing instrument</td>
<td>4</td>
</tr>
<tr>
<td>Overall activity</td>
<td>4</td>
<td>Housekeeping, gardening, cooking</td>
<td>3</td>
</tr>
<tr>
<td>Shopping</td>
<td>4</td>
<td>Other</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*pAlthough these replacements are more vigorous activities, they represent a downward shift in participants’ level of activity after illness onset.

Table 2. Reduced or Lost Activities (n = 177) and Replacement Activities (n = 95)
Predicting the Replacement of Activity Scale (Wave 7)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson Correlation</th>
<th>$R^2$ When Entered</th>
<th>Standardized Regression Coefficient (β) in Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.118**</td>
<td>.027*</td>
<td>.104*</td>
</tr>
<tr>
<td>Illness chronicity</td>
<td>.123**</td>
<td>.031**</td>
<td>.139**</td>
</tr>
<tr>
<td>Physician-rated illness severity</td>
<td>.038</td>
<td>.007</td>
<td>.020</td>
</tr>
<tr>
<td>Physician-rated functional impairment</td>
<td>.256***</td>
<td>.046***</td>
<td>.090</td>
</tr>
<tr>
<td>Self-rated illness severity (onset)</td>
<td>.448***</td>
<td>.171***</td>
<td>.387***</td>
</tr>
<tr>
<td>Self-assessed health (onset)</td>
<td>-.325***</td>
<td>.049***</td>
<td>-.242***</td>
</tr>
<tr>
<td>Sum</td>
<td>N = 212</td>
<td>Total $R^2 = .33$</td>
<td>$F(7,204) = 16.91***</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001.

related to physician ratings of severity and functional impairment. It should be noted that all of the predictors of the reduction of activity described in this section remain significant in analyses using the individual items in the reduction of activity scale; the analysis with the Wave-7 item is “prospective” relative to the predictors, and the analysis with the averaged year of onset items is free of any Wave-7 retrospective bias.

Additional comparisons were made between participants reporting a chronic illness and those reporting an acute illness. Self-reported chronic illnesses averaged 3.2 years in duration, whereas acute illnesses lasted only 0.9 years, $t(163) = 9.14, p < .000$. Physician-rated functional impairment was also greater for those reporting a chronic illness ($M = 48.2$) than for those reporting an acute illness ($M = 40.0$), $t(163) = 2.05, p < .05$. At the year of illness onset participants reporting a chronic illness also reported more interference with what they needed and liked to do ($M = 2.7$) than did participants reporting an acute illness ($M = 1.5$), $t(139) = 5.91, p < .000$.

**Social and personal resources.** Although optimism, satisfaction with social support, and negative affect (i.e., anxiety and depression) were significantly related to the reduction of activity scale, the association between these social and personal resources was not significant after controlling for the illness factors described above.

**Predicting the Replacement of Activity**

The degree of success in activity replacement claimed by the 177 participants who reported a reduction in an important activity was as follows: 15 (9%) very much, 25 (14%) quite a bit, 32 (18%) moderate, and 23 (13%) a little bit. Eighty-two participants (46%) were unable to find a substitute activity. The replacement of activity was unrelated to age, gender, marital status, religion, education, type of disease, lifetime illness burden, or the self-reported importance of the activity; these variables were eliminated from further analyses.

**Illness factors.** The same illness factors used in predicting the reduction of activity were used in a regression analysis predicting the dependent variable, replacement of activity. Of the five illness measures entered in the model, only illness chronicity and self-rated illness severity the year of illness onset were predictive of replacing activity. The illness factors accounted for 7% of the variance in replacement in contrast to the 30% of variance that these variables accounted for in activity reduction.

**Social and personal resources.** Zero-order correlations between the replacement of activity and social and personal resources showed that both social support and social demands were related to finding replacements ($r = .14, p = .07$; $r = .17, p < .05$). Personal resources were also related to finding replacements: optimism, positively ($r = .22, p < .01$) and conservation of energy, negatively ($r = -.15, p < .05$).

**A model for the replacement of activity.** Illness factors significantly related to replacement (illness chronicity, self-rated illness severity at onset) and all social and personal resources significantly related to replacement (social support, social demands, optimism, and conservation of energy) were entered in sequence in a hierarchical, linear regression. These factors accounted for 28% of the variance in replacement (Table 4); except for chronicity, all were assessed prior to the reporting of replacements at Wave 7. The interaction between illness chronicity and social support was entered as the last step, explaining an additional 3% of the variance.

Consistent with the correlations, the regression analyses showed that participants were more likely to find replacements for lost activities if they reported a chronic rather than an acute illness and if they rated their illness as less severe at the year of illness onset. Both measures of personal resources were related to finding replacements: optimism, positively, and the belief that conserving energy enhances longevity, negatively. There was also a main effect for social demands. The more participants felt that others were demanding support from them, the more likely they were to find replacement activities. Additional analyses showed that social demands were related to age and gender: Younger participants reported more social demands than older participants did ($r = -.25, p < .000$); those who were single, married, or divorced reported more demands than widowed

Table 4. Summary of Hierarchical Regression Analysis Predicting the Replacement of Activity at Wave 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson Correlation</th>
<th>$R^2$ When Entered</th>
<th>Standardized Regression Coefficient (β) in Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness chronicity</td>
<td>.210*</td>
<td>.027*</td>
<td>.215**</td>
</tr>
<tr>
<td>Self-rated illness severity (onset)</td>
<td>-.191*</td>
<td>.041*</td>
<td>-.166*</td>
</tr>
<tr>
<td>Social support (onset)</td>
<td>.136*</td>
<td>.028*</td>
<td>.127</td>
</tr>
<tr>
<td>Social demands (onset)</td>
<td>.172*</td>
<td>.033*</td>
<td>.228**</td>
</tr>
<tr>
<td>Optimism (Wave 1)</td>
<td>.221**</td>
<td>.063***</td>
<td>.282***</td>
</tr>
<tr>
<td>Conservation of energy (Wave 3)</td>
<td>-.145**</td>
<td>.028*</td>
<td>-.158*</td>
</tr>
<tr>
<td>Interaction: Illness Chronicity × Social Support</td>
<td>.031*</td>
<td>.178**</td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>N = 150</td>
<td>Total $R^2 = .25$</td>
<td>$F(7,142) = 6.23*$</td>
</tr>
</tbody>
</table>

*p = .07; **p < .05; ***p < .01; ****p < .001.
participants did \(M = 2.0, M = 2.0, M = 2.2,\) and \(M = 1.6,\) respectively), \(F(4,245) = 3.08, p < .05;\) and women reported more demands than men did \(M = 2.0\) and \(M = 1.7,\) respectively), although this last difference was only marginally significant, \(t(249) = 1.83, p = .067.\)

The relationship of positive social support with replacement was modified by an interaction with illness chronicity: Social support facilitated activity replacement for participants reporting acute illnesses \((n = 49)\) but was not beneficial for participants reporting chronic illnesses \((n = 101).\) Analyses revealed a significant difference in simple slopes by group \((\beta = .49\) for acute group, \(\beta = .09\) for chronic group), \(t(143) = 2.96, p < .01.\) These findings suggest that members of a social network are most likely to aid older adults during the initial phases of illness while leaving chronically ill older adults to rely on their personal resources.

**Positive Affect 1 Year Later**

Differences in positive affect following the onset of a chronic illness were compared among the no-activity-reduction group (those who had a condition but did not reduce activities), the no-replacement group (those who reduced activities but did not find a replacement), and the replacement group (those who reduced activities and were able to find a replacement). There were no differences among the three groups in age, gender, marital status, total illness burden reported at 1991, or physician-rated illness severity. However, the duration of illness for the group that did not replace activities was significantly shorter \((M = 1.9)\) than was that for the group that did not reduce activities \((M = 2.6)\) or those who reduced and replaced activities \((M = 2.6), F(3,246) = 3.98, p < .05.\) Those in the no-activity-reduction group rated their illness as less severe during the year of onset \((M = 2.8)\) than did the no-replacement group \((M = 3.7)\) or the replacement group \((M = 3.6), F(3,208) = 11.69, p < .000.\) The no-activity-reduction group also reported less pain \((M = 1.5)\) than the other two groups did \((M = 2.6\) and \(M = 2.4,\) respectively), \(F(3,246) = 14.38, p < .000,\) and had less physician-rated functional impairment \((M = 33.2)\) than did the other groups \((M = 43.5\) and \(M = 47.0,\) respectively), \(F(3,246) = 6.83, p < .001.\)

We hypothesized that when controlling for positive affect prior to illness, older adults who replaced lost activities following a chronic illness would report higher levels of positive affect than would those who did not replace reduced activities. Levels of positive affect 1 year after the onset of a chronic illness \((n = 173)\) differed significantly among the three groups, \(F(3,169) = 4.29, p < .05\) (see Table 5). Further analyses controlling for positive affect 1 year prior to the onset of a chronic illness showed the same effect, \(F(3,169) = 4.00, p < .05.\) The participants who reduced activities but did not find replacements reported lower levels of positive affect 1 year after the onset of a chronic illness than did participants in the other two groups. No differences were detected among participants reporting acute illnesses \((n = 77).\)

**Discussion**

The current study has identified several important determinants of changes in activity patterns in response to illness by older adults. Older adults were more likely to reduce or abandon activities in response to illness if they assessed their health as fair or poor and if the illnesses were chronic and severe. With the exception of chronicity, all of these factors were measured at the year of onset and prior to the Wave-7 measure of reported replacements. Physician ratings of illness severity were not related to reductions of activity, although physician ratings of functional impairment were. Ratings of functional impairment did not remain significant in the final regression model. The data suggest that feelings of frailty may cause reductions in activity above and beyond illness severity, as lower self-assessments of health were predictive of reductions in activity in addition to the reductions predicted by self-ratings of illness severity. It is important to note that activity reduction was not related to the social and personal resources reported by our elderly participants, nor was it related to negative affect (i.e., depression and anxiety). Rather, people’s perception of the physical experience of their illness affected the reduction of activities during an important illness episode.

In contrast to the important role played by physical factors in the reduction of activities, only two illness measures predicted replacements: illness severity and chronicity. Activity replacement was predicted primarily by social and personal factors. Consistent with previous research (Zimmer et al., 1997), older adults who reported more social demands were more likely to find substitute activities. Positive social support predicted replacement only for those elderly adults reporting acute illnesses. Finding replacements was predicted by personal characteristics; positively by an optimistic outlook and negatively by the belief in the need to conserve energy for a long life. Conservation of energy also is assumed to be responsible for the swift seeking of medical care by elderly adults in comparison with the rate of care seeking by middle-aged adults (E. Leventhal, Leventhal, Schaefer, & Easterling, 1993). Consistent with the goal of optimizing adaptation with minimal effort (Baltes & Baltes, 1990; Carstensen, 1992), it has been hypothesized that in comparison with middle-aged adults, elderly adults are more motivated to conserve resources and avoid risk of depleting their more limited physical and emotional reserves (E. Leventhal & Crouch, 1997). The results for optimism and conservation point to the need to identify the specific strategies used to cope with serious chronic illness. This points to the inadequacy of unitary concepts such as “problem-focused coping” for understanding adaptation to chronic illness (Lazarus & Crouch, 1997). The results for optimism and conservation point to the need to identify the specific strategies used to cope with serious chronic illness. This points to the inadequacy of unitary concepts such as “problem-focused coping” for understanding adaptation to chronic illness (Lazarus & Crouch, 1997).
Folkman, 1984). Taken together these results suggest that physical incapacity was less important for activity replacement by older adults than were the social factors that created the opportunity and encouragement to find replacements, and the personal factors such as optimism and conservation that affected motivation to seek and find alternatives. The magnitude of these effects is impressive given that the replacement was reported 1 to 6 years after the assessment of the predictor variables. It is important to note that optimism and conservation affected replacement after we controlled for negative affect, a factor frequently presumed to be responsible for the effects of optimism.

The finding that chronicity of an illness moderates the contribution of social support on activity replacement is of particular theoretical interest. Perceptions of instrumental and companionate support were related to finding replacement activities for acute illnesses. These factors did not contribute to finding replacements for individuals reporting chronic conditions, a group characterized by sustained illnesses that are typically progressive and more functionally impairing. These findings are consistent with and expand on prior studies showing that positive social support facilitates only the initial adjustment to major, stressful life events, and that personal resources are important for the longer term (Hobfoll & Leiberman, 1987). In contrast, however, involvement in a social network perceived to be demanding facilitated finding replacement activities for those with both chronic and acute conditions. It appears that demands for assistance and support from others appear to outlast the willingness to give support. This issue merits further study.

Finally, the data indicated the possible benefits of replacing activities, as levels of positive affect were higher 1 year after illness onset for those who found replacements. It should be noted that these effects were present after we controlled for both optimism and negative affect. The association of age with reducing activities in response to illness is consistent with studies from leisure sciences (e.g., Jackson & Dunn, 1988; Searle, Mahon, Iso-Ahola, Sdrolias, & van Dyck, 1995), which indicate that older persons are less likely to benefit from the association of high levels of general activity with increased positive affect (Holahan, 1988) because they are less likely to replace activities as they age (Searle, Maclavish, & Brayley, 1993). Our data suggest that the ability to sustain activity influences subsequent positive affect in the face of chronic illness and does so over and above the benefits of an optimistic outlook.

The results of this study are consistent with Baltes and Baltes’s (1990) model of selective optimization and with using an accommodative strategy in coping with chronic illness (Brandstätter & Greve, 1994). In accord with the Baltes model, our elderly participants compensated for activity reduction and loss by adopting less effortful behaviors that met valued goals. These compensatory actions allowed them to maintain positive affect despite the added burden of a new chronic illness. Our data underscore the benefits of successfully using the accommodative strategy of shifting from one blocked goal or activity to another in coping with chronic illness (Brandstätter & Greve, 1994; Brandstätter & Renner, 1990), but additional longitudinal studies using validated, multidimensional measures of activity reduction and replacement are needed to further explore these hypotheses (e.g., Brandstätter & Renner, 1990).

The present study has several limitations. First, more detailed, objective measures of disease and disease-related functional impairment would provide a more valid picture of the actual impact of biological factors. Second, the data are based on self-reports, and these reports may not fully correspond with behavioral measures. Factors such as optimism could affect respondents’ perceptions and reports of both their illness at time of occurrence and their subsequent reports of disruption and success in finding replacements. Biased reporting does not appear to provide an adequate account for these findings, however, as negative affect, which is typically considered an indicator of biased reporting of illness events, was unrelated to any of our outcome measures, and optimism predicted replacement but not losses or reductions of activities. Third, the generalization of these results is also limited by the ethnic and socioeconomic homogeneity of our participants; although varied in religious affiliation, the participants were mostly White and sufficiently affluent to purchase homes in a retirement community. Given the properties of the sample and the use of a new and very brief measure of conservation of energy, replication is necessary.

Finally, our data were limited in several ways by our assessing illness impact at Wave 7 of the longitudinal study. One limitation was the loss of participants who had died or moved to a more sheltered living environment; it is unknown how these less healthy individuals would have responded to our questions. Another was the selection of participants on the basis of their retrospective reports of illnesses that resulted in activity reduction and the need for replacements. Although we readily matched these reports to the appropriate prior episode in 85% of the cases, which speaks to their validity, there is no way of determining why a few (n = 17) participants rated an illness at the same level of severity at year of onset as did those reporting an important illness, yet failed to identify it as having a significant impact on their lives at Wave 7. We can only conclude that these problems resolved or were in remission, as these participants were not questioned about the nature of this illness at Wave 7. This methodological problem is not one that is easily remedied, as the great majority of chronic illnesses that have significant impact on function change slowly and fluctuate in severity over months and years. Prognostication is a complex business, and there is no simple way of determining the rate or direction of change of chronic conditions regardless of whether the experience at onset is mild or severe. A possible solution is to track the course of the illness on a monthly or bimonthly basis. Our use of longitudinal data is, however, an important addition to the findings of prior studies (e.g., Zimmer et al., 1997).

The current findings suggest several new directions for research. It would be instructive to learn about the types of activities sought as replacements by older adults in response to specific illness threats and the effects of different types of replacements on subsequent adjustment. For example, longer term well-being may be enhanced by engaging in activities such as walking or socializing rather than more pas-
active activities like watching television or listening to music. Also, it would be of interest to further evaluate hypotheses about the pathways that may determine whether it is the individual’s view of an illness as chronic and part of the self (H. Leventhal, Idler, & Leventhal, 1999), rather than its actual chronicity, that affects replacement and to identify the factors that affect whether the perception of chronicity matches actuality. Other issues that need to be addressed include whether the chronic view elicits depressive affect that undercuts replacement or whether it affects replacement on purely cognitive and/or strategic (conservation) grounds, as suggested by the present data and other studies (Heidrich, Forsthoef, & Ward, 1994; H. Leventhal, Easterling, Coons, Luchterhand, & Love, 1986).

It would be of special value if efforts at replication and extension were focused on coping with a single illness such as heart disease, cancer, or arthritis. Diseases differ in symptoms and responsiveness to self-management, and this may affect how measures of disease severity and social and personal resources contribute both to the disruption of activities and to their replacement. For example, conservation of energy might have more pronounced effects on disruption and replacement for individuals with coronary disease, as conservation is likely to be encouraged by the threat associated with the chest pain that can accompany physical activity (Aikens, Zvolensky, & Eifert, 2001).

In summary, the present work extends prior studies showing that illness disrupts physical and social activities and that replacement activities can help maintain positive well-being. Studies of these processes in patients confronting specific illnesses may suggest new ways of helping people to engage in enjoyable and productive activities. Although the loss of function and its associated loss of valued activities may be an irreversible consequence of many of the chronic illnesses of older age, interventions facilitating the identification and adoption of meaningful replacements may help to sustain quality of life in later years.

Acknowledgments

This study was supported by National Institute on Aging Grant AG03501.

We gratefully acknowledge Bonnie Pepper and Yael Benyamini for their earlier work on this topic. Also, special thanks go to the indispensable aid of Melissa Crouch.

Address correspondence to Jennifer Duke or Howard Leventhal, Institute for Health, Health Care Policy, and Aging Research, Rutgers, The State University of New Jersey, 30 College Avenue, New Brunswick, NJ 08901. E-mail: jduke@rci.rutgers.edu or howard@rci.rutgers.edu

References


State University of New Jersey, 30 College Avenue, New Brunswick, NJ 08901. E-mail: jduke@rci.rutgers.edu or howard@rci.rutgers.edu

Acknowledgments

This study was supported by National Institute on Aging Grant AG03501.

We gratefully acknowledge Bonnie Pepper and Yael Benyamini for their earlier work on this topic. Also, special thanks go to the indispensable aid of Melissa Crouch.

Address correspondence to Jennifer Duke or Howard Leventhal, Institute for Health, Health Care Policy, and Aging Research, Rutgers, The State University of New Jersey, 30 College Avenue, New Brunswick, NJ 08901. E-mail: jduke@rci.rutgers.edu or howard@rci.rutgers.edu

References


