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Motivational Antecedents of Preventive Proactivity in Late Life: Linking Future Orientation and Exercise[1]

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Abstract

Future orientation is considered as a motivational antecedent of late-life proactivity. In a panel study of 453 old-old adults, we linked future orientation to exercise, a key component of late-life proactivity. Findings based on hierarchical linear modeling reveal that future orientation at baseline predicts changes in exercise during the subsequent four years. Whereas exercise behavior generally declined over time, future orientation and female gender were associated with smaller decline. These results suggest that future-oriented thinking has a lasting impact on health promotion behavior. Future orientation thus represents a dispositional antecedent of preventive proactivity as proposed in our successful aging model.

Keywords

future orientation; old age; proactive adaptation; gender; health promotion; exercise behavior; exercise motivation

Psychologists have long been interested in the motivational basis of human behavior. Sociologists, on the other hand have focused their attention on understanding structural factors as they impact on human activity and well-being. More recently, there has been a growing recognition among sociologists that we can best understand complex influences on individuals if we study human agency within social structure (Settersten, 1999). Our research has focused, for many years, on the ways that older adults cope with stressful life events that they had faced at different points during their life course. Our prior theoretical formulations and empirical research considered adaptations of older adults who had survived the Holocaust (Kahana, Harel, & Kahana, 2005), older adults who entered institutional settings (Kahana, Kahana, & Young, 1985), late-life relocators to distant lands (Kahana, Kahana, Segall, Riley, & Vosmik, 1986), and older adults coping with specific forms of illness such as heart disease (Young & Kahana, 1994) or cancer (Deimling, Kahana, Bowman, & Schaefer, 2002). In all of these works, we have been continuously impressed by human resilience.

In the field of aging research, dependency models have characterized early gerontological thinking (Harel, Ehrlich, & Hubbard, 1990). The elderly were often viewed as obsolete human beings dangling hopelessly at the end of the life cycle (Henry, 1968). This orientation to older adults was not inconsistent with a well-meaning desire to offer solutions for problems faced

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by a needy segment of our population. It is interesting to note that a newfound recognition of the positive potentials of older adults (Midlarsky & Kahana, 1994) temporally paralleled trends in the field of psychology that recognize the importance of positive human emotions (Seligman, 1992). It is in this more receptive new intellectual environment of the 1990s that we developed our theoretical formulations about preventive and corrective proactivity for understanding the maintenance of high quality of life among older adults who are facing normative stressors of late life (Kahana & Kahana, 1996). This framework acknowledges that older adults can exercise control and effect positive outcomes even as they encounter increasing physical frailty and social losses associated with aging. Our formulation regarding successful aging is predicated on consideration of preventive and corrective proactivity in the face of normative stressors of aging (Kahana & Kahana, 1996, 2003; Kahana et al., 2004). This innovative aspect of our Preventive and Corrective Proactivity (PCP) model of successful aging involves consideration of behavioral adaptations which have not generally been considered in earlier formulations of the stress paradigm. Furthermore, our model underscores the value of preparatory coping that can facilitate the maintenance of high quality of life through building social resources and delaying or averting subsequent stressors (Aspinwall & Taylor, 1997). Classic formulations of the stress paradigm (Pearlin & Mullan, 1992) include specification of stressors that may adversely impact outcomes relevant to health and psychological well-being. Moderating variables generally considered in the stress paradigm include dispositions and coping strategies (internal resources) and social supports (external resources; Wheaton, 1996). Our model adds the behavioral domain of proactive adaptations and also expands consideration of quality-of-life outcomes.

In this paper we present a brief overview of our PCP model of successful aging (Fig. 1). We then provide a more detailed discussion of the motivational basis for proactivity. We subsequently turn to a more detailed exploration of one illustrative domain of motivational antecedents of preventive proactivity. We link the dispositional resource of future orientation to proactive exercise behaviors in late life, based on data from our ongoing long-term longitudinal study of successful aging (Kahana et al., 2002).

The maintenance of high quality of late life is a crucial concern for gerontologists and health researchers, as rapidly growing numbers of very old adults face challenges of frailty in the twenty-first century (Atchley, 1995; Institute of Medicine [IOM], 1991). As older adults can now expect to attain greater longevity, both challenges of frail health and opportunities for continued good quality of life must be considered to better understand emergent lifestyles of these aged. Our formulation of Preventive and Corrective Proactivity (Fig. 1) seeks to outline how old-old adults can enhance their own quality of life through a broad array of proactive adaptations, as they face normative stressors of social losses, chronic health problems, and frailty. The disability cascade is generally described as leading from chronic illness to physical impairments, to functional limitations (Verbrugge, Reoma, & Gruber-Baldini, 1994), and ultimately to a loss of psychological well-being and social functioning. Researchers have generally focused on understanding the adverse consequences of this cascade for quality of late life. It has also been recognized that dispositional coping resources, social support and other external resources may ameliorate adverse effects of stressors after they have emerged (Dohrenwend, 1998).

Our formulations move beyond considering only corrective moderators in the stress paradigm and also focus on preventive functions of proactive behavior. We thus propose that proactive adaptations may intervene at early stages in the disability cascade. Such proactive adaptations have the potential for enhancing both physical health and other quality of life outcomes. The maintenance of good physical health is seen by many as a key to successful aging, with good health habits improving one’s chance of remaining healthy well into old age (Rowe & Kahn, 1998). Our PCP model also extends quality-of-life outcomes beyond physical health to include

indices of psychological well-being, meaningfulness, and social quality of life (Kahana & Kahana, 1996). In the present paper our focus is on future orientation, a newly-added dispositional moderator. We aim to link future orientation to exercise, a key element of health-promoting behavior.

Outline of the Successful Aging Model

Our comprehensive model of Successful Aging (see Fig. 1) (Kahana & Kahana, 2003;Kahana, Kahana, & Kercher, 2003) specifies how the stressors of chronic illness, long-term and recent life events, and person-environment incongruence (Component B), in the absence of ameliorative buffers, set off a chain of events leading to adverse quality-of-life outcomes (Component F). This model also reflects traditional hypotheses about the roles of external resources (Component E) and internal resources or dispositions (Component C) in ameliorating adverse stress effects. Our model also emphasizes the buffering roles of proactive behaviors (Component D) in reducing (moderating) the adverse consequences of stressors on quality of life and in building resources that prepare individuals to cope well with future stressors. In our later formulations, we also acknowledge that temporal contexts (history and biography) and spatial influences (demographics and community) have main effects on each of the stressors, buffers, and quality-of-life outcome components of our model (Component A) (Kahana & Kahana, 2003).

Components and interrelationships of our comprehensive model and their rationale have been reviewed in our prior publications (Kahana & Kahana, 1996, 2003). In considering the model presented in Fig. 1, there are several simplifying assumptions made for ease of presentation. First, Fig. 1 indicates that proactive adaptations and external resources moderate the effect of stress exposure on quality-of-life outcomes—i.e., that the adverse consequences of stress exposure on quality-of-life outcomes are reduced (buffered) when elderly persons have external resources and engage in proactive adaptations. We have also simplified our conceptual model by focusing on unidirectional causal linkages. We recognize, however, that alternative directions of causality are often plausible and may be tested in longitudinal studies utilizing the proposed model. For example, our final outcome variable, quality of life, may have a reciprocal causal effect on many other components of our proposed model, such as illness, financial resources, marshalling support, and self-esteem.

Our original formulation (Kahana & Kahana, 1996) divided proactive behaviors into preventive and corrective adaptations. Preventive adaptations are undertaken to avert stressors and to build social resources. Thus, for example, health-promoting behaviors, such as exercise, can help avoid or delay stressors of chronic illness. Helping others can build social resources for later times of need, and planning ahead can build financial resources. In contrast to preventive adaptations, which generally come into play prior to the onset of stressors, corrective adaptations are activated by stressors, and can be facilitated by existing internal and external resources. Older adults typically engage in corrective adaptations, such as marshalling support, in response to increasing disability. For example, they may undertake role substitutions in response to social losses. Environmental modifications are suitable corrective adaptations for coping with lack of person-environment fit.

It should be noted that preventive adaptations can occasionally also serve corrective functions, and conversely, corrective adaptations can also be used preventively (Kahana et al., 2003). Thus, for example, physical exercise, which we generally consider to be a preventive adaptation, not only helps forestall the onset of disease, but can also serve as a moderator, once chronic illnesses have impacted on an older person. For example, exercise can serve corrective functions, such as building bone mass to counteract osteoporosis. Exercise can thus reduce further decline (Penninx et al., 2002). In our orientation to buffers in our PCP Model (Fig. 1),

we view elders as active agents who engage in both preventive and corrective pursuits to maximize their quality of life. Our broader model has proposed potentially useful moderating roles for traditional preventive adaptations of health promotion, planning ahead and helping others; for traditional corrective adaptations of marshalling support, role substitution and environmental modifications; and for emergent adaptations of technology use, health care consumerism and self-improvement. The rationale for each of the moderating variables is described in our prior work (Kahana et al., 2003).

Although the present paper does not focus on external resources, we refer to these resources here as part of the larger model. Availability of social supports, as well as financial resources, has been extensively studied as predictors of late life well-being (Kozma, Stones, & Hannah, 1991; Larson, 1978). We selected financial resources and available social supports as the key external resources relevant to buffering adverse stress effects in late life. We depicted them as distinct from internal resources or from proactive adaptations that may have helped generate them. Proactive efforts are facilitated by possessing both external and internal resources. The focus of this paper is on a better explication of the role of selected internal resources, which may be viewed as the motivational underpinnings of behavioral proactivity.

In our formulations of the PCP model in late life (Kahana & Kahana, 1996), we recognized that there are distinct mechanisms that characterize preventive and corrective adaptations. At that time, concepts of prevention were seldom incorporated into the stress paradigm. However, we postulated that preventive adaptations can serve to build resources which may be helpful once normative stressors of aging arise. This type of preventive behavior is exemplified in planful activities such as helping others, which can lead to the development of social resources. Preventive adaptation can also serve to forestall or slow down the onset of normative stressors. Specifically, health-promoting efforts such as exercise can forestall physical impairments and functional limitations due to chronic illnesses.

This exposition of preventive proactivity is congruent with Aspinwall and Taylor's (1997) conceptualization of proactive coping. These authors call for greater attention in conceptualization of the stress paradigm to proactive efforts that temporally precede both coping with stressful events and anticipatory coping. This view of proactive coping is congruent with our formulation of preventive proactivity applied to the aged (Kahana & Kahana, 1996).

In our Preventive and Corrective Proactivity (PCP) model (Kahana & Kahana, 1996), we had presented a parallel formulation whereby preventive coping efforts, such as helping others, can lead to building of social resources by older adults for later times of need. Alternatively, preventive health-promotion efforts (such as exercise) were seen as potential deterrents to the onset of future illness-related stressors. Our framework differs from that proposed by Aspinwall and Taylor (1997) in that proactive coping in our PCP model is conceptualized as encompassing active coping efforts that are primarily preventive, as well as active coping efforts used in a corrective fashion and employed after stressors have arisen. Corrective proactivity, nevertheless, still involves a forward-looking and even anticipatory component. Accordingly, older adults are anticipating further problems likely to be generated by their stressful life circumstances as they marshal support to deal with an illness situation, engage in role substitution to deal with social role losses, and engage in activity or environmental modification to deal with person-environment incongruence. These proactive efforts allow individuals to better deal with both present and continuing or future stressors. In our more recent formulation of emergent proactive adaptations, we also address the permeability of the boundaries between the preventive and corrective functions of proactivity (Kahana et al., 2003). We thus recognize that exercise represents a form of proactive adaptation that can help prevent illness but can also serve to diminish adverse effects of illness. Accordingly, our longitudinal study revealed that respondents who engaged in regular exercise were able to delay

onset of functional impairments over a four-year period, even in the presence of chronic illnesses (Kahana et al., 2002).

Internal Resources as Motivational Antecedents of Proactivity

In our initial model (see Fig. 1, Component C), we considered dispositional characteristics, such as hopefulness, altruism, and self-esteem, as particularly important internal resources, which can facilitate proactive adaptations and serve as buffers in ameliorating adverse impacts of stress (Kahana & Kahana, 1996). Each of the dispositional characteristics proposed can serve as an impetus for engaging in proactive adaptations. Thus, *hopefulness* was included in our model, as it can lead to planning ahead and fostering health-promoting behaviors among older adults (Seligman, 1992). *Altruistic orientations* were proposed as motivational antecedents of helping others and volunteering (Garfein & Herzog, 1995;Midlarsky & Kahana, 1994). *Self-esteem* in older adults was considered as a dispositional antecedent, as it has been associated with competence in adaptation to stress in late life (Ranzjin, Keeves, Luszcz, & Feather, 1998). Coping dispositions, particularly in terms of instrumental coping, were viewed as potentially important antecedents for corrective adaptations that require taking action in coping with problem situations (Kahana et al., 1985). In addition to dispositional antecedents that we linked to specific preventive or corrective adaptations, we recognize that positive affective orientations would serve as important underpinnings for all forms of agentic behavior, both in anticipating and dealing with existing problem situations.

In our model we focus on linking dispositional antecedents directly to proactive behaviors. Nevertheless, we recognize that there has been extensive prior work (Aspinwall, 2004) considering the complex ways that dispositional resources relate to one another. Thus, for example, future orientation may be viewed as an important cognitive underpinning of dispositional characteristics proposed in our original proactivity model. Hopefulness or optimism, which is one of the proposed dispositional characteristics of the PCP model, is predicated on future orientation. Clearly, one could only have hopes for the future or look optimistically toward future events if one is oriented toward a future time perspective.

The PCP model has been an evolving one, and specific variables included in diverse model components are viewed as open to modification and expansion. Stable and invariant features of our model are the broad components of stressors, outcomes, and moderating resource factors, i.e., internal and external resources and proactive adaptations. Our model offers flexibility in identifying the specific variables subsumed as stressors, outcomes, dispositions, proactive adaptations, and external resources. These are identified and may be modified, based on the problem focus of researchers and relevant theoretical or empirical evidence. This flexibility of our model is seen as a special strength which makes the model suitable for use by scholars studying diverse problem areas in social and behavioral science. Because of the comprehensive nature of our model, empirical tests can best be accomplished by exploring linkages among targeted variables specified by the model. For example, sociologically-oriented studies may look at the relative importance of role substitution (a corrective-proactive adaptation) and of external resource factors such as availability of social and financial resources as moderators relevant to ameliorating adverse effects of social losses in late life. Alternatively, psychological researchers may have greater interest in dispositional antecedents and psychological well-being sequelae of proactive adaptations such as health promotion or planful activity. This paper considers the potential value of future orientation as a dispositional basis for a key health-promoting preventive proactive behavior: exercise. Since empirical tests of the model are best accomplished in a longitudinal framework, we also provide evidence from our empirical study of late-life proactivity for the specific linkages we explore here.

Our longitudinal study has thus far yielded some interesting findings linking elements of our proposed comprehensive PCP model. In regard to health promotion as a preventive adaptation, we have found exercise to offer the most consistent protection against disablement and adverse quality-of-life outcomes (Kahana et al., 2002). Individuals who engage in even limited regular exercise were found to have fewer functional limitations and far better psychological well-being and meaningfulness in their lives eight years later than did their less active counterparts. Helping behaviors, particularly in relation to providing assistance to friends during periods of good health, were also found in our study to contribute to building social resources for later times of need (Kahana & Kahana, 2003). Planning ahead, the additional preventive adaptation proposed in our model, has been found to play a significant moderating role in ameliorating adverse outcomes of physical illness and social losses in late life (Kahana, Kahana, & Kelley-Moore, 2005). In a longitudinal analysis, using four waves of data, we found that the propensity to plan for future activities served as an important protective role against adverse effects of ill health and social losses.

We have thus found evidence for the value of all three preventive proactive adaptations proposed in our PCP model. As we consider potential dispositional underpinnings of these diverse preventive adaptations, there appears to be a common thread reflecting future orientation. Exercise, which we will discuss in greater detail, appears to be motivated by positive outcome expectations (Rodgers & Brawley, 1996). Such expectations must be based on anticipation of the future. Planning ahead, by definition, relates to anticipation of the future. Interestingly, we found that planning for discretionary activities such as taking a trip or making a purchase, rather than planning for care, buffers ill effects of stressors, once again suggesting positive outcome expectations (Kahana et al., 2005). Helping others may also be logically linked to the future since helpful acts anticipate needs of others and presuppose that offering assistance will secure positive outcomes for those being assisted (Midlarsky & Kahana, 2005). Our findings regarding the value of three diverse preventive adaptations proposed in our PCP model of successful aging lead us to further explore the potential common dispositional antecedent of future orientation that we now add as a new component to our PCP model. A diagrammatic representation of a trimmed model linking dispositions, preventive proactivity, and selected outcomes is depicted in Fig. 2. It should be noted that this model still stops short of specifying complex interrelationships among elements subsumed under dispositions or other model components.

We focus on future orientation as a dispositional characteristic that is particularly relevant to continued pursuit and maintenance of physical exercise, which is a major component of health-promoting behaviors. These target variables are shaded in Fig. 2.

Prior Work on Motivational Basis of Exercise

The value of physical exercise for the maintenance of physical health, psychological well-being and other indicators of good quality of life has been extensively documented (Caldwell, 1996; Rowe & Kahn, 1998). Our own prior longitudinal research has underscored the value of exercise even when initiated very late in life (Kahanak et al., 2002). In spite of the demonstrated benefits of physical activity, older adults are less physically active than are members of other age groups (Belza et al., 2004), and activity levels have been found to steadily decrease with age (Schutzer & Graves, 2004).

Mechanisms responsible for maintenance of exercise, particularly in late life, are not well explicated (Keller, Fleury, Gregor-Holt, & Thompson, 1999). An extensive review of the literature reveals that most theoretical explanations have relied on Social Cognitive Theory (Bandura, 1986) for understanding the motivational bases of exercise maintenance. This orientation involves the concept of self-efficacy or beliefs in one’s competence and control

over events as the cognitive motivational facilitator of exercise. It is notable that empirical research has supported expectations of self-efficacy as an antecedent of exercise maintenance and the reciprocal link whereby exercise maintenance enhances self-efficacy (Keller et al., 1999).

Bandura recognized the power of future orientation to influence behavior and besides expectations, also incorporated goal setting, a concept that has an inherent future orientation, into his Social Cognitive Theory (1989). In setting a goal, one's thoughts that depict desirable events which might occur in the future helps one to anticipate and therefore act to reach a goal (Bandura, 1989). Such anticipatory thinking can be a proxy for planning behavior, a variable that is central to our PCP model (Kahana & Kahana, 1996).

We concur with several recent reviews of motivational antecedents of exercise that positive outcome expectancies, which presuppose future orientation, are necessary for such competent coping activity (Williams et al., 2005). Motivational antecedents of such competent coping have been subsumed in the psychological literature under concepts of self-regulation. Self-regulation has been defined as the process through which people control, direct and correct their own actions as they move toward or away from various goals (Aspinwall, 2004).

As people age, health-related stressors, care-giving responsibilities, and physical limitations pose challenges to maintenance of exercise and high levels of physical activity. Continued maintenance of an active lifestyle may now become more dependent on future orientation.

Prior Work on Future Orientation

In the field of sociology, future orientation has been studied primarily in relation to adolescence. Future orientation has been linked to a broad range of positive outcomes and has been described as an important aspect of identity development (Kerpelman & Mosher, 2004). However, social psychologists and gerontologists have also recognized the important function of future-oriented cognitive orientations in motivating goal-directed behavior among older adults.

Prior research has established the important role of future time perspective as a social motivation in late life (Lang & Carstensen, 2002). These authors found that older people as a group view their future time as more limited than younger people. However, those older people with a more future-oriented time perspective set more instrumental goals. In terms of self-conceptions, older adults' future-oriented self-perceptions have been associated with exercise behavior (Whaley, 2003). Possible selves have been described as cognitive representations of the self in the future and related to ideas about what people might become. Such future-oriented self-appraisals have been found to serve as a useful motivation for health-promoting behaviors among older adults (Fleury, Sedikides, & Donovan, 2002). Goal-directed behavior, aimed at avoiding feared health-relevant selves, has been found to serve as a significant predictor of health-promoting behaviors among both young and middle-aged persons (Hooker & Kaus, 1994). A restricted future orientation has also been associated with more health problems among elderly caregivers (Rakowski & Clark, 1985). In fact, research suggests that having concrete goals for the future serves as a stronger predictor of health-promoting behaviors than do global values about health (Hooker & Kaus, 1992). In relating future orientation to health in late life (Rakowski, 1986), it is important to note that one's health trajectories may in fact contribute to perceptions of one's future. Personal temporality may thus be shaped by prior health, but it may also relate to health-promoting behavior, which in turn may ultimately contribute to an extended future. It is these relationships between future orientation and exercise as a key health-promoting behavior that our study sought to address.

METHOD

The goal of our current empirical analyses was to consider how well future orientation can predict subsequent long-term changes in exercise among old-old individuals.

Participants

The data for this study are taken from a panel study of older adults living in retirement communities in Clearwater, Florida (Borawski, Kinney, & Kahana, 1996; Kahana et al., 2002). Baseline interviews were conducted in 1990 on 1,000 adults aged 72 or older who live in Florida at least six months out of the year. Respondents were interviewed annually in their own homes by trained interviewers. Those respondents who moved to another location or went into a nursing home or long-term care facility continued to participate as long as their health would allow. Death was the primary source of attrition for this sample. Indeed, loss to follow-up for other reasons (e.g., moving with no forwarding address) accounted for only 7% of annual attrition.

This study uses data from Waves 2 to 7 of our panel study (N = 453). These study waves were chosen because measurement of future orientation was introduced in the second study wave and the four-year follow-up allowed us to utilize a sufficiently large sample for needed analyses. At the time of Wave 2, the sample had an average age of 79.13 with a standard deviation of 4.13, ranging from 72 to 98. There were 159 (35.1%) men and 294 (64.9%) women in the sample. In terms of marital status, 218 were married (48.1%), 211 were widowed (46.6%), and 24 were either divorced or never married (5.3%).

Measures

The following variables from the larger study were analyzed.

Future orientation—We utilized a self-report index where respondents were asked how often they think about the future. This measure is similar to single-item indicators used in prior literature where the focus is on general rather than specific planning, or self-concept related, constructs (Arbuckle & deVries, 1985; Waid & Frazier, 2003). Response categories were on a five-point Likert scale with response choices ranging from (1) *not at all* to (5) *a great deal*.

Exercise—During Wave 4 to Wave 7, participants indicated how many hours per week they spent in the following activities: walking, swimming, golfing, running/jogging, aerobics, stretching or calisthenics, weight lifting, dancing, biking, and other exercises. The total number of hours per week doing diverse exercises was used as the outcome measure.

Global self-rating of health—This one-item question asks the participant to rate his/her overall health in the past year using a five-point Likert scale: 1 = *very poor*, 2 = *poor*, 3 = *fair*, 4 = *good*, 5 = *excellent*. This measure has been shown to be a robust predictor of mortality in prior prospective studies (Idler & Kasl, 1991). This measure was used as a control variable in the data analysis because of expectations that negative health perceptions might limit exercise behavior in late life (Prohaska & Glasser, 1994).

Gender and age—Gender and age, obtained through interview questions, were used as additional control variables.

Data Analysis

Hierarchical Linear Modeling (HLM), also known as Multilevel Modeling (Raudenbush & Bryk, 2002), was used to take advantage of the longitudinal design of the study. Level 1 equations model intra-individual changes over time. At Level 1, exercise hours at Waves 4, 5,

6, and 7 were predicted against time, year (Wave 4 = year 0, Wave 5 = year 1, Wave 6 = year 2, Wave 7 = year 3).

The linear slope of time indicated the change of exercise across the four years. The intercept of the linear equation suggested where each participant started in terms of exercise at Wave 4. In addition, global self-rating of health was entered into the equation as a time-covarying predictor. Therefore, the slope of time was the change of exercise hours across the four years, after controlling for self-rated subjective health. At Level 2, the intercept and slopes of Level 1 regression equations became outcome variables, which were predicted by intra-individual variables such as future orientation, gender, and age. The following is a summary of the HLM model:

Level-1 Model

Exercise = P0 + P1 × (TIME) + P2 × (Self-rated Health) + Error

Level-2 Model

P0 = B00 + B01 × (Gender) + B02 × (Age) + Error

P1 = B10 + B11 × (Future Orientation) + B12 × (Gender) + B13 × (Age) + Error

P2 = B20 + Error

A statistically significant B11 indicates that future orientation at Wave 2 was able to predict changes in exercises from Waves 4 to 7. No predictor was used in the equation for P2 because the focus of the study was not on predicting self-rated health. Due to missing data, 433 respondents were actually used in the data analysis. Comparisons between the 433 respondents included in our data analyses and 20 respondents with missing data showed that they were comparable in terms of gender, age, and other major study variables.

RESULTS

Descriptive statistics showed that as time passes, participants engaged in fewer and fewer hours of exercise per week (Table 1). At Wave 4, they had an average of 5.49 (*SD* = 6.32) hr of exercise per week. At Waves 5, 6, and 7, exercise activities were reduced to 4.57 (*SD* = 5.44), 3.87 (*SD* = 4.76), and 3.35 (*SD* = 4.22) hr of weekly exercise across all forms of exercise considered. A baseline HLM model, in which no Level 2 predictors were included and time was the only Level 1 predictor, showed that over the four years, the number of exercise hours declined on average .79 hr per year.

The results of the full HLM model showed that future orientation significantly predicted the change slope of exercise across the four years, $B = .09$, $t(429) = 2.04$, $p = .042$, after controlling for age and gender. In other words, higher future orientation was associated with greater slope of changes in exercise, i.e., smaller decline of exercise hours across the four years. Predicted means were calculated for participants with the lowest (i.e., 1 = *not at all*) and highest levels (i.e., 5 = *a great deal*) of future orientation using the final HLM model. Participants with the lowest future orientation reported an average decrease of 0.93 exercise hours per week per year, resulting in a net decline of 3.74 hr of exercise per week in year 4, compared to year 1. In contrast, participants with the highest level of future orientation reported decreases of 0.57 hr per week per year, resulting in a net decline of 2.28 hr of exercise per week in year 4, compared to year 1. There was no evidence from our data of any interaction between future orientation and self-rated health in the maintenance of exercise over time.

In our study, baseline future orientation (W2) was used to predict changes in exercise time (W4 to W7), while controlling for self-rated health at each wave. Baseline future orientation was weakly related to self-rated health at W4 to W7, with correlation coefficients ranging from .071 ($p = .129$) to .104 ($p = .026$, $n = 453$). Baseline age (W2) had a significant but weak association with baseline future orientation, $r = -.097$, $p = .038$, such that older age was

associated with less future orientation. Interestingly, baseline age (W2) was not associated with self-rated health at Waves 4 to 7, with correlation coefficients ranging from −.024 (p = .615) to −.085 (p = .070).

Gender was also predictive of changes in exercise hours, B = .87, $t(429) = 4.69$, $p < .001$. Female gender was associated with an increase or smaller decline of exercise hours over the four years. Specifically, women reported decreases of 0.43 hr per week per year, compared to 1.30 for men. Age at Wave 2 was not a significant predictor of changes in exercise after controlling for gender. Note that the intercept at Level 1 equation indicated where a participant was in terms of exercise at Wave 4. Both age and gender were significant predictors. Older age was associated with smaller numbers of exercise hours, $b = -.24$, $t(430) = -4.37$, $p < .001$. Female gender was associated with smaller number of exercise hours, $b = -4.48$, $t(430) = -7.33$, $p < .001$. Table II summarizes the results of the full HLM analysis.

DISCUSSION

Our findings reveal that future orientation has a significant long-term association with exercise behavior among very old adults. They thus provide empirical evidence supporting expectations that future-oriented ways of thinking have a lasting impact on behaving in health-promoting ways (Rakowski, 1986). Future orientation is thus linked to behavioral manifestations of preventive proactivity as proposed in our PCP model (Fig. 1). While old-old adults diminish the time spent in exercising as years go by, those individuals who endorse a greater future orientation at an earlier study wave, appear to maintain their exercise behavior or diminish more slowly the hours they spend exercising than do their less future-oriented counterparts.

Descriptive data shown in Table I also provide evidence of both relatively high levels of exercise and of future orientation among respondents in our sample. Our data confirm findings of prior studies that note that both older age and female gender tend to be associated with lower levels of exercise among older adults (Caldwell, 1996). Although our study did not focus on gender differences, our findings reveal consistent patterns of gender differences with women doing substantially and significantly less exercise than men in our study. It is noteworthy that in our sample, the average age of men and women is almost identical (Table I). Self-rated health of women tends to be somewhat lower than that of men. Both the observed gender-based differences in health perceptions and exercise behaviors are consistent with prior literature (Wolcott-McQuigg, Zerwic, Dan, & Kelley, 2001). A breakdown of types of exercise engaged in by respondents reveals that the major gender differences occur in patterns of golf, walking, bicycling, and weight lifting where men devote substantially more time to these forms of exercise. Other than golf for men, we found patterns similar to prior research that has identified walking to be the exercise of choice for older adults (Belza et al., 2004).

In light of lower levels of exercise among women shown in cross-sectional findings, it is particularly important to note that our longitudinal results reveal women to be more likely to maintain their levels of exercise than do men.

Analyses reported in this paper help us take a first step in gaining greater understanding about motivational or dispositional underpinnings of one key aspect of preventive proactivity, health promotion, and specifically, its most powerful component, exercise, among the very old. In presenting these longitudinal analyses, we were able to capitalize on data available from a long-term longitudinal study that was originated to better understand the disablement process in late life. Based on early findings of this study, we formulated our successful aging model. However, elements of this model were only gradually incorporated into our longitudinal data collection. Consequently, testing further linkages about the motivational basis of proactivity will become possible using data now being collected.

A more fine-grained analysis of dispositional antecedents of proactivity must acknowledge that both cognitive and affective processes come into play in expressions of optimism and hopefulness. We might thus expect that cognitive orientations relevant to future orientation, along with affective orientations, which in our model may be exemplified by life satisfaction, undergird hopeful dispositions. These complexities have been recognized in work by Aspinwall and Leaf (2002) in their critique of prior, predominantly cognitively-oriented, formulations of hopefulness, such as those proposed by Snyder (2002).

Considerations of future orientation in very late life raise unique questions. We might ask, what is the meaning of positive outcome expectations, whether related to benefits of exercise or of financial planning, in very old age at a time when the life expectancy becomes increasingly limited (Arias, 2004)? Consideration of motivations in very late life leads one to recognize transcendent optimism or hopefulness that allows older people to achieve psychological well-being and meaningfulness even where such expectations defy reality. We agree that human optimism and plasticity have evolutionary foundations that enable even very old individuals to retain a future-oriented view of life in spite of their own limited future (Tsuji, 2005).

Thus, for the very old, the ability to envision a future may be a significant psychological resource which may motivate without having to involve additional constructs of self-efficacy or behavioral intentions. These related constructs may play a greater role in motivating younger individuals. Having a longer future, younger persons may require other motivational resources such as self-efficacy to act in goal-directed ways. These expectations are supported by findings of prior research linking exercise and positive outcome expectations that must be predicated on future orientation (Corwyn & Benda, 1999). Our PCP model is not a fundamentally deficit-based model. While we recognize that older adults confront more normative stressors than do their younger counterparts, we see psychological resources as continuing well into late life. Considering the realities of a shortened life expectancy, we view future orientation to represent an important dispositional underpinning of proactivity.

In the empirical study we report here, we focus on future orientation as it directly enhances exercise behaviors. We acknowledge and do not currently test the expectation that future orientation may have indirect effects on exercise via hopefulness, via self-efficacy, via positive outcome expectations, or via other mediators such as optimism (Scheier & Carver, 1985). In our model the terms *agency* or *proactivity* refer to actions taken (such as exercise) rather than to beliefs about agency, such as those expressed in self-efficacy beliefs or even behavioral intentions. The complexities of considering constructs involved in linkages between diverse aspects of self-regulatory competence are beyond the scope of our action-focused model.

Our prior research on the moderating role of proactive adaptation in late life lends support to the value of diverse aspects of proactivity, particularly in the face of normative stressors of aging (Kahana & Kahana, 2003; Kahana et al., 2002). In terms of health promotion, exercise appears to be a consistent predictor of both physical and psychological thriving among the old-old. As we continue to make progress in exploring linkages among components of the proactivity model of successful aging, greater attention to the motivational antecedents proposed in our model is timely.

Our empirical investigations are useful in helping us further evolve the comprehensive PCP model (Kahana et al., 2002, 2004). Based on consideration of the model over time and in more diverse samples, components of preventive and corrective proactivity as well as relevant motivational antecedents can be revised and updated. Even as we seek to obtain empirical confirmation for the original model components, changing opportunities for proactivity call attention to the value of introducing new options for proactivity (Kahana et al., 2003). Such emerging proactive adaptations range from health care consumerism to technology use. Better

understanding of the cognitive and motivational underpinnings of these adaptations can lead to development of interventions to enhance resilience in dealing with stressors of late life. We are presently in the process of exploring emerging forms of proactivity in diverse populations of elders. As we launch these studies, we will include more extensive multidimensional measures of future orientation, such as Zimbardo's (1999) Time Perspective Inventory, so that we can better understand this promising antecedent of proactive behavior. Findings of the present study are consistent with recent explorations by gerontologists regarding more complex understandings of time perspectives in late life. Accordingly, older adults may be less anchored to clock-driven definitions of their future than was previously believed, and may view their future as a more plastic and malleable resource (Tsuji, 2005).

Progress in the social sciences must involve ongoing efforts to better conceptualize key variables reflecting human motivation and human behavior and their interactions with environmental influences. The broad stress paradigm offers a useful framework for developing such understandings. The usefulness of concepts we employ in such efforts must ultimately be tested through carefully designed empirical studies. Each of these studies can typically examine only small portions of the comprehensive paradigms we are capable of developing.

This paper represents an initial effort to provide insights about both theoretically meaningful and empirically suggested linkages between dispositional or motivational factors and preventive proactive behaviors in late life. Such efforts hold great promise for future conceptual developments toward exploring the full potential of the stress paradigm to elucidate both anticipatory and stress-responsive behaviors throughout the life course (Aspinwall, 2004).

We conclude that internal as well as external resources can play a role in human agency that can prepare individuals to behave in effective and resilient ways to help reduce stressors and build resources for dealing with life's challenges. Through such proactive behaviors, older adults can gain greater control over quality of late life in the face of normative adversity.

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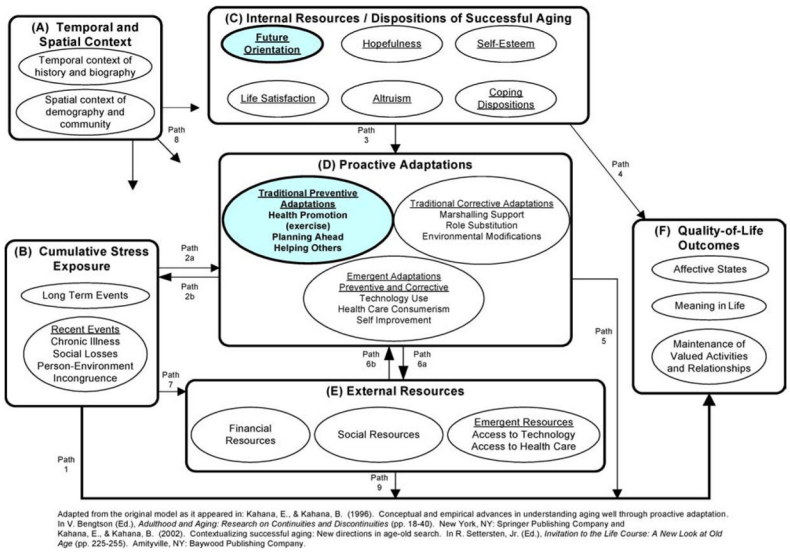

Fig. 1.
Model of emerging proactive options for successful aging.

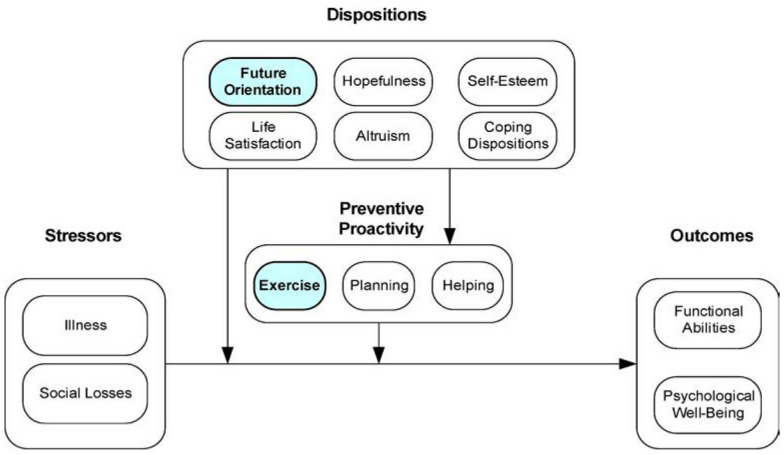

Fig. 2.
Model of future orientation and proactive behavior.

Table 1

Descriptive Statistics of the Variables, Stratified by Gender

	Men (*n* = 159)	Women (*n* = 294)	Total (*n* = 453)
	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Age at baseline[a]	79.19 (4.51)	79.11 (3.92)	79.13 (4.13)
Future Orientation at baseline (W1)	3.08 (1.09)	3.19 (1.05)	3.15 (1.06)
Self-rated health at W3	3.91 (.63)*	3.75 (.77)	3.80 (.73)
Total exercise hours/week at W3	8.54 (7.45)**	3.84 (4.88)	5.49 (6.32)
Exercise 3 time/week or more at W3	81.7%**	57.1%	65.8%
Total exercise hours/week at W4	6.98 (6.03)**	3.26 (4.59)	4.57 (5.44)
Total exercise hours/week at W5	5.72 (5.84)**	2.87 (3.70)	3.87 (4.76)
Total exercise hours/week at W6	4.74 (4.61)**	2.61 (3.80)	3.35 (4.22)
Types of exercise at W3			
Walking	2.81 (3.41)**	1.68 (2.53)	2.07 (2.91)
Swimming	.48 (1.69)	.59 (1.58)	.55 (1.62)
Golfing	3.50 (4.84)**	.56 (2.25)	1.60 (3.67)
Running	.05 (.49)	.00 (.00)	.02 (.29)
Aerobics, stretching/calisthenics	.56 (1.25)	.44 (.91)	.48 (1.04)
Weight lifting	.12 (.65)*	.02 (.23)	.06 (.43)
Dancing	.48 (1.70)	.31 (1.66)	.37 (1.67)
Bicycling/other exercise machine	.53 (1.38)*	.24 (.82)	.34 (1.06)
Other exercise	.78 (2.53)**	.23 (.96)	.42 (1.70)

*
Note. $p < .05$,

**
$p < .01$, men compared to women.

[a]We designate waves to correspond to initiation of these analyses rather than corresponding to waves of the original study. These analyses were initiated at Wave 2 of the original study.

Table II

Summary of Full HLM Analysis: Future Orientation, Age, and Gender as Predictors of Change in Exercise Hours over a Four-Year Follow-Up

Fixed effect	Predictors	B	SE	t	p
Intercept	Mean	29.61	4.64	6.39	<.001
	Age	− 0.24	0.06	− 4.37	<.001
	Gender	− 4.48	0.61	− 7.33	<.001
Slope: Time	Mean	− 4.61	1.35	− 3.40	.001
	Future orientation	0.09	0.04	2.04	.042
	Age	0.03	0.02	1.63	.104
	Gender	0.87	0.19	4.69	<.001
Slope: Self-rated health	Mean	.66	.14	4.77	<.001

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