Primary- and Secondary-Control Strategies in Later Life: Predicting Hospital Outcomes in Men and Women

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Community-dwelling individuals \( n = 143, 73–98 \) years old \) were assessed to consider if their use of task-specific control strategies predicted hospital outcomes in the subsequent 2 years. The authors were interested in whether men and women facing health-induced task restrictions benefited equally from the use of primary- and secondary-control strategies. Gender interacted with primary-control strategies; men’s more frequent use of these proactive strategies generally related to fewer hospital admissions. Gender also interacted with secondary-control strategies; women’s more frequent use of compensatory (self-protective) strategies corresponded to fewer hospital admissions and shorter hospital stay durations. Taken together, our findings suggest that men benefit by adopting certain primary-control strategies and women benefit by adopting certain compensatory secondary-control strategies.

Keywords: control strategies, gender, aging, health services, hospital outcomes

Substantial empirical literature shows that perceptions of personal control in later life relate to psychological and physical health \( \text{e.g.,} \) Langer & Rodin, 1976; Rodin & Salovey, 1989, lower use of health services \( \text{e.g.,} \) Chipperfield, Campbell, & Perry, 2004 and survival \( \text{e.g.,} \) Chipperfield, 1993; Krause & Shaw, 2001. The majority of the existing control-related research \( \text{e.g.,} \) Arbuckle et al., 1999 exclusively focuses on the notion of primary control, which is characterized by beliefs about influencing the environment and the associated proactive strategies that are used to produce desired outcomes. By incorporating a dual-process model of control first introduced by Rothbaum, Weisz, and Snyder’s (1982) pioneering work, the present study explores not only primary control, but secondary control, which is characterized by a restructuring of the self via the adjustment of beliefs, attributions, and interpretations \( \text{Weisz, McCabe, & Dennig, 1994.} \)

Our study draws on Heckhausen and Schulz’s (1995, 1998; Schulz & Heckhausen, 1996) theoretical approach that retains the distinction between primary and secondary control, also integrating notions of selection and compensation \( \text{Baltes & Baltes, 1990.} \) Their theoretical perspective focuses on control striving, identifying four classes of strategies: selective primary control \( \text{direct actions aimed at goal attainment;} \) compensatory primary control \( \text{compensatory proactive reactions to deteriorating internal resources;} \) selective secondary control \( \text{internal thoughts that promote volitional commitment to a goal; and} \) compensatory secondary control \( \text{internal thoughts that buffer against negative effects of failure.} \) Secondary-control strategies become increasingly used and strategically adopted in later life when goals are thwarted because of declining physical or cognitive capacities \( \text{Schulz & Heckhausen, 1996.} \) As described in more detail later, our interest was in the potential health consequences of these types of primary- and secondary-control strategies among older people facing the challenge of health-induced restrictions.

Control and Health

The health benefits of primary-control beliefs and strategies are implied in many studies that have examined constructs such as influence over events or internal locus of control \( \text{Bailis & Chipperfield, 2002; Chipperfield & Greenslade, 1999; Rodin & Langer, 1977; Schulz & Heckhausen, 1999.} \) Although fewer studies have examined secondary control, evidence from our prior longitudinal analysis \( \text{Bailis, Chipperfield, & Perry, 2005} \) suggests the benefit of one specific type of compensatory secondary-control strategy. In particular, we found that optimistically comparing oneself to others “worse-off” in a variety of physical domains \( \text{i.e., physical health, managing health care, desired level of physical activity, physical appearance, and coping with aging} \) predicted a lower odds of subsequent hospitalizations and deaths from 2 to 6 years later.

The question of whether control strategies have disparate consequences for different subgroups has received little attention. However, in a previous study \( \text{Chipperfield, Perry, & Menec, 1999,} \) primary-control strategies appeared to benefit young-old
individuals (<80 years), whereas secondary-control strategies appeared to benefit old-old individuals (80+ years). Just as the health consequences of control strategies may vary by age, they may also be gender specific. The need to examine gender differences in control strategies is highlighted by findings showing that, unlike men, women’s use of primary-control strategies corresponds to their experience of having suffered a life-threatening health crisis (Chipperfield, Perry, Bailis, & Chuchmack, in press).

Although few studies have explicitly examined gender differences in the health benefits of control strategies, findings from related literatures point to this possibility. For example, women are more likely than men to engage in coping strategies when exposed to stressors (Tamres, Janicki, & Helgeson, 2002) and to adopt responses that protect the self, thereby reducing distress and promoting positive health outcomes (Taylor et al., 2000). Moreover, gender differences have been documented in the relationships between psychosocial factors and health (Denton, Prus, & Walters, 2004). These differences between men and women in reactions to stress and health problems provide a backdrop for expecting gender differences in the health consequences of control strategies.

If, as Heckhausen and Schulz’s (1995) theoretical model proposes, the adaptive value of control strategies depends on opportunities for goal attainment, it is plausible that gender differences in the consequences of control strategies are due to men’s and women’s varying opportunities for goal attainment. In later life, women are clearly more functionally limited than men, probably reflecting true gender differences in disability (Crimmins, Hayward, & Saito, 1996; Lawrence & Jette, 1996; Merrill, Seeman, Kasl, & Berkman, 1997; Penning & Strain, 1994; Verbrugge & Jette, 1994). Relative to men, women also have poorer health and fewer socioeconomic resources (Brotman, 1998; Prus & Ge, 2003). If such gender differences translate into fewer opportunities for women to attain daily goals, they may be more inclined than men to rely on and/or to gain proportionately more benefit from using compensatory secondary-control strategies. This would suggest that compensatory secondary-control strategies should be associated with health benefits more so for women than men.

The Present Study: Gender Differences in Consequences of Control Strategies

The present study considered whether control strategies predict health outcomes differently for men and women in later life. In keeping with Wrosch, Schulz, and Heckhausen’s (2002) approach, we assessed strategies in the health context, that is, in response to challenges caused by health problems. Because our aim was to enhance the reliability of reported strategy use, we imposed further specificity by examining strategies for dealing with specific tasks that were made difficult by the participants’ health problems.

In particular, during interviews, we assessed compensatory primary-control strategies (i.e., soliciting others’ help to compensate for deteriorating resources) and selective primary-control strategies (i.e., persistence), as conceived of in Heckhausen and Schulz’s (1995) theory. We also expanded the idea of selective primary control to include task modification strategies such as taking more time to do the task. Although Heckhausen and Schulz do not explicitly identify task modification as a separate form of selective primary control, the very nature of these strategies implies proactive attempts to modify constraints by changing aspects of one’s approach to the problematic task. Thus, proactive strategies continue to be used, despite modifications to the means of approaching the task. Finally, we assessed secondary control in the form of compensatory secondary-control strategies involving task disengagement (i.e., downgrading the task importance or necessity) and self-protective thinking, specifically positive reappraisals and optimistic social comparisons (OSCs).

The outcome measures in our study were obtained from what is recognized as among North America’s best organized and complete health databases (Frohlich et al., 1994). Specifically, we had access to the number of hospital admissions and duration of hospital stays for participants during a 2-year follow-up period after strategies were assessed. Because hospitals are “historically the most well-funded and politically visible institutions” (Currie, 1996, p. 5), this provided a unique opportunity to examine politically relevant outcomes that have obvious policy implications.

We began with the premise that women and men might benefit differentially by the use of primary- and secondary-control strategies, thereby hypothesizing that gender and control strategies would interact to predict the number of hospital admissions and duration of hospital stays. If men generally retain good functional capacity in later life, their use of primary-control strategies should generally be adaptive, fostering goal attainment. Thus, for men, more frequent reliance on primary-control strategies was expected to predict fewer hospital admissions and shorter hospital stays. In contrast, if women’s greater functional impairment leads to limited opportunities for daily goal attainment via primary-control strategies, these may be abandoned in favor of secondary-control strategies that are more adaptive. Therefore, we predicted that women’s more frequent use of compensatory (self-protective) secondary-control strategies (e.g., OSCs) should have a salutary effect, corresponding to fewer hospital admissions and shorter hospital stays.

To the extent that the predicted gender differences emerged, we also examined the logic that gender-specific health consequences of control strategies are due to variations in men’s and women’s opportunities for goal attainment. We did this by statistically controlling for factors that presumably limit women’s goal attainment opportunities, including their health and functional status. By controlling for income, we also ruled out the well-documented association between income and health (Blakely, Kennedy, & Kawachi, 2001; Rodgers, 1979; Wu & Hart, 2002) so that any link emerging between the use of control strategies and hospitalizations could not simply be due to certain strategies being adopted by wealthier and therefore healthier individuals.

Method

The present study included 143 older individuals who were experiencing health-induced task-related restrictions. These individuals were targeted and selected from among participants in the Successful Aging Study (SAS), an offshoot of the larger Aging in Manitoba (AIM) Project. Although the SAS and AIM studies are described elsewhere (Chipperfield et al., 2004), a brief overview is provided before outlining the characteristics of the current analysis sample (n = 143).

Overview: The AIM Project and the SAS

The AIM Project is one of the largest existing population-based longitudinal studies of aging (n = 8982), the original wave of respondents being
interviewed in 1971, and new waves being added in 1976 and 1983. AIM is also among the longest continuing studies of older individuals (Hall et al., 1997), with follow-up interviews being conducted in 1983, 1990, 1996, and 2001. Rigorous stratified randomization techniques were used to select each new wave of AIM participants, resulting in probability samples stratified by age, gender, and region. These procedures minimized selection bias and selective attrition, enhancing the representativeness of the AIM samples initially (e.g., Mossey, Havens, Roos, & Shapiro, 1981) and at follow-up (Chipperfield, Havens, & Doig, 1997).

As an offshoot of AIM, the SAS was undertaken 3 months after the AIM 1996 interview with a smaller subset of those respondents. Inclusion criteria for SAS participation identified approximately one quarter (458 out of 1868) of AIM participants. As described in detail elsewhere (Chipperfield, Perry, Volk, & Hladkyj, 2003), the criteria were based on practical considerations, including complexities and limited resources that prohibited interviewing those who resided outside of the major cities (~46%), and/or in institutions (~13%), and/or those who required the interview be conducted in languages other than English (~6%). Also, participants were ineligible for the more focused SAS study if their cognitive capacity was deemed to be inadequate. In particular, we excluded those who, during the 1996 AIM interview, had required assistance from a proxy (~25%) and/or were rated by interviewers as having only “fairly satisfactory,” “inadequate,” or “unsatisfactory” (~5%) comprehension when answering questions. From among the participants who met the SAS 1996 eligibility criteria, 353 out of 458 (77%) were interviewed. The 23% who did not participate were unwilling (n = 72), too ill (n = 15), or impossible to contact (n = 7).

The procedures were identical for the SAS and AIM studies. Interviewers telephoned eligible participants to describe the study goals and arrange a time for a 1.5-hr face-to-face interview in the respondent’s home. The SAS interview contained many questions regarding psychological aspects relevant to successful aging (e.g., attributions, emotions, strategies). The present analysis focused on questions embedded within the interview that assessed adaptive control strategies used to deal with health-induced task restrictions. Because healthy respondents were not asked about their strategies, the sample for our analyses was restricted to unhealthy participants (n = 143).

Variables

The major independent variables were control strategies as assessed during the SAS 1996 interview. Control strategies were assessed using selected items from the Midlife in the United States national study and the Optimization in Primary and Secondary Control scale. The wording from original items as found elsewhere (see Heckhausen & Schulz, 1998; Peng & Lachman, 1994; Wrosch, Heckhausen, & Lachman, 2000) was modified as required to measure strategies within the specific context of our study, that is, when health challenges resulted in problems with activities and tasks. Additional items were also constructed, for example, to assess task modification strategies as an expanded form of selective primary control. The assessment of strategies was done using a three-step “funnel” approach (see Appendix). Step 1 allowed us to identify participants for the study by asking about the frequency with which they experienced restrictions with certain tasks or activities (0 = never, 1 = sometimes, 2 = often) caused by specific health problems (e.g., arthritis, heart attack). By eliminating those who did not have these restrictions, we were able to focus on a sample of older individuals with health-related restrictions. Step 2 directed participants’ attention to a particular problematic task or activity within a specific domain by asking “in which of these ways have you been restricted most often?” This also allowed for the identification of the most problematic task or activity and the domain in which the problem occurred: achievement tasks (e.g., performing day-to-day tasks), leisure activities (e.g., golf, walking), and/or affiliation activities (e.g., visiting friends). Finally, Step 3 involved assessing the frequency (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = almost always) with which specific control strategies were used by the respondent to deal with his or her most problematic task or activity as identified in Step 2.

The majority of participants were asked to respond to 15 strategies. However, because certain strategies were appropriate only in the achievement domain, they were not asked of respondents who had reported restrictions in the leisure or affiliative domains. This explains, for example, why help seeking strategies were assessed for only 97 respondents (see Table 1). Because the majority of restrictions identified in Step 2 were task related (i.e., in the achievement domain), we refer to these as task-specific control strategies (TSCS). However, for simplicity, the broad label of “control strategies” is sometimes used interchangeably with TSCS.

To examine the psychometric structure of the TSCS, we began by conducting an initial principal factor analysis (PCA) of the 15 strategy items. Although we do not present results of this initial analysis, clear factors did emerge that conformed precisely to Heckhausen and Schulz’s (1998) theoretical constructs of selective and compensatory primary-control and compensatory secondary-control strategies (i.e., disengagement). However, because two ambiguous items loaded with both secondary- and primary-control factors, these items were excluded before conducting further analyses that examined the remaining eight primary- and five secondary-control items separately.

Table 2 shows the results of our PCA analysis of the eight primary-control items in which a three-factor solution was forced to impose conceptually important distinctions. As expected, the selective primary-control items loaded onto factors reflecting task modification (Factor 1; α = .70) and simple task persistence (Factor 2; α = .70). This supports the idea that a modified way of continuing to approach a goal taps something different than simple persistence. A separate two-item (r = .58) compensatory strategy factor emerged. The resulting eight-item “control strategies” factor was stable across 11 years (r = .70, 1996–2001) and well correlated with the TSCS (r = .70). Although the items were not intended to assess help seeking, the factor’s loading with the TSCS was strong (r = .69), indicating that respondents who used help seeking strategies also used task modification strategies.

Table 1
Descriptive Statistics on Respondents’ Background, Independent, and Dependent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Range</th>
<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td><strong>Background variables</strong></td>
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<td></td>
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<tr>
<td>Age</td>
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<tr>
<td>Income (monthly)</td>
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<td>886.41</td>
</tr>
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<td>Education</td>
<td>143</td>
<td>2–18</td>
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<td>2.25</td>
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<td>Health status</td>
<td>143</td>
<td>2–5</td>
<td>3.51</td>
<td>0.68</td>
</tr>
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<td>Functional status</td>
<td>143</td>
<td>6–23</td>
<td>19.29</td>
<td>3.32</td>
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<tr>
<td><strong>Independent variables</strong></td>
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<tr>
<td>Gender</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
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<tr>
<td>Women</td>
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<td>Control strategies</td>
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<td>Primary control strategies</td>
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<td>Task persistence</td>
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<td>2.50</td>
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<td>Help seeking</td>
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<td>0–4</td>
<td>1.91</td>
<td>1.18</td>
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<tr>
<td>Secondary control strategies</td>
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<td></td>
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<tr>
<td>Goal disengagement</td>
<td>142</td>
<td>0–4</td>
<td>1.85</td>
<td>1.00</td>
</tr>
<tr>
<td>Positive reappraisal</td>
<td>136</td>
<td>0–4</td>
<td>2.32</td>
<td>1.26</td>
</tr>
<tr>
<td>Optimistic social comparisons</td>
<td>140</td>
<td>0–4</td>
<td>2.99</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Number of hospitalizations</td>
<td>143</td>
<td>0–4+</td>
<td>0.99</td>
<td>1.20</td>
</tr>
<tr>
<td>Hospital duration</td>
<td>143</td>
<td>0–7+</td>
<td>1.51</td>
<td>2.37</td>
</tr>
</tbody>
</table>

Note. The sample size is lower for help-seeking strategies because these were not asked of participants who identified their domain of restriction as leisure or affiliative.
primary-control factor also emerged reflecting help seeking to substitute for unavailable skills (Factor 3). On the basis of the three-factor distinctions, composite primary-control scores were created by calculating a mean for the items involving persistence, task modification, and help seeking.

Two distinct secondary-control factors emerged in a PCA analysis of the five compensatory secondary-control items (see Table 2). Factor 1 captured the notion of task disengagement, and a composite score was subsequently created by calculating the mean of the three relevant items ($\alpha = .63$). Factor 2 included two items that characterized self-protective strategies to compensate for failure. However, in spite of the two items loading onto this distinct factor, combining them to create a composite score was not justifiable given the low inter-item correlation, $r = .04$. Consequently, we retained single-item measures for positive reappraisal and optimistic social comparisons to assess different types of thoughts that buffer individuals against the negative effects of failure.

Gender (1 = male, 2 = female). As in any representative older sample, a minority of participants were male in our sample, whereas 67.8% were female.

Age. The mean age of individuals was over 80 years (see Table 1), reflecting the longitudinal nature of this study and the fact that the study began in 1971 (25 years earlier).

Income. The monthly Canadian income measure was derived by summing responses to questions about income from several sources (i.e., own resources such as private pensions, wages, rents, dividend interest; pensions/allowances such as Old Age Security, War Veterans, Unemployment Insurance; other sources such as regular cash from children/service groups/private agencies). Three extreme outliers were pulled into the distribution while retaining their rank ordering, and a regression-based substitution method (Tabachnic & Fidell, 2001) was used to estimate income for participants who had failed to report values ($n = 47$). In particular, for each of these participants, income was estimated using the equation (i.e., intercept and regression coefficients) from a stepwise regression analyses that revealed education and gender predicted income. The adjusted mean monthly income was just under $1,350.00 CDN dollars.

Education. Education was assessed by asking respondents how many years or grades had been completed in school. As shown in Table 1, on average, participants had between 10 and 11 years of schooling.

Health status. Self-reported health status was measured by participants’ health ratings: “For your age, would you say, in general, your health is excellent, good, fair, poor, or bad?” Scores were then reverse-coded so that high scores reflected excellent health.

Functional status. Functional status was measured by reported independence on basic activities of daily living (BADL) that are central to daily functioning and instrumental activities of daily living (IADL) that are instrumental to living independently. In particular, participants rated their capacity to perform BADLs (e.g., going up and down the stairs, getting about the house, getting in and out of bed, washing or bathing or grooming, dressing and putting shoes on, eating) and IADLs (e.g., doing light housework, doing heavy housework, making tea or coffee, preparing a hot meal, shovelling/yardwork, shopping, managing financial matters, doing laundry, major household repairs, taking medication/treatment, watching TV, listening to radio, reading and writing, and using the telephone). For each activity, respondents indicated whether they could perform it without any help from anyone (1 = can do without help) or with help from a variety of other sources (2 = person in home, 3 = person outside of home, 4 = service, 5 = staff). An overall functional status measure was created by summing the scores of 1 to obtain the number of BADL and IADL activities that a respondent was able to perform without help, higher scores reflecting more independence ($\alpha = .85$).

Hospital outcomes. Our hospital outcome measures were constructed from data in the Manitoba Health provincial registry maintained by the Manitoba Centre for Health Policy. This registry documents each patient contact with the health care system for all Manitoba residents covered under the universal health-insurance system. Counts of hospital admissions (HAs) and the number of days hospitalized, subsequently referred to as hospital durations (HDs), were acquired from hospital records over a 2-year period (1996–1998) following the SAS interview date. Hospital admissions were as high as 9 and 15, during the 1st and 2nd follow-up years, respectively, and hospital durations were as high as 233 days during the full 2-year period.

In most cases, exact counts were obtained; however, for confidentiality reasons, we received only truncated scores for individuals who had more than four hospital admissions and/or whose hospital durations exceeded 7 days, resulting in a range of 0 to 4+ for hospital admissions and 0 to 7+ for hospital durations. Although this procedure obscured the identification of the hospital usage data for a given person (e.g., the person who spent 233 days in hospital), it had little consequence for the HA variable, because fewer than 3% of respondents were admitted to the hospital more than 4 times. On the other hand, because approximately 13% of respondents had spent between 8 and 233 days in hospital, truncation on the HD variable did have implications for interpreting our findings. Despite this procedure imposing a restricted upper range, it also had the positive effect of eliminating high outliers in these measures.

No hospital records existed for individuals who were not admitted to the hospital. Thus, for these individuals, we assigned scores of 0 to reflect no hospital admissions (53.1%) and no days in hospital (68.5%). As described below, our analysis choice was guided by the fact that these variables had skewed distributions due to many individuals having scores of 0.

Results

Before examining our hypotheses involving the key variables of gender and TSCS, we conducted preliminary correlational analyses to identify potential confounding variables that could pose alternative explanations.
Preliminary Correlational Analyses

First, an examination of correlations among the different strategies revealed no covariation with respect to the compensatory secondary-control strategies of OSCs and positive reappraisal. However, task modification correlated with disengagement ($r = .28; p < .001$), and help seeking correlated with persistence and disengagement ($r = -.32; p = .001$; $r = .21, p = .039$, respectively).

Second, correlations between the key variables and a variety of background variables revealed that gender (1 = male, 2 = female) correlated negatively with income ($r = -.40, p < .0001$), functional status ($r = .37, p < .0001$), and health status ($r = -.22, p < .001$). Although the background variables did not generally correlate with the TSCS items, an exception was that the primary-control strategy of seeking help was associated with decreasing functional status ($r = -.49, p < .0001$) and increasing age ($r = .25, p < .001$). This is not surprising given that the context for strategy assessment in our study was the experience of difficulties with tasks and activities that typically do increase with age.

In keeping with existing criteria for identifying covariates (Keppe & Zedeck, 1989), we specified a predefined cutoff value of $r = .20$ to guide the selection of background variables for inclusion in our subsequent analyses. On this basis, all subsequent analyses included income, health status, and functional status because of their correlations with gender. However, because we used a model-specific approach, some models included additional covariates, as specified below.

Gender and Control Strategies as Predictors of Hospital Outcomes

We constructed regression models to consider whether gender, strategy, and the Gender X Strategy interaction predicted hospital outcomes. Because sample sizes prohibited the adoption of a single, inclusive model to simultaneously examine all strategies, we opted for a multiple model approach in which each separate model tested one control strategy. This limited the number of predictors in each model, thereby avoiding violations of the required case-to-variable ratio (Tabachnick & Fidell, 2001). It also further minimized the risk of overfitting the models.

In addition to the covariates of income, health status, and functional status, age was added in the model that examined help seeking because age correlated with this primary-control strategy. Also, because strategy covariation could explain the hypothesized differences in the consequences of control strategies, relevant strategies were included as covariates if they correlated with the strategy being tested. For example, to test the independent effect of persistence on the hospital outcomes, we controlled for help seeking because it correlated with persistence. Likewise, disengagement was added to the model that tested the independent effect of task modification, persistence and disengagement were included to test the help seeking model, and task modification and help seeking were added to test the disengagement model.

Rationale for analyses. Two analytic approaches were applied, beginning with a log-linear regression conducted using an SAS procedure that fits generalized linear models (GENMOD). This is the best choice for count data that conform to a negative binomial, Poisson-like distribution, which was the case for the distributions involving many individuals with no hospital admissions or 0 days in the hospital. However, we also compared our major findings from the log-linear approach with those obtained using the more traditional OLS regression procedure.

All models were free of multicollinearity (tolerance = .56–.99; variance inflation factors < 2) as determined by examining the collinearity diagnostics before adding the interaction term to each model. As recommended by Tabachnick and Fidell (2001), we applied Jaccard, Turrisi, and Wan’s (1991) method of centering the interaction term (i.e., converting to deviation scores) to avoid multicollinearity problems resulting from correlations between the interaction term and independent variables. The Gender X Strategy product term was entered in the final step to obtain the incremental percentage of variance explained by the interaction.

For models in which an interaction effect did emerge, follow-up OLS regression analyses were conducted separately for men and women, again controlling for the relevant covariates. This produced separate slopes for men and women that we subsequently superimposed on one another to produce the graphic illustrations of relationships between TSCS and hospital outcomes. Although we have limited our presentation in Table 3 to findings from the log-linear approach, the OLS approach produced nearly identical results. Of note, because of missing values on the relevant sets of variables, the sample sizes varied slightly across the models ($n = 140$), with the exception that models including help-seeking were based on a smaller sample ($n = 97$).

Primary-control strategies. The top panel of Table 3 summarizes the log-linear regression estimates for gender, the primary-control strategy, and the Gender X Strategy interaction as predictors of HA and HD. These estimates are shown for each of the three primary-control strategy models that included either: task persistence (Model 1), task modification (Model 2), or help seeking (Model 3).

In the models examining hospital admissions, the majority of individual effects for control strategies and gender were significant. However, in each case, these unique gender and strategy effects were qualified by the Gender X Strategy interaction on number of hospital admissions for task persistence (Model 1: $b = -.59, se = .25, \chi^2(1, N = 97) = 5.32, p = .021$), task modification (Model 2: $b = .59, se = .21, \chi^2(1, N = 141) = 8.04, p = .005$), and help seeking (Model 3: $b = .61, se = .23, \chi^2(1, N = 97) = 6.88, p = .009$). Also significant were the F values associated with entry of the interaction terms in the final step, the interactions in each of these models explaining a significant percentage of the variance (2%, 6%, and 7%, respectively).

Figure 1 (top panel), which shows the frequency of using the primary-control strategies from least (0 = never) to most (4 = almost always) often, illustrates that among those using the strategies of task modification and help seeking most often, women had an average of one hospital admission; whereas, men had an absence of admissions. More importantly, the slope of the regression line for men is consistent with our predictions: As men’s frequency of using these primary-control strategies increased from 0 (never) to 4 (almost always), fewer hospital admissions occurred, perhaps implying that men benefit from the use of primary-control strategies.

To consider the clinical implications of the extent to which men might benefit from these strategies, we applied the Binomial Effect Size Display procedure (Rosenthal & Rubin, 1982). For illustra-
tion purposes, we chose the task modification strategy, specifying the numbers of men who were admitted (≥1 admissions) or not admitted (0 admissions) to hospital, given “low” or “high” use of this strategy as determined by a median split (median = 2.67). Figure 2 shows that, among men “low” on task modification, about half were hospitalized (51.6%, n = 16) and half were not (48.4%, n = 15). In contrast, among men “high” on task modification, admissions occurred rarely (20.0%, n = 3), with most avoiding an admission (80.0%, n = 12).

Finally, with regard to our analyses of primary-control strategies, the findings that did not conform to our expectations are also notable. First, although significant, the meaning of the interaction in Model 1 was opposite to expectations: The more men engaged in simple persistence in the face of health-induced task restrictions, the more often they were admitted to hospital. Second, none of the Gender × Strategy interactions were significant in the models for the hospital duration outcome (Table 3, top panel). Taken together, our findings might suggest that, for men, the proactive primary-control strategies of task modification and help seeking reduce the likelihood of hospital admissions, but once hospitalized, these have little impact on hospital stay durations.

Secondary-control strategies. Turning to the analysis of secondary-control strategies, Table 3 (bottom panel) revealed some significant main effects for gender and strategy. The analysis of task disengagement (Model 1) showed that women used this strategy significantly more often than men. Gender differences also emerged in the analysis of both self-protective secondary-control strategies (Model 2a and 2b); however, main effects were again qualified by a Gender × Strategy interaction.

As hypothesized, in the analysis of positive appraisals, the Gender × Strategy interaction predicted both hospital admissions, although only marginally (Model 2a: b = −3.0, se = .81, χ²(1, N = 136) = 2.90, p = .089), and hospital durations (Model 2b: b = −.71, se = .27, χ²(1, N = 136) = 6.72, p = .009). In the case of hospital durations, the addition of the interaction term resulted in a significant F, explaining 4% of the variance. Likewise, gender interacted with the optimistic social comparison strategy to predict both hospital admissions (Model 2b: b = −.45, se = .23, χ²(1, N = 140) = 3.91, p = .048) and hospital durations (Model 2b: b = −.84, se = .37, χ²(1, N = 140) = 5.35, p = .021), explaining a significant 2% and 1% of the variance, respectively. Although the pattern of findings for men was unexpected, showing that more frequent use of these strategies corresponded to longer stays, the pattern for women was consistent with our predictions (Figure 1, bottom panel). Women’s more frequent use of these compensatory secondary-control strategies was associated with shorter hospital stay durations. For example, women using OSCs infrequently spent an average of 3 days in hospital, whereas those using this strategy most frequently were hospitalized only about 1.5 days.

**Discussion**

Consistent with past research that has shown control beliefs and strategies relate positively to well-being, our longitudinal data suggest that certain TSCS have positive health consequences in later life. Moreover, we demonstrated that the efficacy of these control strategies depends on gender and type of strategy. That is, certain primary- and secondary-control strategies predicted hospital outcomes differently for men and women, perhaps providing insights regarding their potential beneficial effects. A simplified interpretation of the near mirror-image patterns of the Gender × Strategy interaction is that primary-control strategies are beneficial for men (Figure 1, top panel) and secondary-control strategies are beneficial for women (Figure 1, bottom panel). In particular, as men relied more frequently on the strategies of task modification (selective primary control) and help seeking (compensatory primary control), they were admitted to hospital less often. In contrast, as women relied more frequently on the compensatory secondary-control strategies of positive reappraisal and OSCs, they were admitted less often and had shorter durations of hospital stays. The fact that the benefits of secondary control did not apply to disengagement, but rather were limited to these self-protective

### Table 3

**Summary of Estimates from Log-Linear Regression Analyses: Task-Specific Primary and Secondary Control Strategies (S) and Gender (G) as Predictors of Number of Hospital Admissions and Hospital Duration of Stay During a 2-Year Follow-up Period**

<table>
<thead>
<tr>
<th>Models</th>
<th>Strategy</th>
<th>Gender</th>
<th>G × S</th>
<th>Strategy</th>
<th>Gender</th>
<th>G × S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary control strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Task persistence</td>
<td>1.26*</td>
<td>1.18</td>
<td>−0.59**</td>
<td>1.12</td>
<td>1.38</td>
<td>−0.65</td>
</tr>
<tr>
<td>2. Task modification</td>
<td>−0.90*</td>
<td>−1.65*</td>
<td>0.59*</td>
<td>−1.21</td>
<td>−1.65</td>
<td>0.65</td>
</tr>
<tr>
<td>3. Help seeking</td>
<td>−1.26</td>
<td>−1.19*</td>
<td>0.61*</td>
<td>−0.87</td>
<td>−0.71</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>Secondary control strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Task disengagement</td>
<td>−0.90</td>
<td>−1.12**</td>
<td>0.52</td>
<td>−1.75</td>
<td>−1.32</td>
<td>−0.95</td>
</tr>
<tr>
<td>2. Self-protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Positive reappraisal</td>
<td>0.66**</td>
<td>0.59</td>
<td>−0.30</td>
<td>1.22*</td>
<td>1.67**</td>
<td>−0.71*</td>
</tr>
<tr>
<td>b. Optimistic social comparison</td>
<td>0.71</td>
<td>1.15</td>
<td>−0.71**</td>
<td>1.32*</td>
<td>2.33**</td>
<td>−0.84**</td>
</tr>
</tbody>
</table>

*Note.* All models controlled for income, health status, and functional status. For the primary control models, Model 1 also included help seeking, Model 2 included disengagement, and Model 3 included age, task persistence, and task disengagement. For the secondary control strategies, Model 1 also included task modification and help seeking.

* p ≤ .01. ** p ≤ .05.
strategies depicts the differentiated nature of secondary-control strategies (Chipperfield et al., in press; Heckhausen & Schulz, 1998).

The same interaction patterns could also be said to illustrate detrimental effects, particularly in that men’s more frequent endorsement of compensatory secondary-control strategies was associated with relatively longer durations of hospital stays (Figure 1, bottom panel). However, it is counterintuitive and inconsistent with theoretical expectations that these strategies would themselves be detrimental. Rather, it is more likely that there is a detrimental force of a third variable that covaries with more frequent use of compensatory secondary-control strategies. For example, if exposure to earlier life stressors promotes men’s general use of these compensatory strategies, the detrimental effects of stress exposure rather than the strategies per se may account for longer hospital stays. This might further mean that our task-specific control strategies reflect generalized or dispositional styles of responding to challenge.

The Gender × Strategies interactions explained up to 7% of the variance above and beyond the main effects for gender and control strategies and separately from income, functional status, and health status. Although effects explaining less than 10% of the variance can be regarded as small, knowledge in human sciences research has accumulated based on effects of such magnitudes (Maxwell & Delaney, 2000). Moreover, when effect sizes are reconceptualized in favor of simply squaring correlation coefficients (e.g., Meyer et al., 2001; Rosenthal & Rubin, 1982), even variables that explain small amounts of the variance are shown to have clinical significance. For example, our application of Rosenthal and Rubin’s (1982) Binomial Effect Size Display procedure (see Figure 2) points to the profound clinical significance of men’s use of task modification—those who used this primary-control strategy frequently versus infrequently had a 30% lower likelihood of being hospitalized (20.0% vs. 51.6%).

The impact of our findings is also demonstrated by considering the potential financial savings that might result from the use of certain control strategies. For illustration purposes, we estimated the costs of hospital stays for women who frequently (often or almost always) and infrequently (never or rarely) used the secondary-control strategy of OSCs. This involved multiplying the
mean numbers of days spent in the hospital for each group (1.97 and 1.13 days, respectively) by the mean per-person daily hospital cost. Because we did not have access to actual hospital stay costs for individuals in our study, we adopted an estimated cost of $414.00 CDN dollars (DeCoster, Peterson, & Kasiaj, 1996) by averaging over daily costs that ranged from $288.00 to $540.00 at hospitals of varying sizes (Currie, 1996). With this estimated value, we calculated a cost of $815.58 for women who used this secondary-control strategy infrequently ($414.00 \times 1.97$) and $467.82$ ($M = 1.13 \times 414.00$) for women who used it frequently, the difference being $347.78$ ($815.58 - 467.82$).

Because our calculations were not based on actual daily cost, they provide only crude estimates. However, to the extent that they mirror reality, the calculations imply that women’s use of this secondary-control strategy saves money. Because today’s hospital stay costs have risen beyond the estimate used in our calculations, the true cost per day would exceed our estimate. Moreover, the actual savings for a women who used the OSC strategy frequently is likely larger than our reported estimate because some of those women who used OSCs infrequently would have very long hospital stays that were truncated, therefore attenuating the mean lengths of their hospital stays. Nonetheless, if multiplied over many individuals, even a small per-person reduction in cost could result in huge savings to the health care system. Such savings would have dramatic implications for the escalating costs of health care, especially as older individuals have been shown to use the “lion’s share” of hospital resources, constituting 38% of inpatient hospitalizations (Currie, 2002). Moreover, because the hospital environment can be impersonal and can expose patients to infectious diseases, limiting hospital admissions has clear benefits beyond merely cutting costs (Currie, 1996).

Given the magnitude of the relationships between control strategies and hospital outcomes and the potential implications of our findings, an understanding of the underlying processes or mechanisms is critical. What might explain, for example, why women would benefit more so than men from using secondary-control strategies? By statistically adjusting for women’s greater functional limitations, poorer health, and lower incomes that could reduce opportunities for goal attainment, we found no evidence that gender differences in the benefits of control strategies might be due to gender differences in opportunities for goal attainment. That the Gender × Strategy interactions emerged after controlling for these factors means either that our measures inadequately tapped reduced opportunities for goal attainment or the answer lies elsewhere.

**Future Research Directions**

In addition to the need for systematic examinations of the underlying mechanisms that might explain gender differences in the consequences of control strategies, future research should consider whether control strategies operate differently across disparate types of health outcomes. Our findings provide direction by illustrating differences in how primary- and secondary-control strategies predict HAs, which perhaps signify poor health or health problems, and HDs, which perhaps signify vulnerability to complications or compromised recovery. In our study, men’s more frequent use of certain primary-control strategies may have minimized the odds of them developing health problems that led to hospital admissions in later life, but it did not relate to length of hospital stay. In contrast, women’s more frequent use of compensatory (self-protective) secondary control predicted both hospital outcomes.

This leads to testable hypotheses. For example, the salutary effects of self-protective secondary-control strategies, at least for women, should be found across a broad array of health variables, including those implicated in both health promotion and recovery. It is also possible to test whether secondary-control strategies have more wide-ranging positive health consequences for women than do primary-control strategies for men. According to our findings, the benefits of primary-control strategies for men may be limited to their health-protective role, having little effect on recovery once health had suffered to the point that hospitalization occurs.

Finally, our results have implications for research on interventions designed to promote the use of control strategies. Implied in our findings (Figure 1, top panel), women with health-induced restrictions might gain little by interventions to promote primary-control strategies. Furthermore, given that men’s more frequent use of persistence corresponded to more hospital admissions, these proactive strategies may be nonadaptive when men face such health-related restrictions in later life. This seems paradoxical since persistence, which captures the classic notion of proactive primary control, might be expected to have uniform positive health benefits. However, if societal pressures encourage men to persist in the face of extreme difficulties and this undermines their shift to more adaptive strategies, persistence could very well be counterproductive and dysfunctional. This highlights the potential value of interventions encouraging men to modify their approaches to goal achievement by shifting to compensatory primary control in the form of help seeking or selective primary control in the form of task modification.

**Strengths and Limitations**

Three potential limitations of our study are notable. First, our analytic approach that involved testing multiple models may have increased the likelihood of committing Type I errors. On the other hand, Type I errors seem unlikely because the probability of detecting interaction effects is very low in survey data due to few
respondents typically having extreme scores on the factors comprising the interaction (McClelland & Judd, 1993). Also, the consistency with which the predicted gender by strategy interaction emerged provides confidence that statistical error alone cannot explain the interaction patterns.

Second, although the truncation procedure that occurred prior to our receipt of data was effective in removing outliers from our measure, it limits our conclusions. In particular, we are prohibited from drawing precise conclusions regarding the relationship between strategies and the exact number of days in hospital. Nonetheless, we expect that this resulted in conservative tests of our hypotheses and that the magnitude of effects is likely stronger than what we have presented.

Third, our hospital measures were somewhat redundant because of individuals who were not hospitalized having 0 hospital days. This might suggest the value of combining the hospital admissions and hospital durations measures to construct one outcome variable. However, the measures did possess discriminable information because hospital admissions varied in durations. Moreover, justification for retaining separate outcomes is supported by our prior research showing that hospital admissions but not hospital durations related significantly to global self-rated health (Menec & Chipperfield, 2001) and from our present findings that men’s use of certain primary-control strategies corresponded to hospital admissions but not to durations of hospital stays.

Despite these potential limitations, numerous strengths distinguish our study from the existing research. First, our hospital outcomes were highly reliable because they avoided the potential pitfalls of self-report such as poor memory or recall bias (Roos & Shapiro, 1981). Reliability is further enhanced because the measures are derived from an administrative system through which physicians are paid, resulting in a strong incentive for accurate reporting of all patient contacts. In addition, because the universal, Canadian insurance system ensures financially independent hospital access, our measures were not subject to selectivity problems that arise in systems in which individuals’ lack of financial resources can prohibit admissions.

A second major strength of our study is that, because our SAS participants were drawn from the larger AIM study that used stratified random sampling procedures, it was based on a more representative sample than most convenience samples used in previous studies. Nonetheless, as reported elsewhere (Chipperfield, Perry, & Weiner, 2003), because of the SAS selection criteria, it is not surprising that SAS participants differed from those in the larger AIM study who were older and had lower income and education levels. Thus, generalizations are only appropriate to older, cognitively intact, urban- and community-dwelling adults. Moreover, generalizations are further limited because our analysis was restricted to those SAS participants with health-induced problems who differed in obvious ways from their health-induced restrictions.

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Finally, in contrast to the more common cross-sectional designs used in research on primary and secondary control (Heckhausen, Wrosch, & Fleeson, 2001; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen, 1993), we had access to longitudinal data that tracked hospital outcomes for 2 years after assessing strategies. Therefore, although we cannot definitively claim that control strategies for dealing with simple everyday obstacles affect hospital outcomes, a causal inference is implied by our prospective design. The pattern of findings underscores the likelihood of gender differences in the health consequences of control strategies, suggesting that men benefit by adopting certain primary-control strategies and women benefit by adopting certain secondary-control strategies, in particular, self-protective compensatory strategies. To conclude, our findings extend prior demonstrations that men and women differ in the frequency and complexity of their strategy use and in how strategies relate to health problems (Chipperfield et al., 1999, in press; Helgeson, 1992). Taken together, these findings highlight a need for the study of gender differences in the use and consequences of control strategies in later life.

References


(Appendix follows)
Appendix

Three Step Funnelling Approach to Strategy Assessment

Step 1: Identification of Health-Related Restrictions

“How often, if ever (0 = never, 1 = sometimes, 2 = often) has your (insert health condition, e.g., arthritis) interfered or restricted you in terms of...”

Achievement Tasks

“Completing important projects related to your work or volunteer activities”
“Completing important non-routine projects (e.g., building fences, making curtains, canning)”
“Performing day-to-day tasks in the house (e.g., preparing meals, housework)”
“Performing tasks around the yard (e.g., lawn care, routine outdoor maintenance)”
“Performing tasks away from the home (e.g., shopping, banking)”

Leisure Activities

“Leisure activities (e.g., golf, reading, walking, etc.)”

Affiliative Activities

“Social activities (e.g., visiting friends/family)”
“Spiritual activities (e.g., going to meetings/church)”

Step 2: Identification of Most Restricted Domain

“You mentioned that your (insert health condition) has restricted you in several ways. In which of these ways have you been restricted most often?”

Step 3: Assessment of Strategy Use

“When you have difficulty with (insert task/activity), how often do you...?”
“Continue doing these tasks just as you always have” (Persist at task as always)
“Exert more effort in order to do them” (Increase effort exertion)
“See these tasks as being less important than you once did” (Downgrade task importance)
“Tell yourself that you can still do these if you try” (Endorse ability attribution)
“Tell yourself that it is just not necessary to get these done” (Downgrade task necessity)
“Look for a positive side to your struggle” (Positive reappraisal)
“Find someone else to help or assist you” (Seek others’ assistance)
“Find someone else to do them” (Initiate task completion by other)
“Try to do only some parts of them that you can still do” (Modify task components)
“Allow yourself more time to complete them” (Modify task timing)
“Continue to try to do these tasks, but do them less often” (Modify task frequency)
“Expend less effort on these in order to reserve your energy for more important things” (Reduce/reserve effort)
“Tell yourself that others your age have worse problems” (Endorse optimistic social comparison)
(Note: When appropriate, the word “tasks” was replaced with “activities.”)