The Relationship Between Medical Advance Directives and Planful Health Behaviors

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Abstract

This study conceptualized the possession of an advance directive or living will as a type of planful health behavior. We examined demographic characteristics of individuals who have executed advance directives or living wills, as well as explored the relationship between advance directive status and other health practices. Participants of the Seattle Longitudinal Study, a cohort-sequential study of adult intellectual development, were mailed a questionnaire assessing health practices (e.g. medical utilization, diet). Approximately one-half of the adults surveyed had medical advance directives or living wills. Logistic regressions indicated that older adults, those with higher educational attainment, and those in poorer health were more likely to have advance directives. Additionally, advance directive status was related to better dental care and more frequent medical checkups.

The Relationship Between Medical Advance Directives and Planful Health Behaviors

The U.S. Congress passed the Patient Self-Determination Act (PSDA) in 1990 (Omnibus Budget Reconciliation Act of 1990). This legislation required all health care facilities receiving Medicare or Medicaid funds to provide information to patients about medical advance directives and the rights of patients to refuse medical treatment, and to document patients' advance directive status in medical records. Medical advance directives, including living wills and durable powers of attorney for healthcare, stipulate a patient's preferences regarding medical treatment in the event that the patient becomes unable to make treatment decisions for him- or herself, such as if they entered a coma or vegetative state. Proponents of the PSDA believed that, with the passage of the legislation, adults would be encouraged to complete medical advance directives so that end-of life-preferences would be carried out (Wolf, Boyle, Callahan, et al, 1991).

Proponents of the PSDA believed that education would encourage execution of advance directives. General awareness of rights under the law, as well as informal advance care planning seems to have increased, perhaps as a consequence of the PSDA legislation. However, despite an increase in general awareness of rights under the legislation, the magnitude of the increase in the number of people actually executing formal, written advance directives subsequent to the passage of the PSDA has been relatively small (Emanuel,

Weinberg, Gonin, Hummel, and Emanuel, 1993; Park, Eaton, Larson, and Palmer, 1994; Robinson, de Haven, and Koch, 1993). For instance, Emanuel et al (1993) examined 258 adult patients discharged from acute care hospitals before the passage of the PSDA, and 321 patients discharged subsequent to its implementation. They found that the percentage of people who were concerned about end-of-life decisions and made informal advance care plans (e.g. discussed with family members) was much higher than the percentage of people who actually executed advance care documents, both before and after the passage of the PSDA. The percentage of patients with formal, written advance care documents was 19.8% prior to the passage of the PSDA, and rose to 25.5% after the legislation passed. Additionally, 41.1% of patients interviewed before the PSDA had made informal plans, while 47% made informal advance care arrangements subsequent to the passage of the law. Similarly, Robinson et al (1993) surveyed 372 patients over the age of 18 who were hospitalized either before or after the implementation of the PSDA. They found no increase in the number of patients who had living wills after the PSDA was implemented, but reported a significant increase in the number of patients who knew what a living will was.

Thus, after the passage of the PSDA, it appears that while knowledge and awareness of patient rights to execute advance directives has increased, the number of people who actually have them is smaller than proponents of the PSDA

had anticipated. Results such as these may cause some to question the efficacy of the PSDA legislation. Further skepticism for a positive impact of the PSDA is obtained from results reported by Park et al (1994). Park and her colleagues surveyed hospital administrators after the passage of the law and found that people tend to execute advance directives prior to admission into a hospital facility - before provision of materials regarding patients' rights to execute advance care documents. Taken together, these results indicate that people are aware of their rights to have medical advance directives - before being presented with advance directive information upon admission to a hospital - but relatively few elect to execute them.

Given the current evidence that only a small percentage of people actually execute advance directives, a growing body of research has focused on identifying characteristics of people who make this decision. For example, Robinson et al (1993) examined knowledge of living wills, as well as possession of these documents, as a function of certain demographic characteristics. They found that knowledge of living wills was related to respondents' race, income, and level of education. Specifically, whites more than non-whites, those with greater income, and those with more education were more likely to know what a living will was. However, possession of living wills was related only to age. Those who possessed living wills were more likely to belong to an older-age category (greater than 36 years) with a mean age of 61.1 years. Similarly, Emanuel et al (1993)

examined age, sex, income, marital status, education, religion, and self-perceived health status, and found that none of these factors significantly accounted for advance directive status. However, these researchers did find that possession of advance care documents was significantly related to having a regular estate will. In fact, only 6.7% of those who did not have an estate will possessed medical advance directives (Emanuel et al, 1993).

Researchers investigating percentages of people with estate wills have found that 50% of the general population execute such documents (Astrachan, 1979; Emanuel, Barry, Stoeckle, Ettelson, and Emanuel, 1991). Furthermore, possession of estate wills has been shown to be related to older age, greater income, and higher occupational status (Fellows, Simon, and Rau, 1978). Estimates of the percentages of people who have medical advance directives, however, vary considerably from study to study, and no clear relationships between possession of advance directives and demographic characteristics - with the possible exception of age - have been established, as evidenced by results obtained by Emmanuel et al (1993) and Robinson et al (1993). Sachs (1994) reported estimates of people who have executed formal advance directives ranging from 2% to 81%. He suggested that studies showing larger percentages of people with advance care documents (i.e. greater than 60%) included studies of seriously ill or frail elderly patients. Specifically, Sachs (1994) posited that those who are most likely to possess medical advance directives are older and tend to plan for the

future - as evidenced by the relationship between possession of an estate will and advance directive obtained by Emmanuel et al (1993).

Thus, the execution of advance care documents may be seen as a reflection of a general tendency toward planful behavior, and health-related planning in particular. Planful behavior, in the context of formulating an estate will or advance care directive, refers to preparing contingency actions or directions for a future circumstance in which a person may be unable to specify wishes or preferences directly - either because of death, incapacitation, or illness. We propose that the planfulness required to execute an estate will or medical advance directive may generalize to other behaviors reflecting a planful lifestyle - in particular, planful behaviors associated with positive health practices.

Planful Health Behaviors and Potential Relationship with Advance Directive Status

Health behaviors were defined by Kirscht (1983) as activities that people spontaneously perform, or can be induced to perform, "with the intention of alleviating the impact of potential risks and hazards in their environment" (p. 278). The present authors propose that medical advance directives, such as living wills or the appointment of proxy decision makers, are formulated with the intention of alleviating the burden of legally and ethically complex end-of-life decisions, such as were found in the Nancy Cruzan case (Cruzan vs. Harmon,

1990). Consequently, the execution of medical advance directives can be characterized as a planful health behavior.

Research has concentrated on identifying demographic characteristics - such as gender, socioeconomic status (SES), and age - important in the practice of health behaviors. First, Rakowski, Julius, Hickey, and Halter (1987) and Verbrugge (1985) found that gender was a consistent predictor of preventive health behavior, with women being somewhat more likely to report favorable health practices. Second, Steele and McBroom (1972) and Williams and Wechsler (1972) reported a modest association between high SES and more favorable health practices. Finally, research focused on examining the relationship between age and health practices has indicated an overall prevalence of better health behaviors with increased age. Specifically, Prohaska, Leventhal, Leventhal, and Keller (1985) found that older adults practiced more health-promoting and stress-avoidance behaviors than their younger counterparts.

Thus, gender, SES, and age are important predictors in accounting for planful health practices, and the execution of medical advance directives has been characterized as a type of health behavior. Prior research on advance directives evidencing a possible relationship between age and advance directive status, but no relationship between SES, gender, and advance directive status has been limited to studies of patients entering or recently discharged from hospitals. Little research has been focused on the possession of medical advance directives in

healthy, community-dwelling adult samples. Of particular interest to the present authors are characteristics of community-dwelling adults which are associated with preparation of advance care documents.

If advance directive status is conceptualized as a type of planful health behavior, then the execution of medical advance directives may be associated with older age and higher SES as are other planful activities, such as the execution of estate wills (Fellows, Simon, and Rau, 1978) and other types of health behaviors (e.g. Prohaska, et al, 1985; Steele and McBroom, 1972) in healthy, community-dwelling adults. Furthermore, another characteristic, behavioral flexibility/rigidity, has been shown to be associated with increased planfulness in healthy adults (Schaie, Dutta, and Willis, 1991). Schaie, in 1958, defined behavioral rigidity as "a tendency to perseverate and resist conceptual change, to resist the acquisition of new patterns of behavior, and to refuse to relinquish old and established behavior patterns" (p. 608). Therefore, those who are more flexible, older, and have a higher SES may be more likely to possess medical advance directives.

Overview of Present Study

In this article, possession of advance directives is conceptualized as a type of planful health behavior. We examined the relationship between advance directive status, certain demographic variables, behavioral flexibility/rigidity, and other planful health behaviors in a healthy, community-dwelling sample. First, we

hypothesized that, like other health behaviors, advance directive status would be related to increased age and greater income. The relationships between advance directive status and other characteristics such as gender, education, religion, marital status, life satisfaction, and health status were also investigated.

Second, we considered a possible relationship between advance directive status and behavioral flexibility/rigidity. We hypothesized that those high in behavioral flexibility would be more likely to possess medical advance directives.

Finally, in light of research indicating that positive health behaviors are frequently practiced together (e.g. Sobal, Revicki, and DeForge, 1992; Stephens, 1986), we proposed that possession of advance directives was associated with positive health practices in eight specific health domains, including smoking, alcohol consumption, unhealthy food consumption, unhealthy food acquisition and preparation, exercise, seat belt usage, dental care, and medical checkups. Specifically, we hypothesized that people with better health practices (e.g. do not smoke, good oral hygiene) were more likely to possess advance care documents.

Method

Participants

Subjects were participants in the Seattle Longitudinal Study (SLS), a longitudinal-sequential study of adult intellectual development spanning the age range from 22 to 96 (Schaie, 1983; Schaie, 1994). SLS participants are members of a large health maintenance organization (HMO) in the Seattle metropolitan

area. Individuals in this study took part in a mail survey conducted in 1993 to assess their health behaviors.

The sample for this study (N =1467, M =664, F =803,) was subset into 4 age-cohort groups: the old-old (n = 421, M age =78.92, SD = 4.47, Range 73-96), the young-old (n = 458, M age = 66.21, SD = 3.88, Range 59-72), middle-aged adults (n = 331, M age =51.89, SD = 3.96, Range 45-58), and young adults (n = 257, M age = 36.47, SD = 5.58, Range 24-44).

Individuals participating in this study were classified according to whether or not they reported having a medical advance directive (AD) or a living will (LW). According to brochures distributed by the Group Health Cooperative of Puget Sound and the Senior Services of Seattle, ADs and LWs are judged to represent the same document in the state of Washington. Therefore, responses to these two questions were collapsed into one variable, medical advance directives. Thus, medical advance directives classified participants into two categories: those with either a living will, advance directive, or both (n = 824), and those without either document (n = 643). Participants with and without LWs and with and without ADs were compared using demographic information such as age, education, gender, health status, religion, marital status, number of children, income, and life satisfaction. Comparing these analyses to results using the composite medical advance directives variable as the independent measure revealed no significant differences in participant characteristics. Therefore,

medical advance directives was used as the dependent variable in all subsequent analyses.

Materials and Procedure

Demographic information was obtained from the 1991 wave of the SLS and from a 1993 mail survey. Variables included gender, education, income, religion, marital status, life satisfaction, and number of children.

Health Behavior Questionnaire (HBQ). The Penn State Health Behavior Questionnaire consisted of 87 items developed to assess health-related issues and behaviors in adults. In the analyses reported in this paper, missing values in HBQ items were replaced by median values. The items comprised 35 health practices, and application of Bartlett's test for the significance of the correlation matrix (Gorsuch, 1983) revealed that it was reasonable to proceed with factor analysis.

Based on previous research with an earlier version of the HBQ (Maier, McGuire, & Willis, 1994), Maier (1995) proposed a first-order eight factor model involving 30 of the 35 practices. He conducted confirmatory factor analyses using cross-validation methodology by splitting the original 1991 longitudinal sample (calibration sample = 1,246; validation sample = 1,245). He found that a revised first-order eight factor model resulted in an acceptable fit to the data, with eight post-hoc model modifications addressing covariations among health behavior items ($\underline{X}^2 = 948.7$, df = 371, Goodness of fit index = .950; Joereskog & Soerbom,

1993). This model was cross-validated, although there were slight differences in parameter estimates across samples (Maier, 1995).

The accepted model for the HBQ consisted of the following factors: Non-smoking, Alcohol consumption, Avoidance of unhealthy foods, Healthful meal planning and preparation, Exercise, Seat belt utilization, Dental care, and Medical checkups. Factor scores on the HBQ are coded so that high scores indicate more positive health behaviors. For example, those with a high score on the avoidance of unhealthy foods factor were less likely to consume those foods and those with a high score on the medical checkups factor are more likely to have regular medical checkups. Scores are standardized for the entire sample so that each factor has $\underline{M} = 50$, $\underline{SD} = 10$.

Health status. Health status is measured in three ways in this study. First, an estimated total health cost expenditure for a 12-month period was used as a measure of health status (for the total sample, $\underline{M} = 1485.68$). This estimate was derived using an algorithm developed to calculate individuals' total health costs for a six month period surrounding their participation in the 1991 wave of the longitudinal SLS sample (Clark, Von Korff, Saunders, Baluch, & Simon, in press). Second, two factor scores were derived from the responses of participants to the 1993 health behavior questionnaire. The first factor score measures the subjective perceptions of participants regarding their health status (for the total sample, $\underline{M} = 1485.68$). The second factor score measures self-reported objective

health status as indicated by number of physician visits, hospital days, use of a walker, need assistance for stairs, and number of falls. These health status measures were moderately correlated. Estimated health cost expenditures was significantly correlated with both objective health status ($r = -.38$, $p < .01$) and subjective health perception ($r = -.33$, $p < .01$). Additionally, subjective health perception and objective health status were significantly correlated ($r = .32$, $p < .01$).

The Test of Behavioral Rigidity (TBR) The TBR consists of three factors derived from subtests within the SLS battery that were designed to measure behavioral flexibility (Maitland, 1993; Schaie, 1958; Schaie, Dutta, & Willis, 1991). Only the factor scores were used in this study. Again, factor scores are standardized for the entire sample so that each factor has $M = 50$, $SD = 10$. Motor Cognitive Flexibility (MCF) measures the ability of an individual to shift attention from one task to another, keeping both tasks in mind. Attitudinal Flexibility (AF) assesses psychosocial attitudes as well as the ability to perceive, process, and respond to new or unfamiliar patterns in the cognitive realm. Psychomotor Speed (PS) measures individual processing speed for familiar tasks.

The health behavior questionnaire (HBQ) was mailed in 1993 to all subjects who participated in the latest wave (1991) of the SLS study. However, only participants in the longitudinal sample of the SLS were included in this study. A comparison between the individuals completing the HBQ and the original 1991

longitudinal sample indicated that the two samples did not differ with respect to age, educational level, or gender. Therefore, it was concluded that those individuals from the longitudinal sample completing the HBQ were a subset of the 1991 longitudinal sample.

Results

Sample Characterization

Table 1 characterizes the sample in terms of possession of an advance directive or living will and demographic information such as gender, income, number of children, religion, marital status, life satisfaction, and recent hospitalization as a function of age/cohort group. To further characterize the sample, a 4 (age/cohort) X 2 (gender) X 2 (advance directive status) ANOVA with education as the dependent variable revealed several significant main effects but no significant interactions between age/cohort, gender, and medical advance directives. There was a main effect of age/cohort group, $F(3, 1451) = 38.17$, $p < .0001$ (see Table 1). Later-born cohorts (i.e., younger adults) had more education than did earlier-born cohorts (i.e., older adults). There was also a main effect of gender, $F(1, 1451) = 16.34$, $p < .0001$, showing that men were more highly educated than women (M education = 15.36 and 14.72, respectively). Finally, there was a significant main effect of possession of a medical advance directive, $F(1, 1451) = 14.39$, $p < .001$. Those possessing an advance directive

were more educated than the remaining group (M education level = 16.41 and 15.01, respectively).

Insert Table 1 about here

A 4 (age/cohort) X 2 (gender) X 2 (advance directive status) ANOVA was also performed with income as the dependent variable. Again, several significant main effects but no interactions were found between age/cohort, gender and medical advance directive status (see Table 1). There was a main effect of age/cohort, $F(3, 1368) = 85.50$, $p < .0001$, with middle-aged adults having higher income and old-old adults having lower income than other age/cohort groups. There was also a main effect of gender, $F(1, 1368) = 38.73$, $p < .0001$. Men had higher incomes than women (M income = 14.79 and 13.49, respectively). Finally, there was a significant main effect of medical advance directive status, $F(1, 1368) = 11.42$, $p < .001$, showing those without medical advance directives had higher incomes than those with advance directives (M = 14.28 and 13.95, respectively).

Due to the main effect of medical advance directive status on education and income, indicating an effect of socioeconomic status (SES), education and income were used as covariates in 4 (age/cohort) X 2 (gender) X 2 (advance directive status) ANCOVAs with life satisfaction and number of children as the

dependent variables. For life satisfaction, a significant main effect of age/cohort group was observed, $F(3, 1359) = 10.54$, $p < .0001$. Older individuals were more satisfied with their lives than were younger individuals (see Table 1). There was also a significant gender by medical advance directive status interaction, $F(1, 1359) = 6.72$, $p < .01$. Men with advance directives ($M = 1.71$, $SD = 0.73$) were more satisfied with their lives than men without them ($M = 1.97$, $SD = 0.86$), while women without advance directives were more satisfied ($M = 1.98$, $SD = 0.91$) than women with them ($M = 2.00$, $SD = 0.90$).

With regard to how many children individuals had, there was a significant interaction between age/cohort group and advance directive status with education and income as covariates, $F(3, 1150) = 3.83$, $p < .01$. A follow-up one-way ANCOVA with education and income as covariates and a combined age/cohort and medical advance directive variable as the independent variable revealed significant differences between (a) young-old cohorts without advance directives and and all other age groups and (b) young adults without advance directives and all other age/cohort groups. Young-old cohorts without advance directives had significantly more children ($M = 3.72$, $SD = 2.03$) than any other age/cohort group. Young adults without medical advance directives, however, had significantly fewer children ($M = 1.92$, $SD = 1.05$) than any other age/cohort group. Old-old adults with advance directives had a mean of 2.94 children ($SD = 1.59$), and those without advance directives had a mean of 2.92 children ($SD =$

1.42). Middle-aged adults with advance directives had a mean of 2.69 children (SD = 1.40), and those without advance directives had a mean of 2.85 children (SD = 1.61). Finally, members of the young-old cohort with medical advance directives had 3.16 children, on average (SD = 1.43), and young adults with advance directives had 2.23 children, on average (SD = 0.83).

There was also a significant interaction between gender and advance directive status for number of children, $F(1, 1150) = 5.45$, $p < .02$. A follow-up one-way ANCOVA using a combined gender and medical advance directive status variable as the independent variable, however, failed to reveal any significant differences in pairwise comparisons. In general, men without medical advance directives tended to have more children than men with them (M = 3.08, SD = 1.82, M = 2.84, SD = 1.48, respectively), but women who possessed advance directives tended to have more children than women who did not (M = 3.01, SD = 1.48, M = 2.79, SD = 1.66, respectively).

The relationships between religion, marital status and medical advance directives were investigated. With regard to religion, a 2 (advance directive status) X 5 (religion) X^2 analysis indicated significant differences as a function of religious affiliation ($X^2 = 24.95$, $p = .01$, $df = 5$). The greatest percentage of persons with medical advance directives within a religious affiliation was reported among individuals identifying themselves as Protestant (60%) or Jewish (70%). Individuals identifying themselves as Catholic, another religion not listed on the

questionnaire, or having no religious affiliation were equally likely either to possess medical advance directives or not to possess them.

A 2 (advance directive status) X 5 (marital status) X^2 was also conducted to determine the relationship between these two variables. Results indicated that there were significant differences in advance directive status according to marital state ($X^2 = 42.98$, $p = .01$, $df = 4$). Comparing married to non-married individuals, the greatest percentage of persons with medical advance directives occurred among married people (56%). Refer to Table 1 for a categorization of subjects according to religious preference and marital status.

Finally, a 2 (advance directive status) X 2 (hospitalization in the past year) X^2 was conducted. This analysis indicated a significant difference in advance directive status as a function of hospitalization in the last year ($X^2 = 6.58$, $p = .01$, $df = 1$) with those recently hospitalized more likely to possess a medical advance directive (see Table 1). A 2 (advance directive status) X 2 (hospitalization in the past year) ANCOVA with education and income as the covariates and age as the dependent variable was conducted in order to explore whether hospitalized individuals with medical advance directives tended to be older than hospitalized persons without advance directives or non-hospitalized adults. There was only a significant main effect of advance directive status, $F(1, 1371) = 175.92$, $p < .0001$, showing that those with medical advance directives were older than those without

them. There was no interaction between advance directive status and hospitalization.

Descriptive Statistics

Means and standard deviations of estimated health cost expenditures, the two health status factors (subjective perception and objective), the eight factor scores from the HBQ (health behavior factors) and the three TBR (behavioral rigidity factors) are shown in Table 2 broken down by cohort group.

Insert Table 2 about here

The relationships among medical advance directive status, demographic variables, health behaviors and behavioral rigidity were examined via correlations and logistic regressions. All analyses were initially conducted using possession of AD, possession of LW and the composite medical advance directive variable. Due to the high correlation between AD and LW ($r = .62$, $p = .0001$), results were essentially the same using any of these three dependent variables,. Therefore, the results reported here use the composite medical advance directive variable. Additionally, in all analyses reported in this study, alpha levels of $p=.01$ were used to determine significance due to the large sample size.

Correlations

The intercorrelation matrix among possession of medical advance directives, demographic variables, health status, health behaviors, and behavioral rigidity are shown in Table 3 for the entire sample. With regard to demographic variables, possession of a medical advance directive was negatively related to age/cohort, indicating that older individuals were more likely to possess advance directives.

Insert Table 3 about here

In general health status factors showed significant relationships with possession of medical advance directives with those in poorer health more likely to have them. Estimated health cost and objective self-rated health status were significantly correlated with possession of medical advance directives. Additionally, health behaviors showed modest relationships with possession of advance directives. Specifically, healthy meal preparation, regular exercise, seat belt usage, better dental care, and frequent medical checkups were all related to having advance care documents.

Finally, behavioral flexibility factors were significantly related to advance directive status. Attitudinal flexibility, motor cognitive flexibility, and psychomotor speed all evidenced negative relationships, indicating that more

flexible individuals were more likely to have advance directives in this sample.

Logistic Regressions

In order to determine specific factors associated with the possession of medical advance directives, a series of simultaneous logistic regressions were conducted. First, main effects models for demographic characteristics, health status and health behavior factors, and behavioral flexibility factors were used to predict advance directive status in three separate sets of analyses (see Table 4). Several steps were run for each main effects model, with variables not accounting for a unique proportion of variance in medical advance directive status systematically removed. In each step within a model, the one variable that was the least significant was removed and the model was run again until all of the remaining variables were significant, unique predictors of medical advance directive status. In the main effects model for demographic variables, the significant predictors of advance directive status were age/cohort, education, and income. For health status and health behavior factors, the significant predictors were health cost expenditures, dental care and medical checkups. Alcohol consumption and exercise were also marginally significant predictors in this model. For behavioral flexibility factors, only motor/cognitive flexibility explained a significant, unique proportion of variance in medical advance directive status. Table 4 presents the results of these sets of regressions.

Insert Table 4 about here

Second, two interaction models were run to test for significant interactions between age/cohort, education, gender, and the variables found to be significant in the health status/health behavior and behavioral flexibility main effects models. Interaction terms were entered into the main effects models one at a time in order to see if the interaction accounted for variance in advance directive status over and above the proportion explained by the main effects alone. Interactions found to be significant in the presence of the significant main effects were retained were included in the health status/health behavior and behavioral flexibility models. The model for health status/health behavior factors model containing interactions included health cost expenditures, dental care, medical checkups, alcohol consumption, exercise, and the interaction between exercise and age/cohort group (see Table 4). For the behavioral flexibility interaction model, the significant predictors were motor/cognitive flexibility and the interaction between motor/cognitive flexibility and age/cohort group (see Table 4).

Finally, the significant variables associated with the demographics model, the health status/health behavior model, and thebehavioral flexibility were entered into a final overall simultaneous logistic regression model to explain medical advance directive status (see Table 5). Once again, variables not

accounting for significant proportions of variance were systematically removed from the regression until only significant predictors remained. Tables 4 and 5 present nonsignificant and significant predictors for each model along with adjusted odds ratios(AORs), confidence intervals, p-values, and indices of explained variance and model fit. Proportion of variance accounted for (R^2) was estimated using a formula derived by Aldrich and Nelson (1984). Model fit was assessed via the receiver operating characteristics (ROC) statistics for each model, with an ROC statistic $\geq .70$ indicating a good-fitting model and an ROC statistic of .50 indicating a bad model fit (Hanley & McNeil, 1982). The ROC represents the probability that a randomly chosen participant with a medical advance directive was more likely to be predicted as having one than a randomly chosen participant who does not possess a medical advance directive. A more detailed description of each of the models derived is provided below.

Insert Table 5 about here

Demographic variables. The first model tested included age/cohort group, gender, education, number of children, income, marital status, life satisfaction, and religion as predictor variables, with the medical advance directive composite variable as the criterion. The model including all demographic variables explained 11 % of variance. In subsequent steps, gender, number of

children, marital status, life satisfaction and religion were systematically removed from the equation because they did not explain unique proportions of variance in advance directive status. Of the demographic characteristics tested here, only cohort group, education, and income contributed to the possession of a medical advance directive. As can be seen from Table 4, older individuals were more likely to possess advance directives than were middle-aged adult or young adult cohort groups. Additionally, individuals with higher educational attainment and greater income were more likely to possess advance directives. The ROC for this series of analyses is 0.85.

Health behavior factor scores. The health behavior model to predict advance directive status was fitted in two steps. A main effects model was first developed using health behavior and health status factors, as well as health cost expenditures. Then, a model including interaction terms of significant health variables and age/cohort, gender, and education was developed.

The first step in developing the model for health behavior factors included the following as predictors of possession of an advance directive: the eight health behavior factors (non-smoking, alcohol consumption, avoidance of unhealthy food consumption, healthful meal preparation , exercise, seat belt use, dental care, medical checkups), estimated total health cost expenditures, and the two health status factors (subjective perceived health status and objective health status). This model explained approximately 10% of the variance in advance

directive status. Non-significant factors were removed until dental care, medical checkups, and estimated health cost expenditures remained. These factors significantly accounted for possession of advance directives, with $p<.01$. Exercise and alcohol consumption were marginal predictors of advance directive status with $p=.02$.

The second step in developing the model for health status and health behavior factors as predictors of medical advance directive status included 5 interaction terms found to independently account for significant variance in the presence of the main effects of health cost estimates, dental care, medical checkups, exercise, and alcohol abstention. These interactions involved age/cohort group and the 5 main effects, and this model explained approximately 14% of the variance in advance directive status. Non-significant factors were removed until estimated health cost expenditures, dental care, medical checkups, alcohol consumption, exercise, and the exercise by age/cohort group interaction remained. Table 4 depicts results obtained from this series of analyses.

As shown in Table 4, dental care and medical checkups were positively related to having advance directives. Those with better dental care (including teeth brushing and flossing, as well as dental checkups) and more frequent medical checkups were more likely to possess a medical advance directive. Additionally, greater health cost expenditures predicted possession of advance directives. Exercise and alcohol consumption were also marginally related to

advance directive status. People who exercise more frequently and consume alcohol were marginally more likely to have advance directives. Finally, the interaction term of exercise and age/cohort group also significantly accounted for variance in advance directive status. The ROC for this interaction model was 0.93.

Behavioral flexibility. Main effects and interaction models were also calculated to determine which behavioral flexibility factors were important in explaining advance directive status. The main effects model included attitudinal flexibility, psychomotor speed, and motor/ cognitive flexibility factor scores as predictors. Proportion of variance explained by this model was 3%. In subsequent analyses, attitudinal flexibility and psychomotor speed were removed because they were not significant predictors of advance directive status, so the final model contained only motor/cognitive flexibility. Results reported in Table 4 indicate that more flexible, or less rigid individuals - particularly in the motor/cognitive domain - are more likely to possess advance directives.

The second step in developing the model for behavioral flexibility factors as predictors of medical advance directive status included an interaction term found to independently account for significant variance in the presence of the main effect of motor/cognitive flexibility. This interaction involved motor/cognitive flexibility and age/cohort group, and this model explained

approximately 11% of the variance in advance directive status. The ROC for this interaction model was 0.71.

Overall model. In the final stage of model development, significant demographic characteristics, health status/health behavior factors, and behavioral flexibility factors from preceding analyses were entered into a final series of simultaneous regressions. The first model tested included cohort group, education, income, estimated health cost expenditures, alcohol consumption, exercise, dental care, medical checkups, motor/cognitive flexibility and the interactions between age/cohort group and exercise, as well as age/cohort group and motor/cognitive flexibility. This model explained 14% of variance in advance directive status, and in subsequent analyses, motor/cognitive flexibility, exercise, alcohol consumption, income, and both interaction terms were systematically removed from the model. The ROC statistic for this final model is 0.84. Table 5 shows the final results obtained from this series of analyses.

As shown in Table 5, results from the comprehensive model are consistent with results yielded from the individual demographic characteristics and health behavior models. Specifically, older cohort groups, individuals with higher educational attainment, individuals with greater health cost expenditures, and those who have better dental care and more frequent medical checkups were more likely to possess an advance directive or living will.

Discussion

In this study, we posited that the execution of advance directives could be characterized as a type of planful health behavior. In accordance with this characterization, we hypothesized that having an advance directive, like other health behaviors, was related to certain demographic variables such as age, education, and health status. Although this is consistent with the health behavior literature (e.g., Prohaska, et al., 1985; Rakowski et al., 1987; Steele & McBroon, 1972;) it is inconsistent with other studies of the relationship between advance directives and demographic characteristics (e.g., Emanuel et al., 1993; Robinson et al., 1993). Previous studies investigating the profile of individuals having advance directives, however, have been conducted in the context of health care facilities. Results of this study indicated that, similar to investigations of health behaviors, demographic characteristics were significant predictors of possession of advance directives. That is, in this healthy, community-dwelling sample, older individuals and those with more education were more likely to have advance directives.

Second, previous investigations of health behaviors (e.g., Sobal et al., 1992; Stephens, 1986) have found that people are inclined to practice favorable health behaviors together. In accordance with these findings, and with our conceptualization of possession of advance directives as a planful health behavior, we hypothesized that having advance directives would co-occurr with other positive health practices. We found that estimated health cost expenditures, dental

care, medical checkups, and to a lesser extent, exercise and alcohol consumption were significant predictors of advance directive status, but that other health behaviors investigated were not. This pattern of results supports the multidimensional nature of health behaviors proposed by other investigators (Kannas, 1981; Krick & Sobal, 1990). It appears that having advance medical directives is related to medical checkups, health maintenance activities and substance use, but not nutrition behaviors - four broad dimensions of health behaviors conceptualized by Sobal et al (1992).

Third, we proposed that advance directive status would be related to behavioral flexibility. Specifically, we hypothesized that less rigid adults would be more likely to consider potential health risks and hazards, such as decisional incapacity near the end of life, and consequently execute medical advance directives. However, results from the behavioral rigidity model indicated that more flexible individuals were more likely to have advance directives. Despite the fact that motor cognitive flexibility was a significant predictor of advance directive status when only behavioral rigidity factors were included, it failed to account for a unique proportion of variance in advance directive status when demographic characteristics and health behavior factors were entered into the model.

We have provided evidence in support of the conceptualization of advance directives as a planful health behavior. Alternatively, possession of medical advance directives could be due primarily to the influence of contact with

health professionals. For instance, those who visit the doctor more frequently may be more likely to receive information about advance directives and consequently execute them. While this may partially explain the present findings, it does not explain the contribution of health maintenance activities which are planful, self-imposed, daily endeavors extending beyond the intermittent influence of contact with health professionals. Thus, based on the results outlined here, the influence of contact with health professionals is an insufficient explanation of advance directive status.

Limitations of present study. The sample utilized in this study, though large, was possibly more educated, had greater income, and was more healthy than the general population. Additionally, participants in this study were all members of the Group Health Cooperative of Puget Sound - a Seattle-based HMO. One could argue that members of an HMO could potentially be more aware of health care issues, such as end of life decision making and advance directives. However, Group Health does not routinely distribute information regarding advance directives, nor do they require their physicians to discuss them, so there is no reason to assume that individuals in this study are more informed than the rest of the population.

Furthermore, the circumstances surrounding the execution of advance care documents for participants in this study are unknown. Specifically, we did not have information about when participants decided to execute advance

directives, or what events led to that decision. Factors that may precipitate such decisions include recent hospitalization, discussion with a physician, exposure to critically ill others, and media influence. This type of information was unavailable in the present investigation, but could be important to consider when attempting to explain possession of advance directives. These and similar factors should be explored in future studies.

Implications and conclusions. In this investigation, we proposed that possession of advance directives is a type of planful health behavior, and presented evidence consistent with this interpretation. We outlined results indicating that advance directive status was related to the practice of positive health maintenance activities (i.e. dental care and possibly exercise), and regular medical checkups. Additionally, we found that older people, those with more education, and people with poorer health status were more likely to have advance directives.

Results from the present investigation extend previous research regarding the characterization of people who possess advance directives to a healthy, community-dwelling sample. Studies such as this one, in addition to studies conducted by Emanuel et al (1993) and Robinson et al (1993), provide important information about the general impact of the PSDA and attempts to heighten awareness about advance directives. Studies identifying characteristics of people who have chosen to execute advance directives enable effective intervention

strategies to be developed to target individuals without them - especially those who may be at risk for medical crisis and difficult end-of-life situations.

References

Aldrich, J.H. and Nelson, F.D. (1984). Linear Probability, Logit, and Probit Models. Beverly Hills, CA: Sage Publications.

Astrachan, J.M. (1979). Why people don't make wills. Trusts and Estates, 45-50.

Clark, D.O., Von Korff, M., Saunders, K., Baluch, W.M., and Simon, G.E. (in press). A chronic disease score with empirically derived weights.

Cruzan vs. Harmon, Director, Missouri Department of Health (1990). 497, U.S. 261, 110 s. Ct. 2841.

Emanuel, L.L., Barry, M.J., Stoeckle, J.D., Ettelson, L.M., and Emanuel, E.J. (1991). Advance directives for medical care - a case for greater need. The New England Journal of Medicine, 324, 889-895.

Emanuel, E.J., Weinberg, D.S., Gonin, R., Hummel, L.R., and Emanuel, L.L. (1993). How well is the Patient Self-Determination Act working?: An early assessment. The American Journal of Medicine, 95, 619-628.

Fellows, M.L., Simon, R.J., and Rau, W. (1978). Public attitudes about property distribution at death and interstate succession laws in the United States. American Bar Foundation Research Journal, 319, 319-391.

Gorsuch, R.L. (1983). Factor Analysis. Hillsdale, NJ: Lawrence Erlbaum Associates.

Hanley, J.A. and McNeil, B.G. (1982). The meaning and use of the area under the receiver operating characteristic curve (ROC). Radiology, 143, 29-36.

Joereskog, R.L and Soerbom, D. (1989). LISREL 7 Users Guide. Mooresville, Indiana: Scientific Software.

Kannas, L. (1981). The dimensions of health behaviors among young men in Finland. International Journal of Health Education, 24, 146-155.

Kirscht, J.P. (1983). Preventive health behavior: A review of research and issues. Health Psychology, 2, 227-301.

Krick, J.P. and Sobal, J. (1990). Relationships between health protective behaviors. Journal of Community Health, 15, 19-33.

Maier, H. (in preparation). Health behaviors in adults: Interrelationships and correlates.

Maier, H., McGuire, L.C., and Willis, S.L. (1994). Structure of health behaviors in older adults. Paper presented at the 47th Annual Scientific Meeting of the Gerontological Society of America, November 22, 1994, Atlanta, GA.

Maitland, S. B. (1993). Individual and lifestyle antecedents and concomitants of chronic disease: Behavioral influences on health. Unpublished master's thesis, The Pennsylvania State University, University Park.

Omnibus Budget Reconciliation Act of 1990, P.L. 101-508, § 4206, and 4751, codified at 42 U.S.C. §§ 1395cc (a) (1) (q), 1395 mm (c) (8), 1395cc (f), 1396a (57), (58), 1396a (w).

Park, D.C., Eaton, T.A., Larson, E.A., and Palmer, H.T. (1994). Implementation and impact of the Patient Self-Determination Act. Southern Medical Journal, 87, 971-977.

Prohaska, T.R., Leventhal, E.a., Leventhal, H., and Keller, M.L. (1985). Health practices and illness cognition in young, middle aged, and elderly adults. Journal of Gerontology, 40, 569-578.

Rakowski, W., Julius, M., Hickey, T., and Halter, J.B. (1987). Correlates of preventive health behavior in late life. In (Eds.), Research on Aging, 9, pp. 331-355. Sage Publications, Inc.

Robinson, M.K., DeHaven, M.J., Koch, K.A. (1993). Effects of the Patient Self-Determination Act on patient knowledge and behavior. The Journal of Family Practice, 37, 363-368.

Sachs, G.A. (1994). Increasing the prevalence of advance care planning. The Hastings Center Report, Special Supplement, S13-S16.

Schaie, K. W. (1958). Rigidity-flexibility and intelligence: A cross-sectional study of the adult life span from 20 to 70 years. Psychological Monographs, 72, 1-26.

Schaie, K. W. (1983). The Seattle Longitudinal Study: A 21-year exploration of psychometric intelligence in adulthood. In K. W. Schaie (Ed.), Longitudinal studies of adult psychological development (pp. 64-135) New York: Guilford.

Schaie, K. W , Dutta, R., and Willis, S.L. (1991). The relationship between rigidity-flexibility and cognitive abilities in adulthood. Psychology and Aging, 6, 371-383.

Sobal, J., Revicki, D., and DeForge, B.R. (1992). Patterns of interrelationships among health-promotion behaviors. American Journal of Preventive Medicine, 8, 351-359.

Steele, J.L., and McBroom, W.H. (1972). conceptual and empirical dimensions of health behavior. Journal of Health and Social Behavior, 13, 383-392.

Stephens, T. (1986). Health practices and health status: Evidence from the Canada Health Survey. American Journal of Preventive Medicine, 2, 209-215.

Verbrugge, L.M. (1985). Gender and health: An update on hypotheses and evidence. Journal of Health and Social Behavior, 26, 156-182.

Williams, A.F. and Wechsler, H. (1972). Interrelationshiops of preventive actions in health and other areas. Health Services Report, 10, 969-976.

Wolf, S.M., Boyle, P., Callahan, D., et al (1991). Sources of concern about the Patient Self-Determination Act. New England Journal of Medicine, 236, 1666-1671.

Table 1

Descriptive Variables by Age-Cohort Group.

Variable	Old-old N=421	Young-old N=458	Middle-aged N=331	Young adult N=257	Total N=1467
AD/LW					
Yes	75.06	64.19	44.41	26.07	56.20
No	24.94	35.81	55.59	73.93	43.80
Gender					
Men	44.66	45.85	45.02	45.53	45.26
Women	55.34	54.15	54.98	54.47	54.74
Marital status					
Single	2.15	1.98	4.60	21.88	6.12
Divorced	5.98	7.91	17.79	9.77	9.90
Separated	0.24	0.44	0.92	1.56	0.69
Widowed	30.62	11.43	0.92	0.00	12.58
Married	61.00	78.24	75.77	66.80	70.72
Religion					
Protestant	67.95	59.33	51.99	33.33	55.66
Catholic	12.29	15.56	15.29	15.66	14.57
Jewish	5.30	3.11	3.06	4.02	3.89
Other	5.06	6.89	10.09	20.08	9.37
None	9.16	15.11	19.57	26.91	16.45
Hospitalization					
Yes	29.43	20.83	14.85	19.61	21.73
No	70.57	79.17	85.15	80.39	78.27
Life satis. [a]	1.82	1.85	1.96	2.09	1.91
	(0.83)	(0.79)	(0.84)	(1.01)	(0.86)
Education	14.04	14.88	15.89	15.70	15.01
	(2.90)	(2.75)	(2.62)	(2.27)	(2.78)
Income [b]	11.67	14.37	15.88	15.00	14.09
	(4.49)	(3.57)	(2.51)	(3.45)	(3.95)
# of children	2.87	3.33	2.78	2.01	2.91
	(1.52)	(1.66)	(1.51)	(0.99)	(1.57)

Note. AD/LW, gender, marital status, religion, and hospitalization in the last year are reported in percentages. Life satisfaction, education, income, and # of children are reported as means with standard deviations in parentheses. [a] Life satisfaction was coded on a five point ordinal scale with 1 = very happy, 2 = moderately happy, 3 = average, 4 = moderately unhappy, and 5 = very unhappy. [b] Annual income information was acquired using a 17-point classification scale (Range $2000 to more than $50,000 per year) using $2000 increments from $2000 to $29,999. The next range encompassed annual income from $30,000 to 50,000, and the final category encompassed income greater than $50,000 per year.

Table 2

Means of Health Cost Expenditures, Health Factors, and TBR Factors by Age/Cohort Group.

Variable	Old-old	Young-old	Middle-aged	Young
Health cost	2320.87	1538.26	885.43	595.31
expenditures	(1132.03)	(1159.05)	(844.86)	(609.90)
Health status factors				
Perceived	47.39	50.15	50.88	51.10
	(10.68)	(9.78)	(10.07)	(9.55)
Objective	46.63	48.95	52.29	51.12
	(10.02)	(10.10)	(9.00)	(9.73)
Health behaviors				
Smoking	50.00	48.27	49.53	51.61
	(9.61)	(9.99)	(10.05)	(9.83)
Alcohol consump.	52.19	49.60	49.14	49.53
	(10.20)	(10.31)	(9.57)	(9.19)
Food consump.	47.90	49.38	51.07	51.58
	(10.46)	(9.62)	(9.68)	(9.46)
Food prep.	51.93	51.65	49.03	47.77
	(9.82)	(10.38)	(9.69)	(9.62)
Exercise	50.14	52.15	49.44	49.15
	(10.63)	(10.50)	(9.44)	(8.85)
Seat belts	50.52	50.33	50.09	49.89
	(9.33)	(9.30)	(9.79)	(10.68)
Dental care	51.18	50.90	50.50	47.90
	(11.43)	(10.39)	(9.08)	(9.08)
Med. checkups	56.31	54.12	47.03	43.89
	(8.38)	(8.74)	(9.06)	(7.37)
Attitudinal Flex.	49.15	52.80	55.88	55.83
	(7.34)	(8.11)	(8.16)	(7.43)
Psychomotor	47.51	55.21	62.39	64.37
speed	(8.59)	(8.32)	(7.92)	(7.60)
Motor/Cog. Flex	46.65	51.53	55.63	56.77
	(9.04)	(6.68)	(5.57)	(5.02)

Note. Standard deviations are in parentheses. Health cost expenditures are estimated for a 12 month period. Health factors and TBR factor scores were standardized to T-scores with a mean of 50 and a standard deviation of 10 for the original sample.

Table 3

Intercorrelation Matrix

Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1. Advance directive	1.00														
2. Age/cohort	-.35*	1.00													
3. Education	.00	.24*	1.00												
4. Gender	-.02	.00	-.11*	1.00											
5. Marital status[a]	-.00	-.05	-.02	.21*	1.00										
6. Income	-.04	.33*	.31*	-.38*	.25*	1.00									
7. Life satisfaction	-.05	.11*	-.08*	.18*	-.21*	-.10*	1.00								
8. # children	-.00	-.15*	-.09*	-.04	.07*	-.03	-.07*	1.00							
9. Health cost exp.	.24*	-.53*	-.24*	.06	.07*	-.27*	.03	.06	1.00						
10. Obj. health stat.	-.13*	.19*	.11*	-.10*	.00	.13*	-.01	.01	-.38*	1.00					
11. Per. health stat.	-.05	.10*	.12*	.05	-.01	.11*	-.19*	.06	-.33*	.32*	1.00				
12. Non-smoking	-.01	.05	.09*	.25*	.03	.01	-.06	-.03	-.11*	-.02	.09*	1.00			
13. Alcohol con.	-.03	-.10*	-.16*	.17*	.07*	-.17*	.03	.07*	.15*	-.14*	-.10*	.20*	1.00		
14. Food consump.	-.01	.14*	.15*	.08*	.09*	.03	.02	-.06	-.12*	.04	.15*	.16*	.12*	1.00	
15. Food prep.	.11*	-.16*	-.05	.04	-.08*	.00	-.11*	.01	.12*	-.11*	.04	.02	.11*	.21*	1.00
16. Exercise	.08*	-.06	.14*	-.10*	-.03	.07*	-.12*	07*	-.06	.06	.22*	.05	-.09*	.14*	.13*
17. Seat belt	.07*	-.02	.07*	.06	-.04	.02	-.10*	.00	.01	-.06	.06	.13*	.03	.07*	.18*
18. Dental care	.13*	-.10*	.14*	.15*	.04	.03	-.06	.00	.02	-.01	.13*	.06	-.06	.05	.10*
19. Med. checkups	.26*	-.48*	-.13*	.03	-.02	-.12*	-.07	.05	.36*	-.32*	-.09*	-.07*	.08*	-.04	.27*
20. Att. flex.	-.07*	.29*	.30*	.00	.02	.21*	-.01	-.04	-.24*	.10*	.09*	.05	-.10*	.10*	-.05
21. Psych. speed	-.12*	.58*	.45*	.14*	.01	.34*	.00	-.07*	-.42*	.15*	.17*	.18*	-.11*	.19*	-.09*
22. Mot. cog. flex.	-.16*	.47*	.28*	-.10*	-.06	.31*	.00	.-.03	-.36*	.11*	.08*	.08*	-.10*	.08*	-.10*

Table 3 (continued)

Variable 16	17	18	19	20	21	22	
16. Exercise	1.00						
17. Seat belt	.10*	1.00					
18. Dental care	.16*	.14*	1.00				
19. Med. checkups	.08*	.08*	.12*	1.00			
20. Att. flex.	.04	.02	.03	-.18*	1.00		
21. Psych. speed	.03	.08*	.07*	-.33*	.34*	1.00	
22. Mot. cog. flex.	-.02	.02	-.03	-.21*	.26*	.46*	1.00

Note. * significant at $p \leq .01$. [a] Marital status was broken down into two groups: married and not married (including single, deviorced, separated, and widowed); married individuals were scored as '2', while unmarried individuals were scored as '1'.

Table 4

Preliminary Logistic Regression Models with Demographic Variables, Health Factors, and Behavioral Flexibility Factors Predicting Advance Directive Status

Variable	OR	CI	p	R^2	ROC
Demographic Variables					
Age/Cohort Group	0.425	0.395/0.483	.0001		
Education	1.070	1.024/1.119	.0027		
Income	1.044	1.011/1.079	.0087		
Gender					
# Children					
Marital Status					
Life Satisfaction					
Religion					
				.13[a]	0.85
Health Status and Behavior					
Alcohol Consumption	0.986	0.974/0.997	.0170		
Exercise	1.015	1.003/1.027	.0157		
Dental Care	1.022	1.011/1.034	.0002		
Medical Checkups	1.038	1.025/1.051	.0001		
Health Cost Exp.	1.000	1.000/1.000	.0001		
Exercise*Age/cohort	0.989	0.986/0.992	.0001		
Non-smoking					
Food consumption					
Food preparation					
Seatbelt Use					
Perceived Health Status					
Objective Health Status					
Alcohol*Age/cohort					
Dental*Age/cohort					
Med.check*Age/cohort					
Health cost exp.*Age/cohort					
				.14[b]	0.93

Table 4 (continued)

Variable	OR	CI	p	R^2	ROC
Behavioral Flexibility					
Motor/Cognitive	0.957	0.942/0.973	.0001		
Mot.Cog*Age/cohort	1.013	1.011/1.016	.0001		
Attitudinal Flexibility					
Psychomotor Speed					
				.11[c]	0.71

Notes. Where OR=adjusted odds ratio, CI=95% confidence interval (lower/upper limits), and R^2 is estimated proportion of variance explained. Each set of variables was entered into regression equation independently of the other sets. [a] Model X^2=211.36, p=.0001, df=3. [b] Model X^2=212.78, p=.0001, df=6. [c] Model X^2=145.60, p=.0001, df=2.

Table 5

Logistic Regression Final Model Predicting Advance Directive

Variable	OR	CI	p	R^2	ROC
Age/Cohort Group	0.559	0.483/0.647	.0001		
Education	1.071	1.024/1.121	.0029		
Health Cost Exp.	1.000	1.000/1.000	.0126		
Dental Care	1.021	1.008/1.033	.0008		
Medical Checkups	1.022	1.008/1.036	.0025		
Income					
Alcohol Consumption					
Exercise					
Exercise*Age/Cohort Group					
Motor Cognitive Flexibility					
Motor Cognitive Flex.*Age/Cohort Group					
				.13	0.84

Notes. Where OR=odds ratio, CI=95% confidence interval (lower/upper limits), and R^2 is estimated proportion of variance explained. Model X^2=228.01, p=.0001, df=4.