Self-Rated Health and Adverse Health Outcomes: An Exploration and Refinement of the Trajectory Hypothesis

Fredric D. Wolinsky1,2 and William M. Tierney3,4,5

1Saint Louis University School of Public Health and 2School of Medicine, St. Louis, Missouri. 3Indiana University School of Medicine, Indianapolis. 4Regenstrief Institute for Health Care and 5Roudebush Veterans Administration Medical Center, Indianapolis, Indiana.

Objectives. To examine the hypothesis that the relationship between poor self-rated health and adverse health outcomes simply reflects self-assessments of declining health trajectories rather than current health status.

Methods. A 12-month follow-up of 786 disadvantaged adults aged 50–99 years old was conducted. Baseline markers of poor self-rated health and declining health trajectory were used to predict 12-month follow-up reports of the expectations of being hospitalized within one year, being placed in a nursing home within five years, and dying within ten years. Hierarchical multivariable logistic regression was used with poor self-rated health entered first, standard epidemiologic covariates entered next, and declining health trajectory entered last.

Results. Poor self-rated health was not independently associated with expectations for being hospitalized, but declining health trajectory independently increased the risk of such expectations by 65–88%. Neither poor self-rated health nor declining health trajectory were independently associated with expectations for being placed in a nursing home, but both were independently associated with expectations for dying, increasing such expectations by 70–105%.

Discussion. The relationship between poor self-rated health and adverse outcomes is not a simple reflection of unmeasured self-assessments of impending decline or doom. Rather, the effects of poor self-rated health and declining health trajectory appear to be independent and complementary.

The association between self-rated health and adverse health outcomes was first observed in the 1960s and 1970s (Maddox, 1962; Maddox & Douglass, 1973), although the pivotal linkage with mortality was first documented in the early 1980s (Mossey & Shapiro, 1982). Since then there has been a flurry of activity in this area, with the results of more than two dozen community studies published, and with most of those reporting independent associations between self-rated health and mortality despite elaborate “attacks” aimed at decomposing that relationship (Idler & Benyamini, 1997). At least four possible interpretations of the relationship between self-rated health and adverse health outcomes have been offered (Idler & Benyamini, 1997). One might be called the “sponge” hypothesis, and suggests that self-rated health is a more inclusive measure of health status, capturing what less accurate indicators leave behind. Another might be called the “trajectory” hypothesis, and suggests that poor self-rated health represents respondents’ assessments of their impending decline or doom. Yet another might be called the “intervening” hypothesis, and suggests that self-rated health influences health behaviors which in turn affect health outcomes. A fourth might be called the “resource” hypothesis, and suggests that self-rated health reflects the availability of internal or external supports which subsequently affect health outcomes.

Empirical support for each of these hypotheses is both modest and mixed. This has led Idler and Benyamini (1997) to argue that in order to advance our understanding of the relationship between self-rated health and mortality, the next generation of studies needs to be somewhat different. They suggest that adverse health outcomes other than mortality be considered, that special high-risk and more homogeneous populations be targeted, that qualitative and other innovative measurement approaches be used, and that cognitive or cultural processes associated with self-rated health be considered. The purpose of this brief report is to present the results of one such study.

Specifically, we examined the trajectory hypothesis in a 12-month follow-up of 786 disadvantaged adults aged 50–99 years old. Baseline data were used to construct markers of poor self-rated health and declining health trajectory. These markers were then used to predict expectations of being hospitalized within one year, being placed in a nursing home within five years, and dying within ten years that were obtained from respondents at the 12-month follow-up interviews. Using hierarchical multivariable logistic regression, poor self-rated health was entered first to gauge its crude effect. Standard epidemiologic covariates were entered next, and declining health trajectory was entered last. Maximum support for the trajectory hypothesis would be reflected in three observations: (1) the progressive decom-
position of the effects of poor self-rated health; (2) the in-
significance of poor self-rated health in the final models;
and (3) the significance of declining health trajectory in the
final models.

METHODS

Sampling

Face-to-face interviews were conducted in the general
medicine clinics of an academic medical center as part of a
randomized, controlled trial investigating physician-initi-
ated discussion and completion of advance directives (see
Dexter et al., 1998; Dexter, Stump, Tierney, & Wolinsky,
1996; Stump, Dexter, Tierney, & Wolinsky, 1995; Wolinsky
were eligible for inclusion if their age or medical diagnoses
placed them at risk for acute deterioration of their clinical
condition. Enrollment was limited to those who kept sched-
uled visits between November 1993 and August 1994. A
total of 1,859 potentially eligible patients were identified
from weekly lists generated by the computerized record-
keeping system. Of these, 450 were ineligible because they
never kept any scheduled visits. Another 150 were ineli-
gible because they did not speak English, were deaf, lived
in a nursing home, were prisoners, or failed a cognitive
screening test (Pfeiffer, 1975). That left 1,248 eligible pa-
tients who kept scheduled visits, of whom 1,051 (84%)
agreed to participate and were interviewed.

Brief face-to-face follow-up interviews were attempted at
each subsequent scheduled visit, with a detailed reinterview
targeted between the 11th and 16th month anniversary of
the baseline interview. If no scheduled visit occurred within
that window, the detailed reinterview was immediately at-
ttempted by telephone. Detailed reinterviews were com-
pleted on 786 individuals (75% of the 1,051 patients inter-
viewed at baseline). The 265 baseline patients for whom no
detailed reinterviews were obtained were classified into six
categories: 57 refused at the scheduled visit; 10 refused over
the telephone; 11 became ineligible because they failed the
cognitive screening test (Pfeiffer, 1975); 60 died; 61 could
not be reinterviewed during the targeted window; and 52
could not be contacted at all. Extensive analyses have
shown that few baseline characteristics were significantly
related to detailed reinterview status, and that the fit of a
multivariable logistic regression model of reinterview status
was marginal (Wolinsky, Wan, & Tierney, 1998). Thus, loss
to follow-up did not result in appreciable sampling bias.

Poor Self-Rated Health and Declining Health Trajectory

Markers for poor self-rated health and declining health
trajectory were derived from two items in the SF-36 (see
McHorney, Ware, Lu, & Sherbourne, 1994; McHorney,
Ware, & Raczek, 1993; Stewart & Ware, 1992; Ware &
Sherbourne, 1992; Ware, Snow, Kosinski, & Gandek,
1993). The first item was the traditional self-reported health
question: “In general, would you say that your health is ex-
cellent, very good, good, fair, or poor?” In constructing the
poor self-rated health marker, the fair and poor responses
were coded as ones, and the excellent, very good, and good
responses were coded as zeroes. The second item was the
following paired statement and question. “I expect my
health to get worse. Would you say that is definitely true,
mostly true, mostly false, definitely false, or don’t know?”
In constructing the declining health trajectory marker, the
definitely true and mostly true responses were coded as
ones, and the don’t know, mostly false, and definitely false
responses were coded as zeroes. Thus, the construction of
the markers for poor self-rated health and declining health
trajectory were consistent with established practices (Idler
& Benyamini, 1997).

Expectations for Hospitalization, Nursing Home
Placement, and Death

The traditional approach to examining the relationship
between poor self-rated health and mortality involves pro-
spectively modeling the effect of baseline values on either
collateral reports or official death records. In short periods
(such as the one-year follow-up in this study), however,
there are too few deaths to support multivariable modeling.
Accordingly, at the 12-month follow-up interviews three
questions were asked that tap respondents’ expectations for
being hospitalized in the next year, being placed in a nurs-
ing home in the next five years, or dying within the next ten
years. These questions are similar to those used in the
Health and Retirement Study (see Holden, McBride, & Per-
zek, 1997; Hurd & McGarry, 1995; Juster, 1997), and
were preceded by the following training protocol:

“Next I have some questions about how likely you think var-
ious events might be. When I ask a question I’d like for you
to give me a number between 0 and 100, where 0 means that
you think there is absolutely no chance, and 100 means that
you think the event is absolutely sure to happen. Let’s try an
example and start with the weather. What do you think are the
chances that it will be sunny tomorrow?”

Each question was preceded by a statement recognizing
that hospitalization, nursing home placement, and dying are
difficult and stressful subjects to contemplate, but that some-
times these events are either necessary or inevitable.

Because of the novelty of the expectations approach and
the lack of consensus about appropriate cut-points (see
Holden et al., 1997; Hurd & McGarry, 1995; Juster, 1997),
three approaches were taken to dichotomize the responses
in this study. One may be called the “mean split approach,”
in which responses at or above the sample mean were coded
as ones, and those below the sample mean were coded as ze-
roes. A second dichotomization may be called the “upper
quartile approach,” in which responses at or above the 75th
percentile in the sample were coded as ones, and those below
this level were coded as zeroes. The third dichotomization
may be called the “90% or greater chance approach,” in
which responses reflecting perceived chances of 90% or
greater were coded as ones, and those with lower expecta-
tions were coded as zeroes. If the results obtained are robust
across the dichotomization approaches, greater confidence
can be expressed in the findings and their interpretation.

Epidemiologic Covariates

As in most previous studies (Idler & Benyamini, 1997), a
number of epidemiologic covariates were used in order to

THE TRAJECTORY HYPOTHESIS

S37
decompose the crude relationship between poor self-rated health and adverse health outcomes prior to the introduction of declining health trajectory. These included sociodemographic factors, disease history markers, and functional status. Among the sociodemographic factors were age (measured in years), and dichotomous markers for sex (female vs male), race (African American vs Anglo), marital status (widowed vs all other), education (grade school or less vs all other), and financial strain (not having enough income to make ends meet vs making ends meet or being comfortable). Disease history markers reflected the presence (vs absence) of clinically diagnosed coronary artery disease, cerebrovascular accidents, chronic renal insufficiency, liver disease, congestive heart failure, and cancer (other than skin). Functional status was measured by the SF–36 physical functioning and mental health scales, which range from 0 (worst health) to 100 (best health).

RESULTS
Of the 786 respondents reinterviewed, 65% had poor self-rated health, and 25% had declining health trajectories. Consistent with previous research (see Institute for Social Research, 1995; van Doorn, 1998), the expectations questions proved rather difficult for respondents to answer, and rounding and heaping patterns constrained the precision of some of the targeted dichotomizations. Among the 633 respondents answering the chance of being hospitalized question, 51% were coded as above the mean, 22% were coded in the upper quartile, and 13% were coded as having a 90% or greater chance. For the 647 respondents answering the chance of being placed in a nursing home question, 31% were coded as above the mean, 25% were coded in the upper quartile, and 7% were coded as having a 90% or greater chance. Of the 579 respondents who answered the chance of dying question, 60% were coded as above the mean, 25% were coded in the upper quartile, and 25% were coded as having a 90% or greater chance. The sociodemographic characteristics indicated that the mean age was 64 years old, 32% were women, 57% were African Americans, 31% were widowed, 37% had an eighth grade education or less, and 37% did not have enough income to make ends meet. In terms of disease history, 45% had coronary artery disease, 44% had reactive airways disease, 34% had congestive heart failure, 17% had cerebrovascular disease, 12% had cancer, 7% had chronic heart insufficiency, and 4% had liver disease. The mean score on the SF–36 physical functioning scale was 42, and the mean score on the SF–36 mental health scale was 67.

Table 1 contains the crude odds ratios for the poor self-rated health marker on each of the three approaches to dichotomizing the expectations outcomes, as well as the adjusted odds ratios for the poor self-rated health marker after the serial introduction of the epidemiologic covariates and the declining health trajectory marker. Also shown in the table are the adjusted odds ratios for the declining health trajectory marker. Not shown, for simplicity, are the adjusted odds ratios associated with the epidemiologic covariates.

On the one hand, these data provide little, if any, support for the hypothesis that the relationship between poor self-rated health and adverse health outcomes simply reflects unmeasured self-assessments of declining health trajectories, rather than current health status. Although the crude association between poor self-rated health and expectations for either being hospitalized or dying was sometimes diminished or eliminated by the introduction of the epidemiologic covariates, those crude associations were never adversely affected by the introduction of the declining health trajectory marker. On the other hand, these data provide considerable support for an alternative hypothesis that the associations between poor self-rated health and declining health trajectory with adverse health outcomes appear to be independent and complementary. That is, declining health trajectory was significantly associated with greater expectations for being hospitalized and dying, regardless of the presence of poor self-rated health in the model, or the particular approach to dichotomizing these expectations outcomes. Moreover, when both poor self-rated health and declining health trajectory had significant independent associations, their effects were of equal magnitude.

DISCUSSION
The hypothesis that the long-standing relationship between poor self-rated health and mortality, as well as other adverse health outcomes, simply reflects self-assessments of declining health trajectories rather than current health status was not supported by these data. Instead, the results provided substantial support for an alternative hypothesis that poor self-rated health and declining health trajectory appear to have independent and complementary effects on adverse health outcomes. Furthermore, the magnitude of these relationships may be equivalent.

Confidence in these results is enhanced because this study incorporated several of the design strengths recently advocated by Idler and Benyamini (1997). It broadened the focus from mortality to adverse outcomes in general. A high-risk, clinical population was targeted. Innovative approaches to the measurement of poor self-rated health, declining health trajectory, and adverse health outcomes were implemented. And hierarchical multivariable models with appropriate epidemiologic covariates were used.

Enthusiasm for the results reported here and the alternative hypothesis that they support, however, must be tempered by four factors. First, although the expectations approach to health outcomes measurement is gaining both credence and broader application (Holden et al., 1997; Hurd & McGarry, 1995; Juster, 1997), replication based on objectively documented health outcomes is needed. Second, and as observed elsewhere (Institute for Social Research, 1995; van Doorn, 1998), the expectations questions were rather difficult for respondents to answer. Indeed, 98 individuals were either unable or unwilling to respond even to the training question that asked about the weather. Although about half of the item nonresponse appears to be related to the taxing demands of expectations items in general, the potential for selection bias exists. To explore this issue, we used multivariable logistic regression to predict nonresponse on each of the three expectations questions (data not shown). Several of the epidemiologic covariates (especially older age, less education, and African American race) were significant predictors of nonresponse, but poor
Table 1. Crude and Adjusted Odds Ratios Obtained From the Hierarchical Multivariable Logistic Regression of Three Approaches to Dichotomizing Expectations for Being Hospitalized in One Year, Being Placed in a Nursing Home in Five Years, or Dying in Ten Years, on Poor Self-Rated Health, the Epidemiologic Covariates, and Declining Health Trajectory*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Hospitalization within one year (n = 633)</th>
<th>Nursing home placement within five years (n = 647)</th>
<th>Dying within ten years (n = 579)</th>
</tr>
</thead>
</table>
| Mean Split Approach (≥ 40% chance) | Poor self-reported health 1.46** 1.17  1.09  
Declining health trajectory 1.81** | Upper Quartile Approach (≥ 60% chance) 
Poor self-reported health 1.85** 1.62†  
Declining health trajectory 1.52 1.65* | 90% or Greater Chance Approach (≥ 90% chance) 
Poor self-reported health 2.03* 1.45  
Declining health trajectory 1.34 1.88* |
| Upper Quartile Approach (≥ 30% chance) | Poor self-reported health 1.16 1.38  
Declining health trajectory 1.35 1.33 | Poor self-reported health 1.26 1.47  
Declining health trajectory 1.43 1.41 | Poor self-reported health 1.62 1.86  
Declining health trajectory 1.83 1.29 |
| 90% or Greater Chance Approach (≥ 90% chance) | Poor self-reported health 2.07** 2.17**  
Declining health trajectory 2.03** 2.05** | Poor self-reported health 2.07** 2.17**  
Declining health trajectory 2.03** 2.05** | Poor self-reported health 2.07** 2.17**  
Declining health trajectory 2.03** 2.05** |

*Adjusted odds ratios for the epidemiologic covariates are omitted for clarity.

Model 1 contains only poor self-rated health.

Model 2 contains poor self-rated health and the epidemiologic covariates (i.e., age, sex, race, marital status, education, financial strain, coronary artery disease, cerebrovascular accidents, chronic renal insufficiency, liver disease, congestive heart failure, cancer, the SF-36 physical functioning scale, and the SF-36 mental health scale).

Model 3 contains the variables in Model 2, and declining health trajectory.

†p < .10; *p < .05; **p < .01.

self-rated health was not, and declining health trajectory was only associated with increased nonresponse on the chance of dying question. Thus, if selection bias has occurred, it would appear to have resulted in underestimating the effect of declining health trajectory. Third, the respondents in this study were quite socioeconomically disadvantaged, raising potential concerns about generalizability. Finally, neither poor self-rated health nor declining health trajectory were significantly associated with expectations for nursing home placement in any model under any dichotomization approach.

Those limitations notwithstanding, these results have important implications for future research on the relationship between poor self-rated health and adverse health outcomes. Continued reliance on the traditional, single-item measure to assess poor self-rated health will not facilitate understanding the underlying mechanism(s). This brief report demonstrates that at a minimum, additional questions must be fielded that tap the respondent’s sense of impending decline or doom. Moreover, future studies of the trajectory hypothesis as refined here are needed that incorporate sufficient measures to simultaneously assess the sponge, intervening, and resource hypotheses. Only then will the long-standing relationship between self-rated health and adverse health outcomes be understood.

ACKNOWLEDGMENTS

This research was supported by grants to Dr. Wolinsky from the National Institutes of Health (R37 AG-09692) and to Dr. Tierney from the Agency for Health Care Policy Research (R01 HS-07632). The opinions
expressed here are those of the authors and do not necessarily reflect those of the funding agencies, academic, research, or governmental institutions involved. The authors express their appreciation to three anonymous referees, whose comments and suggestions substantially improved and clarified this manuscript. Dr. David J. Ekorot served as the decision editor for this manuscript, which was submitted to the journal under his tenure.

Address correspondence to Dr. Fredric D. Wolinsky, Saint Louis University School of Public Health, 3663 Lindell Boulevard, St. Louis, MO 63108-3342. E-mail: wolinsky@slu.edu

REFERENCES


Received November 7, 1997
Accepted June 22, 1998