



Pathway from poor self-rated health to mortality: Explanatory power of disease diagnosis



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ABSTRACT

Poor self-rated health has been consistently demonstrated as a reliable predictor for mortality, often exceeding the predictive power of other “objective” medical factors. Drawing from a theoretical framework for the cognitive processes underlying the self-assessment of health, this study seeks to test the knowledge mechanisms that moderate the predictive power of poor self-rated health. Using nationally-representative longitudinal data from the Canadian National Population Health Survey (NPHS) from 1994 to 2010, this study tests the effects of physician-diagnosed disease for the life course trajectory of self-rated health, and as a moderator for the power of poor self-rated health to predict proximate mortality. Disruptions to self-rated health trajectories are measured using an interrupted time-series analysis. Predictive power is modelled using generalized estimating equation (GEE) logistic regression. Findings show that physician-diagnosed diseases cause a negative shock to self-rated health, even accounting for endogeneity. Furthermore, a major portion of the predictive power of poor self-rated health in the final years of life is explained by respondents' knowledge of the disease conditions which eventually cause their death. This novel finding supports one of the foremost theories putting cognition and knowledge at the root of why poor self-rated health is such a robust predictor of mortality.

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1. Introduction

Much of the quantitative sociology of health research to date has relied upon self-reported measures of health and illness. In this context, self-rated health (a.k.a. subjective, perceived, self-reported, or self-assessed health) became a mainstay of population health research. It has been consistently demonstrated as a reliable predictor for mortality, often exceeding the predictive power of other, more “objective” medical factors (Idler and Benyamini, 1997; Mossey and Shapiro, 1982). Drawing from a theoretical framework for the cognitive processes underlying the self-assessment of health (Jylhä, 2009; Knäuper and Turner, 2003), this study seeks to test the hypothesis that objective health knowledge, in the form of physician-diagnosed disease, moderates the power of poor self-rated health to predict mortality.

Self-rated health is measured by asking respondents “In general,

how would you rate the overall state of your health?” with response options 1:Poor, 2:Fair, 3:Good, 4:Very good, or 5:Excellent. The validity of this measure for predicting mortality has been one of the most consistently reproduced findings in social epidemiology. Not only is “poor” health strongly associated with a greater risk of mortality than “excellent” health, but the risk of mortality shows a gradual increase with each incremental worsening in self-rated health (DeSalvo et al., 2006; Idler and Benyamini, 1997, 1999).

However, use of self-rated health in population health research has been the subject of controversy because the question of what the measure really “captures” is unresolved. Despite the measure's consistent association with mortality, its predictive validity shows systematic differences across population subgroups – a fact that has served to critique the measure's reliability, validity, and comparative utility (Huisman and Deeg, 2010; Lindeboom and Doorslaer, 2004). Because a growing number of studies have found predictive power to vary depending on social characteristics (e.g., gender, socioeconomic status), debate still persists about the extent to which self-rated health can be validly used in the study of individual and population health across contexts (Delpierre et al.,

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2009; Dowd and Zajacova, 2010; Singh-Manoux et al., 2007; Zajacova and Dowd, 2011).

In support of the reliability of self-rated health across contexts, Idler and Benyamini (1997) conducted a meta-analysis that has become a landmark study of the association between self-rated health and mortality. Examining the evidence from 27 studies, they found such “impressively consistent findings” of a predictive association between self-rated health and mortality that they concluded any further investigation into this simple bivariate relationship would be redundant. Thus, despite the sensitivity of the concept to social context, this persistent finding continues to emerge: subjective health is a reliable predictor of mortality, often exceeding the reliability of predictions from more objective health measurements (DeSalvo et al., 2006; Mossey and Shapiro, 1982).

Explaining the persistent robustness of poor subjective health as a predictor for mortality required a unified conceptual model of self-rated health. Jylhä's (2009) and Knäuper and Turner's (2003) theoretical models explain that both individual and social circumstances “flow” through the individual's cognition to influence their self-rated health. Self-rated health consists of many factors, such as information from medical diagnoses received from a physician, signs and symptoms of illness that the individual can recognize for themselves, perceptions of change in functional status or in bodily sensations over time, and a projection of the expected development of health into the future. The objective information influencing an individual's self-rating of health (such as clinical measurements or physician diagnoses) can only be taken into account if they are known to the individual and understood to be health-related (Jylhä, 2009). For example, a landmark U.S. study found evidence that poor self-rated health was a better predictor for mortality among respondents who were previously diagnosed with circulatory disease and who could perceive their symptoms (Idler et al., 2004). Thus, even in a context of universal health care, such as the present Canadian study, self-perceptions of health can be influenced by social-structural factors in several ways: the individual's social environment determines their population health landscape and their position within it, and therefore the social comparisons they can establish; it affects their likelihood of accessing the objective health information upon which their subjective health depends; and finally, it shapes cultural conceptions through which their objective health information is mediated.

The main message from these frameworks is that, ultimately, self-rated health is based upon the health information available to the individual. This study tests whether objective medical information known to the individual moderates the relationship by which poor self-rated health is predictive of mortality.

2. Defining predictive power

The predictive association between poor self-rated health and mortality can be viewed as a measure of correspondence between health *perceptions* and *reality*. Using longitudinal panel data, we can retrospectively examine how closely a respondent's health perceptions through the life course correspond with their actual survival or mortality outcome, and investigate the factors which can improve or diminish this predictive power.

Although self-rated health has been criticized for its subjective nature that can vary according to different cultural interpretations of health, its *predictive power for mortality* is objective and quantifiable. Predictive power is defined as the association between a respondent's self-rated health status and their survival or mortality outcome (DeSalvo et al., 2006; Dowd and Zajacova, 2007; Huisman et al., 2007; Idler and Benyamini, 1997; Jylhä, 2009; Mossey and Shapiro, 1982; Stenholm et al., 2014). This predictive association can be detected up to 12 years prior to death, and is robust to

statistical adjustments for a large set of objectively-measured sociodemographic variables and health risk factors, suggesting that the power of self-rated health to predict mortality goes beyond the reach of objective health factors (Stenholm et al., 2014).

3. Objectives

This study tests the effects of physician-diagnosed disease on the life course trajectory of self-rated health, and as a moderator for the power of poor self-rated health to predict proximate mortality. First, we ask whether a disease diagnosis affects trajectories of subjective health, and if so, how much? Does the conferral of a disease diagnosis *precede* and *cause* a decline in self-rated health, and is the decline significant and sustained? We hypothesize that receiving a disease diagnosis from a physician will produce a significant and sustained negative shock to self-rated health, because it constitutes authoritative and objective medical information that respondents use in the construction of their subjective health self-assessments. To test these elements of cognitive flow, we first determine the causal ordering between disease diagnosis and changes to self-rated health using an adapted interrupted time-series regression design.

Once the causal ordering between disease diagnosis and subjective health is established, our second research question is whether this knowledge pathway explains some or all of the predictive power of self-rated health. For example, does the predictive power of self-rated health persist, even among respondents who died of unanticipated causes – or is the explanatory power absorbed by those respondents who died of causes with which they were diagnosed during their lifetimes, such that their reports of “poor self-rated health” are more predictive of mortality? This question was initially posed in Idler et al.'s (2004) seminal U.S. study testing the hypothesis that individuals whose self-perceptions of health integrate various objective and subjective health information about their circulatory disease will show self-ratings of health that are more predictive of mortality. We expand on this question by testing whether respondent knowledge of their diagnoses for 6 leading causes of death will explain the robust association between self-rated health and risk of proximate mortality.

This study design is accomplished by matching respondent ICD-10 cause-of-death codes with disease diagnoses they reported receiving during their lifetimes. We then estimate longitudinal trajectories of predictive power for mortality, decomposed according to cases who died of diseases that were diagnosed during their lifetime (i.e., causes of death of which they had foreknowledge), versus those who died of unrelated or undiagnosed causes. The difference in predictive power between these two trajectories is the proportion explained by the information flow that begins with objective medical information from physician-diagnosed disease, and that culminates in changes to a respondent's self-rated health. Finding that a portion of the explanatory mechanism is explained away by disease diagnosis would support the cognitive flow theory (Jylhä, 2009; Knäuper and Turner, 2003) as an explanation for why self-rated health remains such a robust predictor for mortality net of other objective health factors.

The mechanism we aim to test operates as follows: First, individuals either receive a disease diagnosis, or not. Second, they either downgrade their self-rated health to “poor” in response to this new objective medical information, or not. Third, they either survive throughout, or die during longitudinal observation. Physician-diagnosed diseases give respondents an opportunity to downgrade their self-rated health in response to new medical information, and thus increase the correspondence between their health self-perceptions and their real risk of mortality. The

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