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Do self-perceived health changes predict longevity?

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ABSTRACT

Researchers can rely either on retrospectively reported or on prospectively measured health changes to identify and quantify recent changes in respondents' health status. The two methods typically do not provide the same answers. We compare the validity of prospective versus retrospective measures of health changes by investigating their predictive power for subsequent mortality. Data from a cohort study conducted in the Netherlands are used to compare the ability of changes in self-assessed health (SAH) – either reported retrospectively or measured prospectively in three waves (1991, 1993 and 1995) – to predict survival until 2004. We examine the relationship between health changes and mortality with a proportional hazard models controlling for individual unobserved heterogeneity, with and without control for pre-existing chronic conditions and the onset of new chronic diseases. For a high proportion of reports (39.8%), prospectively measured health changes in SAH do not concur with retrospectively reported health changes. Our results show that both measures of health changes are predictive of mortality in the model controlling for levels of SAH and socioeconomic characteristics only. Controlling for SAH, prior presence of chronic conditions, the onset of new conditions and unobserved characteristics, we find that prospectively reported health changes still predict longevity, whereas retrospective changes do not. These results suggest that the collection of longitudinal information on health changes has advantages over the – easier and cheaper – option of retrospective collection of the same information.

Introduction

It is well known that self-assessed health (SAH) at one point in time has substantial predictive power for behavior including medical care utilization (Van Doorslaer, Wagstaff, van der Burg, Christiansen, De Graeve, Duchesne et al. 2000; Van Doorslaer, Koolman, & Jones, 2004), labor force participation (Bound, 1991), as well as for subsequent health outcomes, like survival (Dowd & Zajacova, 2007; Huisman, van Lenthe, & Mackenbach, 2007; Idler & Benyamini, 1997; Mackenbach, Simon, Looman, & Joung, 2002; Van Doorslaer & Gerdtham, 2003), even after controlling for other, more objective, health indicators. Much less is known about the predictive value of health *dynamics*, i.e., changes in SAH. In many instances, researchers are interested in such changes, especially the negative ones – often referred to as 'health shocks' – because these may be equally (or even more) important precursors of later outcomes as (than) health levels. They are also indicators of the degree of persistence of health status. The two questions that we seek to answer are: (a) do changes in health levels have predictive ability over and above the information contained in health level itself?; and, if so, (b) how can such changes best be elicited?

A priori, the answer to the first question ought to be affirmative, and this can easily be seen from the graph in Fig. 1, which depicts health trajectories for two hypothetical individuals A and B. Clearly, the information about a difference in the level of health at time t+1 has predictive power for the likelihood of each person's health falling below a critical level. If all else is equal, including the health level at t, then person A, with the lower health at t+1, is likely to reach the minimal critical health level sooner and exhibit shorter expected survival. In the particular case depicted, knowing that both persons started off at the same health in t will lead to very different predictions of future health paths than knowing that they were already in different health states at t and moved along parallel trajectories between t and t+1 (such as A′ and B). It seems therefore obvious that information on recent health changes does add to the information on health levels.

Regarding the second question, there are basically two main approaches to eliciting health changes from self-reports. The first and easiest option is to simply ask *retrospective* questions about health changes: respondents then rate their health compared to a reference point in the past. This health transition question asks

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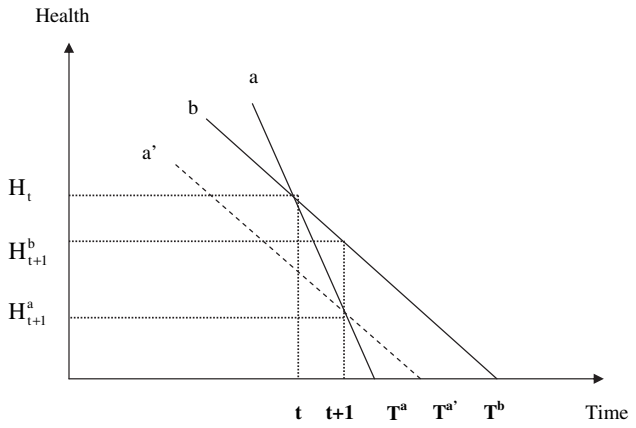

Fig. 1. Health trajectories of hypothetical individuals a, a′ and b.

respondents to rate their general health compared with a previous period, with three response categories: "better", "same", and "worse". It represents a simple and straightforward way of obtaining health change information from cross-sectional surveys when there is no opportunity to follow respondents over time. However, it only provides a proper alternative to the prospective, longitudinal collection of health change data, if the information obtained is similar, if not identical. The prospective health changes can simply be obtained by computing the changes in SAH between two consecutive waves in longitudinal data. However, it has been shown that retrospectively reported health changes between point 1 and 2, assessed at point 2, do not always concur with prospectively assessed changes between point 1 and 2 in time. Benitez Silva and Ni (2008) discuss several reasons for the possible incongruence. First of all, the incongruence may occur due to the reporting heterogeneity bias and cut-point shifts in SAH.[1] In particular, cut-point shifts of SAH, for a given individual, *over time* may be one possible source of bias in the prospectively health change measure. This means that, for a given true but unobserved health state, individuals may report health differently depending on their health expectations at two different points in time. In addition, health changes identified by retrospective health changes may not be large enough to cause a category jump in SAH in the next period and may not show up in prospectively measured changes in SAH.

On the other hand, some biases have been reported regarding retrospective health change elicitation. The direct health change question forces individuals to provide a comparison of their current health with a different point in time. This may cause reliability and recall problems, and individuals may use different reference points in time when recalling the previous health state (Norman, Sridhar, Guyatt, & Walter, 2001). There is also some evidence that retrospective self-reports of health are biased towards the respondent's present health state (Knox & King, 2009; Norman, Stratford, & Regehr, 1997) indicating that respondents with good health currently are more likely to report that their health has recently improved, and respondents with poor health currently are more likely to report that it has worsened. Given possible biases with both of the health change measures, the empirical question then becomes: which of the two change measures appears to perform better in predicting future hard health outcomes like mortality?

[1] See Kerkhofs and Lindeboom (1995) and Lindeboom and van Doorslaer (2004) for the discussion of reporting heterogeneity and cut-point shifts and Bago d'Uva, van Doorslaer, Lindeboom & O'Donnell (2008) and Bago d'Uva, O'Donnell & van Doorslaer (2008) for attempts at correcting using vignettes.

In spite of an abundance of studies demonstrating high predictive ability of SAH for mortality, only a few have done this for health changes. Ferraro and Kelley-Moore (2001), for instance, found that SAH predicted mortality risk over 20 years follow-up only when treated as a time-dependent covariate, highlighting the importance of using dynamic models when multiple observations are available. Han et al. (2005) studied the impact of SAH as a time-dependent covariate in Cox regression model among older people and found change in SAH to be a stronger predictor of mortality than SAH at baseline. Strawbridge and Wallhagen (1999) also used SAH as a time-dependent covariate and found that change in SAH was a significant predictor of mortality among women. More recently, Lyyra, Leskinen, Jylhä, and Heikkinen (2009) showed that the use of SAH as a time-dependent covariate in a Cox regression model enables advantage to be taken of all the information in a longitudinal study design. Using data from the German Socio-Economic Panel, Schwarze, Andersen, and Anger (2000) found that mortality was not only affected by the level of SAH but also by changes compared to a previous year. On the other hand, the only study we could find which analyzed simultaneously the effect of SAH and retrospectively reported health declines, found only the latter to be significant (Deeg, Van Zonneveld, Van der Maas, & Habbema, 1989).

While all of these studies do examine the relationship between SAH changes and mortality, none of them has compared the predictive ability of different measures of health change. One such direct comparison of the predictive ability of self-reported retrospective versus prospective changes was done by Benitez Silva and Ni (2008) using data from the US Health and Retirement Survey (HRS) but for subjective survival expectations as outcome measure, not actual mortality. Their results have favored the use of retrospectively reported health changes instead of prospectively computed changes in SAH but the measurement of survival expectations has been shown elsewhere to be noisy and subjective itself (Bassett & Lumsdaine, 2001). We also believe their results stem in part from the inappropriate control for initial health (cf measures section below).

In this study, we exploit the simultaneous availability of four waves (1991-93-95) of longitudinal health data from the GLOBE study (Mackenbach, van de Mheen, & Stronks, 1994) and a mortality follow-up until 2004 to examine and compare the validity of alternative measures of health levels and changes for predicting mortality. These health measures include the level of SAH, computed changes in SAH, retrospective assessments of health changes, a set of self-reported chronic conditions and changes in self-reported chronic conditions. They enable us to answer the two main questions of this study. First, is there any value added of including retrospective/prospective health changes for mortality prediction, over and above health levels? Second, are prospectively and retrospectively reported health changes equally predictive of subsequent mortality?

Methods

Data

Our data were taken from the longitudinal GLOBE study that was conducted since 1991 in a region in the Southeast of the Netherlands. The study is based on a cohort of non-institutionalized Dutch nationals, aged 15–74 years, living in the city of Eindhoven and surroundings. The GLOBE study is widely used and has contributed to the understanding of the explanation of socioeconomic inequalities in health in the Netherlands (see e.g., Van Lenthe et al., 2004, and Van de Mheen, Stronks, Schrijvers, & Mackenbach, 1999). Study results were a main source of information in the development