# Do Reporting Styles Affect the Predictive Utility of Self-Rated Health?

## Introduction

Self-rated health (SRH) has been shown to be related to mortality in many countries, even after accounting for variations in objective health status (Benyamini, 2011). A notable problem with subjective measures such as SRH is the presence of different reporting styles. Existing research has noted discrepancies between SRH and objective indicators of health across different demographic groups due to reporting heterogeneity. For example, some researchers have found that higher-educated respondents tended to have lower SRH than lower-educated respondents, and this was because higher-educated respondents had higher evaluation standards and they would give lower ratings to the same hypothetical cases than their lower-educated counterparts (Hanandita & Tampubolon, 2016).

In order to address the heterogeneity in reporting styles, anchoring vignettes have been proposed to add to the self-rated question (King et al., 2004). Anchoring vignettes are descriptions of hypothetical cases characterized by the most salient objective aspects of a person or a situation. Respondents were asked to rate the hypothetical cases with the same response option they would rate themselves. With the assumption of vignette equivalence, meaning that vignettes are perceived by all respondents in the same way, any variation in respondents' ratings of vignettes are due to their differences in reporting styles.

So far, existing empirical research on the use of anchoring vignettes has heavily focused on the issue of correcting for group level bias when subjective rating such as SRH was used as the outcome variable. For example, anchoring vignettes have been used to correct for the possibly biased effect of education on SRH, or gender effect on SRH (Peracchi, & Rossetti, 2012; Xu & Xie, 2015). No previous study has considered whether anchoring vignettes would be useful when subjective ratings were used as the independent variables. The purpose of the current research is to estimate whether different ways of controlling for reporting styles would change the predictive utility of SRH in predicting respondents' mortality risks. Since gender differences have often been noted in the association between SRH and mortality (Benyamini et al., 2003), we would examine the role of reporting styles separately for each gender group.

## Method

Data are from the nationally representative China Family Panel Studies (CFPS). CFPS is a nationally representative study focusing on the economic and non-economic well-being of Chinese families. CFPS was launched in 2010, and follow-up surveys were carried out every other year since 2010. The current study used SRH in 2012 ("*How would you rate your health status? Excellent, very good, good, fair [silent option], or poor?*") to predict mortality risk during a four-year follow-up. We focused on the 2012 wave because in addition to the SRH question, respondents were also asked to rate the health status of two hypothetical persons (i.e., anchoring vignettes) using the same five-point Likert scale they used for SRH in CFPS2012. We reordered the options so that higher values indicated better health. The two anchoring vignettes items were as

follows.

Vignette 1
*"Li has no problem with walking, running, or moving the limbs. He/she jogs 5 km twice a week. He/she does not remember when was the last time he/she felt ache because he/she has never felt so in the past year. He/she never feels ache after physical labor or exercises. How would you rate his/her health status? "*

Vignette 2
*"Wang has no problem with walking 200 meters. But he/she feels tired after walking 1 km or climbing stairs up to several floors. He/she has no problem with daily activities such as bringing the vegetables from a supermarket. He/she feels headache once every month, but gets better after taking some medicine. He/she can still do the daily work with the monthly headache. How would you rate his/her health status?"*

The effect of raw SRH on mortality was estimated using the logistic regression. Two different methods were used to adjust for reporting styles. Method 1 was to form an adjusted score based on the two anchoring vignettes and the SRH item. The score was formed according to a non-parametric approach by simply comparing ratings on SRH with the ratings of the anchoring vignettes (Wand, 2013). The adjusted scores were also on ordinal scales and would have the more concrete meanings of relative standings compared with the anchoring vignettes. Take the above listed two vignettes as examples, by comparing the SRH rating with ratings on the two vignettes, respondents would be assigned to one of the following five categories: worse than Li, equal to Li, between Li and Wang, equal to Wang, better than Wang. After the adjusted scores were formed, we replaced the raw SRH with adjusted SRH and assessed whether using the adjusted score would change the predictive utility in estimating respondents' mortality risks. Method 2 was to additionally control for the two anchoring vignettes items in the logistic regression while retaining the raw SRH rating in the same model.

Analysis was restricted to those aged 60 and above, and performed within each gender group. In all the regression models, we also controlled for age, gender, marital status, education, household income per capita in quartiles, doctor-diagnosed chronic disease, memory scores, functional limitations, depressive symptoms, and in-patient hospitalization in the past year.

## Preliminary Results

### Demographic features and health status by gender

Table 1 shows the descriptive statistics on the demographic characteristics and health status of male and female respondents. The average age of the studied sample was 69.46, with slightly more females than males. Seventy-four percent of the sample were married, and the average years of education was 3.14. Household income per capita was 10416 RMB (equivalent of 1,653 USD). There were notable gender differences in marital status and education. While 82% of the men were married, only

66% women were married. Men on average had 4.37 years of education, much higher than that of the women (1.97).

The four-year mortality rate was 10% among the studied sample, with a higher rate for men (12%) than women (8%). However, men had higher SRH than women whereas they endorsed lower ratings for the two anchoring vignettes. Women also fared worse on the following health indicators. A higher proportion of women (23%) had doctor-diagnosed chronic diseases in the past six months than men (19%). Their average memory score was lower (2.55 vs. 3.01), and they reported higher levels of depressive symptoms than men (1.79 vs. 1.65). In addition, women also reported higher levels of functional limitation than men (25% vs. 16%).

**Raw SRH and mortality risk**

Model 1 in Table 2 analyzed the effects of SRH on the four-year mortality risk only controlling for age. Higher ratings of SRH were associated with lower levels of mortality over a four-year span, and the effects were stronger among men (OR=.64, 95% CI=.57-.62) than women (OR=.82, 95% CI=.71-.94). When we added other demographic variables and a number of health indicators, the effects of SRH were attenuated for both men and women. Among women, the effect was not statistically significant any more. For men, the odds ratio was reduced to .83 (95% CI=.72-.95) but still significant.

Among all the added covariates, only depressive symptoms was associated with mortality risks in both gender groups, and the effect was stronger among men (OR=1.90, 95% CI=1.40-2.58) than women (OR=1. 60, 95% CI=1.16-2.19). Other health indicators were predictive of mortality risk in only one group. For example, having doctor-diagnosed chronic diseases was associated with lower mortality risk among women (OR=.60, 95% CI=.40-.89), and women with higher memory scores had lower mortality risk (OR=.78, 95%=.72-.86). For men, having higher household income was predictive of lower mortality risk (OR-.81, 95% CI=.72-.91); being hospitalized as an in-patient in the past year was associated with higher mortality risk (OR=1.38, 95% CI=1.01-1.89), and having at least one functional limitation also meant a higher mortality risk (OR=2.44, 95% CI=1.82-3.27). Marital status and education were not related to mortality risk in either group.

**Adjusting for reporting styles of self-rated health**

Table 3 shows the abbreviated results before and after adjusting for reporting styles of SRH using the basic setting of Model 2 in the previous analysis. The “no adjustment” columns were simply the copies of results from Model 2 of Table 2. The middle panels labeled as “using adjusted scores” were the results when SRH was replaced with the adjusted scores based on Method 1. We observed no increase in the OR nor an overall improvement in the c-statistics. When we used Method 2 by additionally controlling for the two anchoring vignettes in our logistic regression model with raw SRH, we did not see positive changes in the predictive utility of SRH either.

## Conclusion

Higher SRH was associated with reduced four-year mortality risk among Chinese men and women aged 60+. The effect remained significant for men after controlling for demographic characteristics and other health indicators, but not so for women. The predictive utility of SRH was not improved for either men or women after we took into account heterogeneity in the reporting styles of SRH.

**Table 1. Descriptive statistics of the health status and demographic variables by gender**

| Characteristics | Full | Female | Male |
|---|---|---|---|
| n | 7067 | 3648 | 3621 |
| Age (in years) | 69.46(7.51) | 69.78 (7.92) | 69.13(7.05) |
| Married | 74% | 66% | 82% |
| Years of Education | 3.14(4.27) | 1.97(3.67) | 4.37(4.49) |
| Household income per capita (in RMB) | 10416(16126) | 10149.12 （17967） | 10695 （14060） |
| Four-year mortality | 10% | 8% | 12% |
| Self rated health | 2.24(1.11) | 2.14(1.14) | 2.35(1.08) |
| Health vignette 1 | 3.77(1.03) | 3.82(1.05) | 3.71(1.02) |
| Health vignette 2 | 1.87(.99) | 1.92(1.04) | 1.82(.94) |
| Chronic disease | 21% | 23% | 19% |
| Hospitalization | 16% | 16% | 15% |
| Cognition | 2.77(2.56) | 2.55（2.69） | 3.01(2.41) |
| Depressive symptoms | 1.72(.46) | 1.79（.48） | 1.65(.41) |
| Functional Limitation | 21% | 25% | 16% |

*Note*. Numbers in parenthesis are standard deviations.

**Table 2. Logistic regressions of mortality on self rated health status**

| | F | M | P value for gender interraction | F | M | P value for gender interraction |
|---|---|---|---|---|---|---|
| | Model 1 | | | Model 2 | | |
| SRH | .82(.71,.94)** | .64(.57,.72)*** | <.01 | .88(.76,1.02) | .83(.72,.95)** | <.01 |
| Adj. SRH | | | | | | |
| Age | 1.14(1.12,1.16)*** | 1.10(1.08,1.12)*** | | 1.12(1.09,1.14)*** | 1.08(1.06,1.10)*** | |
| Anchor 1 | | | | | | |
| Anchor 2 | | | | | | |
| Married | | | | 1.08(.77,1.52) | 1.03(.75,1.41) | |
| Years of Education | | | | .96(.90,1.02) | .99(.96,1.02) | |
| Income q | | | | 1.08(.93,1.24) | .81(.72,.91)*** | |
| Chronic | | | | .60(.40,.89)* | .94(.69,1.30) | |
| Hospitalization | | | | 1.03(.68,1.56) | 1.38(1.01,1.89)* | |
| Cognition | | | | .78(.72,.86)*** | .99(.92,1.06) | |
| Depression | | | | 1.60(1.16,2.19)** | 1.90(1.40,2.58)*** | |
| Fun. Lim | | | | 1.02(.73,1.43)** | 2.44(1.82,3.27)*** | |
| C-stat | .762 | .701 | | .775 | .741 | |

*Note*. *p<0.1; **p<0.05; ***p<0.01.

**Table 3. Logistic regressions of mortality on self rated health status**

| | F | M | F | M | F | M |
|---|---|---|---|---|---|---|
| | No adjustment | | Using adjusted scores | | Controlling for vignettes | |
| SRH | .88(.76,1.02) | .83(.72,.95)** | | | .92(.79,1.07) | .83（.73,.95）** |
| Adjusted SRH | | | .89(.76,1.03) | .85(.74,.96)* | | |
| Vignette 1 | | | | | .91(.74,1.11) | 1.12(.96,1.32) |
| Vignette 2 | | | | | 1.21(1.01,1.44)* | .99(.84,1.16) |
| C-stat | .775 | .741 | .776 | .742 | .774 | .742 |

*Note*. *p<0.1; **p<0.05; ***p<0.01. All models were controlled for marital status, education, household income per capita quartiles, doctor-diagnosed chronic disease in the past six months, hospitalization in the past year, memory scores, depressive symptoms and functional limitation.