



Education and mortality among older adults in China



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ABSTRACT

This study examines the relationship between education and mortality, its underlying mechanisms, and its gender and age variations among older adults in China, using data from the 2002 to 2011 waves of the Chinese Longitudinal Healthy Longevity Survey. There is an inverse relationship between education and mortality risk. The relationship is explained in full by each of the three mechanisms: other socioeconomic attainments, social relationships and activities, and health status, and partially by physical exercise. In addition, primary education has a stronger effect on mortality for men than for women and the effect of education is stronger for the young old than for the oldest old. These findings underscore the importance of national and subpopulation contexts in understanding the relationship between education and mortality.

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1. Introduction

The inverse relationship between educational attainment and mortality has been well documented in the developed countries (Elo, 2009; Hummer and Lariscy, 2011), and recent studies showed a similar relationship in less developed countries, like China, though the evidence remains scarce (Liang et al., 2000; Liu et al., 1998; Zhu and Xie, 2007). Previous research also suggests that the strength of education–mortality relationship varies across subgroups and social settings. Two demographic factors, age and gender, have received much attention as important moderators of this relationship, but the findings are inconsistent. Although different theories have been advanced to explain these findings, there is a relative lack of empirical research testing the underlying mechanisms that produce age and gender variations (Montez et al., 2009; Zajacova and Hummer, 2009).

A few studies examined education–mortality relationship in Taiwan and mainland China. Although very informative, each has its own limitations. For example, Liu et al. (1998) tested three mediating factors among older Taiwanese—health status, health behaviors, and social relationships—but it did not examine gender and age variations. Zhu and Xie (2007) only included the oldest-old Chinese and did not examine the mechanisms for the effect of

education on mortality. Liang et al. (2000)'s sample was drawn from one city which limits its generalizability. Our study extends previous research by examining the relationship between education and mortality and its gender and age variations using a national longitudinal survey of Chinese older adults. We address four questions. First, is there an inverse relationship between education and mortality among older Chinese adults? Second, what are the possible underlying mechanisms of this relationship? Third, do the education–mortality relationship and its underlying mechanisms differ between men and women? And fourth, do the education–mortality relationship and its underlying mechanisms differ between the young old and the oldest old?

1.1. Education and mortality

Our conceptual framework for the relationship between education and mortality is depicted in Fig. 1. This theoretical framework stems from the human capital explanation which posits that education enhances human capital—knowledge, skills, and resources—which shapes health over the life course and ultimately, how and when individuals die (Mirowsky and Ross, 2003). There are three mechanisms through which education may affect health and mortality. First, a higher level of educational attainment helps individuals acquire better and more stable employment and increase their earning power. Research consistently found a positive association between education and other socioeconomic attainments (e.g., higher status occupations and more income) and access to

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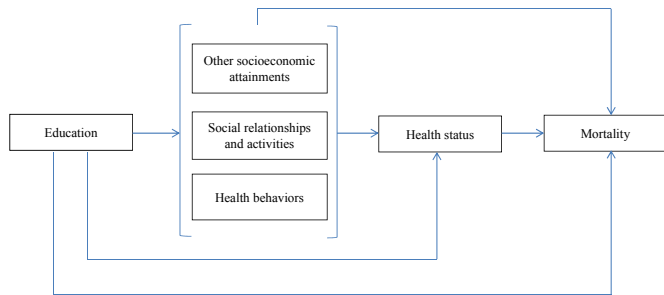


Fig. 1. Conceptual model of the relationship between education and mortality.

health resources (e.g., health care), which are associated with better health and survival (Lantz et al., 1998; Marmot et al., 2001). Second, a higher level of education helps individuals build psychosocial resources, such as heightened sense of personal control, more supportive social relationships and active participation in cognitive stimulating activities, and more psychosocial resources are associated with better health and lower mortality (House et al., 1988). Third, more educated people are more likely than less educated people to adopt positive health behaviors, such as exercising regularly, drinking moderately, and avoiding or quitting smoking, which in turn lead to better health and lower mortality (Lantz et al., 1998; Ross and Wu, 1995). In addition, health is conceptualized as a more proximal predictor of mortality and some of the aforementioned factors may affect mortality through their effects on health. There is strong evidence that health status predicts mortality (Ariyo et al., 2000; Idler and Benyamini, 1997; Okun et al., 2010; Sabia et al., 2010).

Based on this conceptual model, we hypothesize that *education is negatively associated with mortality risk and that the education effect on mortality is mediated by other socioeconomic attainments, social relationships and activity participation, and health behaviors.*

1.2. Gender, education, and mortality

Research on gender differences in the effect of education on health and mortality is limited and the findings are mixed. While earlier research showed a stronger education effect on mortality among women than men (Kitagawa and Hauser, 1973), more recent data show a stronger education effect for men than women (Backlund et al., 1999). Still others found no gender difference (McDonough et al., 1999; Zajacova, 2006), or the difference only exists among certain groups (Hummer and Lariscy, 2011; Montez et al., 2009; Zajacova and Hummer, 2009).

In addition, previous research suggests that gender differences in education–mortality relationship may exist in the pathways that link education to health and mortality (Zajacova, 2006). For example, there is evidence that women still earn less than men of comparable education (Blau and Kahn, 2007), which could contribute to gender differences in education–mortality relationship since economic resources can affect health and mortality through access to health care, exposure to stress, availability of coping resources and other pathways (Zajacova, 2006). In addition, the association between education and health behaviors may vary by gender (Bloomfield et al., 2006; Mackenbach et al., 2004), and health behaviors, especially smoking and excess alcohol consumption, account for a meaningful share of excess male mortality (Liang et al., 2003). Furthermore, social relationships may also play a role. It is well documented that married adults experience better health and survival than unmarried adults and this disparity appears to be greater among men than women, and such a gender

differential persists at very old ages (Zhu and Gu, 2010). The less-educated men may be less likely to have access to health-enhancing social ties such as marriage, and thus are more likely to engage in risky health behaviors (Montez et al., 2009; Zajacova and Hummer, 2009). Based on these explanations, we hypothesize that *the effect of education on mortality is stronger for men than for women.*

1.3. Age, education, and mortality

Most studies reported that the strength of education–mortality relationship declines in old age (Elo and Preston, 1996; House et al., 1994; Hummer and Lariscy, 2011; Kitagawa and Hauser, 1973; Montez et al., 2011). There are several explanations for the mortality convergence at old ages (Hoffmann, 2008; House et al., 1994; Zhu and Xie, 2007). First, with age, biological processes assume dominance over social determinants and, eventually, everybody must die regardless of social class. Second, most older adults gradually disengage from the economic activities that mediate the relationship between education and health, and thus they are less influenced by some of the mechanisms through which education affects health (e.g., working conditions). Third, in some developed countries, social welfare policies that favor the elderly population contribute to some redistribution between social groups and thus reduce socioeconomic differentials in health. Fourth, unhealthy behaviors, such as smoking and heavy drinking, are less prevalent among older people due to selective mortality that has already removed many smokers and heavy drinkers from the population before they reach old ages. Selective mortality also drops less healthy people before they reach old ages, leaving the surviving population more homogenous and contributes to declining differences observed on the aggregate level.

In contrast, a few studies, most of which focused on health status indicators rather than mortality, found increasing or stable educational differences (Huisman et al., 2003; Lynch, 2003; Ross and Wu, 1996). Possible explanations include the vulnerability hypothesis and the cumulative advantage/disadvantage hypothesis. The vulnerability hypothesis suggests that vulnerability increases in old age and makes differential exposure to health hazards more harmful (House et al., 1994). The cumulative advantage/disadvantage hypothesis suggests that health benefits of education, such as economic and social capital, accumulate over the life course, producing a larger gap in health among older adults than younger adults. In addition, the impact of past unhealthy experiences, such as smoking, is unlikely to cause health problems among younger people, but over time, the effects accumulate to produce disease, disability, and death (Dannefer, 2003; Ross and Wu, 1996).

Despite the growing interest in age variations in education–mortality relationship, few studies have compared the young old and the oldest old. As Zhu and Xie (2007) suggest, it is important to make this distinction because the young old and the oldest old are different in several significant respects. For example, the oldest old are far more detached from social and economic activities than the young old. Because there is strong evidence for the convergence hypothesis when mortality is the outcome, we hypothesize that *the effect of education on mortality is stronger among the young old than the oldest old.*

1.4. The China context

China is experiencing rapid population aging and the proportion of older people (65 years and older) is expected to reach 24% (331 million) by 2050 (United Nations, 2013). Because China and developed countries are substantially different in population

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