

Original Article

# Perceived Income Adequacy and Well-being Among Older Adults in Six Low- and Middle-Income Countries

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## Abstract

**Objectives:** Perceived income adequacy is positively associated with self-rated health (SRH) and quality of life (QOL) among adults in higher-income countries. Additionally, older individuals often report higher levels of income adequacy. However, it is unclear if these associations, documented primarily in high-income countries, are also evident across economically and culturally distinctive low- and middle-income countries.

**Methods:** Data were drawn from the World Health Organization's Study on global AGEing and adult health (SAGE), a study of adults aged 50 years or older in China, Ghana, India, Mexico, the Russian Federation, and South Africa. Smaller samples of younger adults (18–49 years) were included for comparison purposes. Participants reported income adequacy, SRH, and QOL. Associations between age and income adequacy and between income adequacy and SRH/QOL were examined using country-specific logistic regression analysis.

**Results:** Older adults in China and Russia were more likely to report better income adequacy than their 18- to 49-year-old counterparts; however, the opposite was observed in Ghana and India. SRH and QOL improved as income adequacy increased in all countries.

**Discussion:** As expected, income adequacy was correlated with SRH and QOL. However, the relationship between age and income adequacy varied cross-culturally, potentially due to differences in familial and governmental financial support.

**Keywords:** Health economics—Population ageing—Social gradients—Subjective well-being

Perceived income adequacy has become an increasingly important measure of economic stability and well-being. Evidence indicates that the subjective experience of financial strain has a stronger association with health outcomes (such as depression, physical disability, and cardiovascular conditions) than actual income levels (Cheng, Chi, Boey, Ko, & Chou, 2002; Nummela, Sulander, Heinonen, &

Uutela, 2007; Ullah, 1990; Wilkinson, 1996). Several individual characteristics appear to influence perceptions of income adequacy, including age. Despite the fact that individual income levels tend to decline later in life with retirement, older adults frequently report sufficient income adequacy compared with younger individuals, even at low income levels (Litwin & Sapir, 2009; Stoller & Stoller, 2003).

This pattern has been attributed to decreased spending on grown children, combined with higher rates of home ownership and untaxed income among older adults (Litwin & Sapir, 2009; Stoller & Stoller, 2003).

Moreover, it is possible that older adults have acquired enough material wealth to reach an income threshold beyond which the relationship between income level and well-being diminishes. This idea is supported by previous work documenting the negligible effect of increasing affluence on happiness, once individuals are able to afford life's necessities (Myers & Diener, 1995). In addition, older individuals tend to express fewer negative emotions and rate their experiences and personal relationships more positively than their younger counterparts (Charles & Carstensen, 2010; Mather & Carstensen, 2005). This has been attributed to changes in how information is processed as individuals age (Carstensen & Mikels, 2005), with older adults directing their attention away from negative stimuli (Charles & Carstensen, 2008; Charles, Mather, & Carstensen, 2003; Mather & Carstensen, 2003). However, most research examining the relationship between age and perceived income adequacy has been conducted in high-income nations that are typically characterized by higher absolute levels of resource availability, even among individuals of lower socioeconomic status. It is therefore unclear if these age-related patterns are evident in low- or middle-income countries (LMICs).

In addition to being influenced by age, subjective income adequacy measures exhibit a strong positive association with health and well-being, above and beyond the health benefits associated with objective income measures (Cheng et al., 2002; Nummela et al., 2007; Ullah, 1990; Wilkinson, 1996). These results suggest that perceived financial strain results in quantifiable health problems, which may further exacerbate perceptions of inadequate resources to meet daily needs. Several approaches are commonly used to capture perceptions of health and well-being. One such measure is self-rated overall general health (SRH), typically measured with a single question using a rating scale ranging from very good to very poor. This subjective measure has consistently been shown to be an independent predictor of numerous health outcomes (Idler & Benyamini, 1997; Menec, Shooshtari, & Lambert, 2007).

Subjective well-being is also measured using self-rated quality of life (QOL), typically based on the World Health Organization (WHO) definition of health as a state of complete physical, mental, and social well-being with an emphasis on functional ability (Farquhar, 1995). Like SRH, previous research indicates that QOL is associated with numerous health outcomes (Smith, Avis, & Assmann, 1999) and is positively correlated with income adequacy (Lawton, 1999). SRH and QOL are therefore frequently used as proxy measures of health. However, more work is needed to determine the relationship between perceived income adequacy, SRH, and QOL among different populations.

Previous research has demonstrated that subjective well-being varies between nations, even when controlling for income differences (Diener, Diener, & Diener, 1995; Myers & Diener, 1995). In general, collectivist societies exhibit relatively low self-reported well-being levels compared with individualistic societies, where norms more strongly support the expression of positive emotions (Diener, Suh, Smith, & Shao, 1995; Myers & Diener, 1995). This variation in reported well-being (for example, SRH and QOL) across nations has also been attributed to national differences in disease definitions, health care expectations, and gender roles (Hunt, 1993; Jylhä, Guralnik, Ferrucci, Jokela, & Heikkinen, 1998; Salomon, Tandon, & Murray, 2004).

Moreover, socially defined perceptions of what constitutes adequate income and well-being may change within cultures due to economic development. For instance, exposure to western ideals in economically developing countries may lead to altered perceptions of the resources required to live a successful life. This phenomenon is generally referred to as "lifestyle incongruity," which describes the situation where an individual aspires to a consumption-based lifestyle that is inconsistent with their current socioeconomic situation (Dressler, 1999; McDade, 2002, McDade, Stallings, & Worthman, 2000). Evidence suggests that psychosocial stress associated with lifestyle incongruity results in quantifiable negative health outcomes, including elevated blood pressure and suppressed immune function (Dressler, 1999; McDade et al., 2000). Regardless of whether actual income levels are sufficient to meet basic needs, the lifestyle incongruity apparent among economically developing LMICs may create the perception of income inadequacy and negatively impact SRH and QOL ratings (Yazawa et al., 2014). Yet, relationships between perceived income adequacy, QOL ratings, and SRH scores remain poorly understood in these nations.

The present study uses cross-country data from the World Health Organization's Study on global AGEing and adult health (SAGE) Wave 1 to examine how links among age, income adequacy, SRH, and overall QOL vary within different LMICs while controlling for known covariates. For example, depression and individual mood have been shown to substantially affect SRH and QOL measures (Croyle & Uretsky, 1987; Idler & Benyamini, 1997; Ruo et al., 2003) and must therefore be considered when studying perceptions of well-being. Previous work also suggests that differences in SRH exist between older adults living in urban and rural settings (Nummela, Sulander, Rahkonen, Karisto, & Uutela, 2008) and that employment status may contribute to perceptions of financial stability (Litwin & Sapir, 2009).

Moreover, factors associated with household socioeconomic status (including income and education levels) have been shown to influence individual income adequacy, access to medical services, and overall health (Kuo & Lai, 2013). Finally, having a spouse has been shown to improve SRH, perhaps due to the increased social support received

from a spouse (Cheng et al., 2002; Janzen & Muhajarine, 2003; Nummela et al., 2007). This study therefore controls for these covariates while using data from six LMICs (China, Ghana, India, Mexico, Russian Federation, and South Africa) to construct a more holistic picture of how these associations vary among older adults from culturally and economically diverse backgrounds.

At the outset of data collection in 2007, the gross national income (GNI) per capita (a measure of average individual income) ranged from \$2,580 in Ghana to \$16,280 in the Russian Federation (The World Bank, 2015). This variation in economic development, in conjunction with cultural differences, impacts several factors known to influence perceptions of financial security and well-being among older adults, including accessibility of health care, the extent of government support programs for aging populations, level of filial piety, and national changes in disease and migration patterns (Aboderin, 2004; Chen & Silverstein, 2000; Gavrilova & Gavrilov, 2009; Vera-Sanso, 2005). Thus, examining the relationship between income adequacy and subjective well-being among these culturally and economically diverse nations has the potential to highlight how this association varies or is similar cross-culturally. Information clarifying how population-specific cultural and economic factors shape individual well-being can be used to inform interventions seeking to improve perceived QOL, particularly at older ages when QOL and SRH measures typically decline (Leinonen, Heikkinen, & Jylhä, 2001).

To date, however, little research has been conducted to examine these patterns cross-culturally; it is therefore unclear if associations among age, income adequacy, and well-being are similar, or whether incongruent patterns emerge between distinct populations. To clarify these patterns within each participant country, the present study examined (i) the relationship between age group and perceived income adequacy and (ii) the relationship between income adequacy ratings and (a) SRH and (b) subjective QOL. Two hypotheses are tested: First, older individuals in all countries will exhibit higher income adequacy compared with their younger counterparts. Second, income adequacy ratings will be positively associated with overall general health and well-being in this same sample of older adults, suggesting perceived financial security is protective against the decline in well-being often experienced during aging.

## Methods

### Ethical Approval

SAGE was approved by the World Health Organization's Ethical Review Committee. Additionally, partner organizations in each SAGE country obtained ethical clearance through their respective institutional review bodies. Written informed consent was obtained from all study participants.

## Study Design and Participants

Nationally representative samples of adults aged 50 years or older and comparative samples of younger adults (18–49 years old) were drawn from each participating SAGE country (Kowal et al., 2012) using stratified multistage cluster sampling (Naidoo, 2012). Face-to-face interviews were used to collect household and individual level data between 2007 and 2010. At the time of interviews for SAGE Wave 1, one country was categorized as low income (Ghana), two as lower–middle income (China and India), and three as upper-middle income countries (Mexico, Russia, and South Africa) (The World Bank, 2007).

## Perceived Income Adequacy

Income adequacy was evaluated by asking participants whether they had enough money to meet their needs, with a 5-point response scale: 1 = completely; 2 = mostly; 3 = moderately; 4 = a little; or, 5 = not at all. A binary variable was then created to categorize participants as either income insecure (rating of income meeting their needs “not at all” or “a little” or “moderately”) or income secure (rating of income meeting their needs “completely” or “mostly”).

## Health and Well-being Variables

Participants were also asked to rate their overall general health (SRH) that day on a scale of 1 (*very good*) to 5 (*very poor*). Similarly, participants were asked “How would you rate your overall quality of life?” using the same response rating scale as for SRH. Following a standard approach (Tucker-Seeley, Harley, Stoddard, & Sorensen, 2013), the SRH and QOL categories were collapsed to create a binary variable defined as either low SRH or QOL (rating of “very poor” or “poor” or “moderate”) or high SRH or QOL (rating of “good” or “very good”).

## Covariates

Individual characteristics known to influence perceptions of well-being or income adequacy were controlled for during analysis. Sex and age were collected as part of the interview. Participant age was categorized as a binary variable “younger” (18–49 years) versus “older” ( $\geq 50$  years) for Hypothesis 1. For Hypothesis 2, participant age was categorized following standard epidemiological protocol to examine changes in health outcomes across increasing age categories (Litwin & Sapir, 2009). Age was included as a categorical variable in these analyses because the association between the logit of the outcomes and age in years was not linear (a requirement of logistic regression). Specifically, the study population of older adults was classified as 50–59, 60–69, 70–79, or 80+ years. Depression was included in the models as a dichotomous variable using symptom reporting and an algorithm to assign diagnosis based on the

World Mental Health Composite International Diagnostic Interview (Kessler et al., 2010). Participants were also asked whether they thought their mood was generally worse, the same, or better compared with others, and this variable was included in the models.

Participant setting was classified as urban or rural, based on definitions used by national statistical agencies in each country. Participants also reported whether they had worked for wages at least 2 days in the previous week, and this variable was categorized as (1) never worked for wages/not currently working or (2) currently working. Further, to account for various factors associated with household socioeconomic status, reported annual household income was combined with an index of durable goods ownership, dwelling characteristics, and access to services to allow for comparisons across countries; this income variable was then classified into quintiles. Education level was standardized across countries using the International Standard Classification of Education (UNESCO, 1997) and classified as (1) no formal education, (2) less than high school, and (3) completed high school or a higher degree. Finally, current marital status was categorized as (1) single (never married/divorced/widowed) or (2) married (currently married/cohabitating).

### Statistical Analyses

Logistic regressions were conducted separately for each country using SPSS version 20, and results were regarded as significant at  $p$  less than .05. We dichotomized perceived income adequacy, SRH and QOL, and used logistic regression as there was evidence of violation of the assumptions of normality, homoscedasticity, and linearity necessary for linear regression, and violation of the proportional odds assumption for ordinal logistic regression modeling of the variables in their original format. In addition, we found evidence from pooled models of significant interaction between country and the primary explanatory variables of interest for all three outcomes. These findings indicated important heterogeneity in the primary associations of interest by country; because other pattern associations between outcomes and other covariates were also likely to vary by country, we fit models that tested hypotheses separately by country rather than pooled across all countries.

Descriptive statistics are presented for income adequacy, self-rated health, and QOL category frequencies by country and gender. Individuals missing one or more the variables of interest were excluded from analysis ( $n = 3,316$ ), resulting in a final sample size of 33,703 older participants. The frequency of missing data was less than 5% for each regression in all countries except South Africa. The frequency of missing cases in South Africa was approximately 23% in each regression, largely due to the high number of participants who failed to report education level ( $n = 603$ ); as a sensitivity analysis, the models were therefore generated excluding education. The results of these analyses were

identical to the full models, except that age category (previously nonsignificant) now significantly contributed to the model, such that younger adults had significantly lower odds of reporting moderately insecure income than income secure, compared with older adults ( $p < .05$ ). Still, the missing data from South African participants do not substantively alter the interpretation of the results.

### Examination of Association Between Perceived Income Adequacy and Age Group by Country (Hypothesis 1)

Logistic regression models were fit by country to assess the relationship between perceived income adequacy as the outcome and age group (18–49 vs. 50+ years). All regression models also included sex, household setting (urban or rural), income quintile, current employment status, education level, marital status, depression diagnosis, and self-reported mood.

### Examination of the Association Between SRH and QOL, and Perceived Income Adequacy by Country (Hypothesis 2)

Similarly, two separate sets of logistic regression models were fit to assess the relationship between SRH and QOL and perceived income adequacy in older adults ( $\geq 50$  years), by country. All regression models also included sex, age, household setting (urban or rural), income quintile, current employment status, education level, marital status, depression diagnosis, and self-reported mood.

Odds ratios (ORs) and 95% confidence intervals (CIs) are reported for the associations of interest and the Wald chi-squared test was used to assess the statistical significance of associations. The Hosmer–Lemeshow goodness-of-fit test was used to assess the fit of all models.

## Results

### Descriptive Statistics (Older Adults, $\geq 50$ Years Old)

Lifestyle demographics varied by country. The samples in China, Mexico, Russia, and South Africa included slightly more women than men (53%–65%), whereas gender was equally distributed in Ghana and India. The majority of participants from Mexico, Russia, and South Africa lived in urban settings (73%, 76%, and 67%, respectively), whereas most individuals from Ghana (59%) and India (74%) lived in rural settings and Chinese participants were evenly divided. Most older adults living in Ghana and India had never received formal schooling (55% and 51%, respectively). Conversely, the majority of participants living in China, Mexico, and South Africa (57%, 70%, 63%, respectively) had received some schooling but never completed high school. Only Russia had the majority of individuals (70%) completed a high school education or beyond.

The majority of individuals were married (53%–83%) and not currently working (60%–73%; except in Ghana, where only 31% of older adults reported not currently working).

Frequencies of respondents at each level for the income adequacy, SRH, and QOL variables are presented for each country in Table 1. The highest percentage of individuals reporting income security was observed in China (51%), whereas Ghana, Mexico, and South Africa had the highest percentage of participants reporting income insecurity (94%, 83%, and 88%, respectively). Russia had the highest percentage of participants with poor SRH (87%) and Ghana the lowest (59%). Russia also had the highest percentage of participants with poor QOL (78%), whereas Mexico exhibited the lowest (49%).

### Income Adequacy and Age, by Country

Income adequacy was statistically significantly associated with age group (18–49 vs. 50+ years) in all countries except Mexico and South Africa (Table 2, see supplementary material for full table); however, the relationship was not uniform across the countries. Compared with older adults, younger individuals in China (OR: 1.5, 95% CI: 1.3–1.7,  $p < .001$ ) and Russia (OR: 1.5, 95% CI: 1.2–1.9,  $p < .001$ ) had significantly higher odds of reporting that their income was insecure rather than secure, as hypothesized. The opposite was seen in Ghana (OR: 0.69, 95% CI: 0.52–0.91,  $p = .008$ ) and India (OR: 0.80, 95% CI: 0.72–0.89,  $p < .001$ ) where compared with older individuals, younger adults had significantly lower odds of reporting income as

insecure (rather than as secure). Hosmer and Lemeshow goodness-of-fit tests indicated that all models were a good fit ( $p$  values ranged from .376 to .825), except in India ( $p = .004$ ). This is potentially due to the influence of additional factors not accounted for in these analyses.

### Associations Between Well-being Measures and Income Adequacy in Older Adults, by Country

SRH was statistically significantly associated with perceived income adequacy in all countries, with consistently higher odds of poor (compared with good) SRH with increasing income insecurity (OR: 1.8–2.9,  $p < .001$ ; Table 3, see supplementary material for full table). Hosmer and Lemeshow goodness-of-fit tests showed that all models were a good fit ( $p = .151$ –.893).

QOL was statistically significantly associated with perceived income adequacy in all countries, with elevated odds of poor (compared with good) QOL as income insecurity increased (OR: 1.9–5.4,  $p < .001$ ; Table 4, see supplementary material for full table). Hosmer and Lemeshow goodness-of-fit tests showed that all models were an adequate fit ( $p = .069$ –.760).

### Discussion

The results of the present study provide mixed support for the first hypothesis (older adults exhibit higher levels of income security) and strong support for the second hypothesis (SRH and QOL are positively associated with

**Table 1.** Distribution of Low and High Income Adequacy, Self-Rated Health, and Quality of Life for Older (≥50 years) Participants in Each Country, SAGE Wave 1 (2007/2010)

	Income adequacy	Self-rated health	Quality of life
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
China, total <i>N</i>	12,772	12,955	12,754
Low	6,284 (49%)	8,582 (66%)	8,431 (66%)
High	6,488 (51%)	4,373 (34%)	4,323 (34%)
Ghana, total <i>N</i>	4,256	4,301	4,269
Low	3,988 (94%)	2,555 (59%)	3,000 (70%)
High	268 (6%)	1,746 (41%)	1,269 (30%)
India, total <i>N</i>	6,554	6,559	6,547
Low	5,132 (78%)	4,727 (72%)	4,367 (67%)
High	1,422 (22%)	1,832 (28%)	2,180 (33%)
Mexico, total <i>N</i>	2,206	2,211	2,203
Low	1,820 (83%)	1,378 (62%)	1,074 (49%)
High	386 (17%)	833 (38%)	1,129 (51%)
Russia, total <i>N</i>	3,845	3,919	3,817
Low	2,400 (62%)	3,426 (87%)	2,989 (78%)
High	1,445 (38%)	493 (13%)	828 (22%)
South Africa, total <i>N</i>	3,565	3,758	3,624
Low	3,154 (88%)	2,298 (61%)	2,408 (66%)
High	411 (12%)	1,460 (39%)	1,216 (34%)
Total ( <i>N</i> )	<i>n</i> = 33,198	<i>n</i> = 33,703	<i>n</i> = 33,214

**Table 2.** Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Association Between High Perceived Income Security and Older Age From Multiple Logistic Regression<sup>a</sup>, by Country

Country	OR	95% CI	Wald test	
			$\chi^2$	<i>p</i> Value
China ( <i>n</i> = 14,037)	1.5	1.3–1.7	44.7	<.001
Ghana ( <i>n</i> = 4,948)	0.69	0.52–0.91	7.0	.008
India ( <i>n</i> = 11,139)	0.80	0.72–0.89	16.3	<.001
Mexico ( <i>n</i> = 2,618)	1.1	0.79–1.4	0.12	.732
Russia ( <i>n</i> = 4,151)	1.5	1.2–1.9	12.8	<.001
South Africa ( <i>n</i> = 3,200)	1.1	0.70–1.6	0.11	.739

Note: Hosmer–Lemeshow Test chi-squared values indicate good model fit in all countries except India (nonsignificant *p* values indicate that the distribution of predicted and observed values does not differ significantly, suggesting good model fit).

<sup>a</sup>Adjusted for sex, rural/urban location, income quintile, employment status, education level, depression, mood, and marital status.

**Table 3.** Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Association Between High Self-Rated Health and High Perceived Income Security From Multiple Logistic Regression<sup>a</sup>

Country	OR	95% CI	Wald test	
			$\chi^2$	<i>p</i> Value
China ( <i>n</i> = 12,449)	2.3	2.1–2.5	380.1	<.001
Ghana ( <i>n</i> = 4,170)	1.8	1.4–2.4	18.3	<.001
India ( <i>n</i> = 6,512)	2.4	2.1–2.7	150.3	<.001
Mexico ( <i>n</i> = 2,200)	1.8	1.5–2.3	25.6	<.001
Russia ( <i>n</i> = 3,749)	2.6	2.1–3.2	74.7	<.001
South Africa ( <i>n</i> = 2,938)	2.9	2.2–3.9	58.4	<.001

Note: Hosmer–Lemeshow Test chi-squared values indicate good model fit (nonsignificant *p* values indicate that the distribution of predicted and observed values does not differ significantly, suggesting good model fit).

<sup>a</sup>Adjusted for sex, age, rural/urban location, income quintile, employment status, education level, depression, mood, and marital status.

income adequacy). A uniform association between income adequacy and age was not apparent in all countries, perhaps due to differences in filial piety and government welfare programs for older adults. However, as expected, SRH and QOL ratings were better among individuals with better income adequacy. These significant positive associations were apparent in all six countries, suggesting that this pattern is apparent in diverse societies despite cultural differences and disparate levels of national income.

### Income Adequacy, SRH, and QOL Rating Frequencies

The frequency of income adequacy, SRH, and QOL ratings did display some variation by country. Ghana reported the highest rates of income inadequacy (a rating of income meeting their needs “not at all,” “a little,” or “moderately”) at

**Table 4.** Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Association Between High Quality of Life and High Perceived Income Security From Multiple Logistic Regression<sup>a</sup>

Country	OR	95% CI	Wald test	
			$\chi^2$	<i>p</i> Value
China ( <i>n</i> = 12,449)	5.4	4.9–5.9	1287.0	<.001
Ghana ( <i>n</i> = 4,170)	3.6	2.7–4.7	80.2	<.001
India ( <i>n</i> = 6,512)	4.3	3.7–4.9	427.2	<.001
Mexico ( <i>n</i> = 2,200)	1.9	1.5–2.4	27.5	<.001
Russia ( <i>n</i> = 3,749)	4.5	3.7–5.3	276.9	<.001
South Africa ( <i>n</i> = 2,938)	4.6	3.5–6.2	113.9	<.001

Note: Hosmer–Lemeshow Test chi-squared values indicate adequate model fit (nonsignificant *p* values indicate that the distribution of predicted and observed values does not differ significantly, suggesting good model fit).

<sup>a</sup>Adjusted for sex, age, rural/urban location, income quintile, employment status, education level, depression, mood, and marital status.

94%, whereas China and Russia reported the lowest (49% and 62%, respectively) (Table 1). These values correspond with national GNI per capita values: Ghana had the lowest GNI value of the six participant countries at the time of data collection (\$2,580) whereas China and Russia had much higher values (\$6,820 and \$16,280, respectively) (The World Bank, 2015). This supports previous findings and suggests that population-wide measures of perceived income adequacy do reflect absolute income (Litwin & Sapir, 2009).

Interestingly, South Africa exhibited both the second highest GNI per capita (\$10,980) and the second highest frequency of perceived income inadequacy (88%). These contrasting values support previous work indicating high levels of wealth inequality within this ethnically divided country (Woolard, 2002) and also suggest that perceived income adequacy frequencies at a population level can capture financial inequality patterns not evident in standard measures of national wealth.

### Age Differences in Perceived Income Adequacy

Significant differences in income adequacy ratings were apparent between younger and older adults, yet the direction of these differences varied by country. As hypothesized, adults aged 18–49 years in China and Russia had significantly higher odds of being income insecure or moderately secure rather than income secure, compared with their older counterparts ( $\geq 50$  years old). Previous research in these countries suggests that this may be due to increased levels of filial support in China (Chen & Silverstein, 2000) and fairly stable pension income in Russia (Gavrilova & Gavrilov, 2009). It is also possible that younger adults in these rapidly developing countries were more affected by lifestyle incongruity, although this has yet to be tested. However, the opposite pattern was observed in Ghana and India and no significant relationship was documented in Mexico or South Africa, suggesting the existence of cultural

or policy differences in these countries that may shape perceptions of income adequacy.

These cultural differences might include variation in the accessibility of social safety nets available to older adults (such as retirement-related benefits and programs). These programs buffer older individuals from income inadequacy in high-income countries when effectively implemented and utilized (Hungerford, 2007). It is possible that older adults in Ghana and India might rely on institutional safety nets that fail to meet their basic needs; it would therefore be unsurprising that perceptions of income adequacy decrease with age in these nations. It is also possible that older individuals in these countries experience living arrangements that do not ensure adequate financial support. For instance, older adults in these communities may still be expected to financially support their extended family, instead of receiving increased care from family members as they age. It is also possible that escalating costs of living in these areas have made it difficult for older individuals to live comfortably on their savings, assets, or current income.

Although the influence of available government support and filial piety on income adequacy ratings among older adults has yet to be tested in this data set, previous work examining social support among older adults living in Ghana and India indicates that these factors impact perceived income security. For example, evidence suggests that material family support for older individuals has waned in recent years (Aboderin, 2004; Vera-Sanso, 2005). This has been attributed to a decreased capacity of younger adults (especially sons) to provide support, necessitating financial assistance from their aging parents. In addition, the concept of filial support appears to have shifted, resulting in filial care based on reciprocity (e.g., influenced by parents' past conduct) (Aboderin, 2004; Vera-Sanso, 2005).

### Income Adequacy, SRH, and QOL Scores

The present study documented strong positive associations between ratings of perceived income adequacy and well-being (using both SRH and QOL measures) in all countries, regardless of their national income level. These consistent associations are especially relevant given inconsistencies in previous research examining these relationships in diverse populations. Given the subjective nature of well-being questions and cultural differences (e.g., different understandings of what constitutes illness or adequate health care), previous studies have queried whether results can be compared cross-culturally (Hunt, 1993; Jylhä et al., 1998; Menec et al., 2007; Salomon et al., 2004). In particular, differences in subjective well-being between ethnic groups and different countries have been documented in past studies (Menec et al., 2007), lending credence to this concern. For instance, SRH scores differed significantly among older adults of different ethnic backgrounds in Canada (Menec et al., 2007). However, in contrast to these concerns, strong positive associations were observed in the present study between

perceived income adequacy, SRH, and QOL. In particular, high income security was associated with increased odds of high QOL across all study populations.

Furthermore, high income security appeared to be associated with the odds of both high SRH and QOL (compared with low SRH and QOL) in all countries. It is therefore apparent that although care should be taken when comparing these variables across distinctive populations, it is possible to examine the relationship between perceptions of well-being cross-culturally. Moreover, these findings support work in high-income nations and suggest that perceived income adequacy meaningfully influences subjective ratings of individual well-being, regardless of national economic development level. Therefore, these associations appear robust in LMICs, suggesting perceived financial situation influences measures of well-being across different levels of national wealth and development. This information can be used to reduce health disparities resulting from income inequality through targeted measures, such as improving educational, occupational, and social protection opportunities.

### Strengths and Limitations

Due to the cross-sectional nature of the data used, it is not possible to establish whether decreases in subjective well-being do in fact follow decreases in perceived income adequacy. It is instead possible that high income adequacy ratings could follow from increased well-being scores. For example, individuals who view their current health status and QOL more favorably may feel their needs are met and they have sufficient resources. Perceptions of increased well-being may also reduce spending on medical treatments or devices (for instance, prescription drugs or walking frames), increasing participant financial security and income adequacy ratings. Individual income may also only influence subjective well-being to a certain level, beyond which increased income is not significantly associated with improved life evaluation (Kahneman & Deaton, 2010). Still, previous longitudinal work indicates that these relationships do exist in the proposed direction (Janzen & Muhajarine, 2003; Shippee, Wilkinson, & Ferraro, 2012). However, longitudinal data documenting these patterns over time are required to verify the temporal ordering of these associations in these countries.

An additional limitation is that the younger age group (18–49 year olds) included in the first set of regression analyses was composed of more household heads than was observed in the older adult age group ( $\geq 50$  years old). This was not directly controlled for in the analysis but may have impacted individual perceptions of income adequacy and well-being. Furthermore, this study did not take into account aspects of individual history (for example, economic situation during childhood) that might influence health and wealth in older age. Variables in the model that allow for the examination of early life adversities, environment,

and health would likely yield a more nuanced assessment of how these factors shape perceptions and health outcomes in late adulthood (McEniry, 2013). Similarly, although the analyses controlled for factors linked with socioeconomic status, they did not control for participant ethnic group. Previous work indicates that individual ethnicity influences access to medical care and quality of received treatment (Mayberry, Mili, & Ofili, 2000). SAGE did include a question on ethnic group; however, the decision was made to exclude from this analysis due to the level of nonendorsement ( $n = 6,314$ ).

Despite these limitations, the present study provides a unique examination of the links between perceived income adequacy and subjective well-being in older individuals using an extensive and unparalleled collection of cross-cultural measurements. Previous studies examining these patterns have been confined to high-income countries and have generally relied on data collected from small and non-representative population samples. SAGE is unique in that it is very large, includes several diverse nations, and is representative of the range of living conditions in contributing countries. These results therefore offer a novel examination of these important associations.

## Conclusions

This study documented strong positive relationships between perceived income adequacy and well-being measures among adults from six LMICs; however, it appears that the relationship between age and income security varies across countries. These results support previous findings in high-income populations and suggest that higher ratings of income adequacy are associated with increased subjective well-being measures in this diverse set of nations.

## Supplementary Material

Please visit the article online at <http://gerontologist.oxfordjournals.org/> to view supplementary material.

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## Conflict of Interest

The authors declare that they have no competing interests.

## References

- Aboderin, I. (2004). Decline in material family support for older people in urban Ghana, Africa: Understanding processes and causes of change. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *59*, S128–S137. doi:10.1093/geronb/59.3.s128
- Carstensen, L. L., & Mikels, J. A. (2005). At the intersection of emotion and cognition aging and the positivity effect. *Current Directions in Psychological Science*, *14*, 117–121. doi:10.1111/j.0963-7214.2005.00348.x
- Charles, S. T., & Carstensen, L. L. (2008). Unpleasant situations elicit different emotional responses in younger and older adults. *Psychology and Aging*, *23*, 495. doi:10.1037/a0013284
- Charles, S., & Carstensen, L. L. (2010). Social and emotional aging. *Annual Review of Psychology*, *61*, 383. doi:10.1146/annurev.psych.093008.100448
- Charles, S. T., Mather, M., & Carstensen, L. L. (2003). Aging and emotional memory: The forgettable nature of negative images for older adults. *Journal of Experimental Psychology: General*, *132*, 310. doi:10.1037/0096-3445.132.2.310
- Chen, X., & Silverstein, M. (2000). Intergenerational social support and the psychological well-being of older parents in China. *Research on Aging*, *22*, 43–65. doi:10.1177/0164027500221003
- Cheng, Y. H., Chi, I., Boey, K. W., Ko, L. S. F., & Chou, K. L. (2002). Self-rated economic condition and the health of elderly persons in Hong Kong. *Social Science & Medicine*, *55*, 1415–1424. doi:10.1017/S0714980800012460
- Croyle, R. T., & Uretsky, M. B. (1987). Effects of mood on self-appraisal of health status. *Health Psychology*, *6*, 239.
- Diener, E., Diener, M., & Diener, C. (1995). Factors predicting the subjective well-being of nations. *Journal of Personality and Social Psychology*, *69*, 851–864. doi:10.1037/0022-3514.69.5.851
- Diener, E., Suh, E. M., Smith, H., & Shao, L. (1995). National differences in reported subjective well-being: Why do they occur? *Social Indicators Research*, *34*, 7–32. doi:10.1007/bf01078966
- Dressler, W. W. (1999). Modernization, stress, and blood pressure: New directions in research. *Human Biology*, *71*, 583–605.
- Farquhar, M. (1995). Elderly people's definitions of quality of life. *Social Science & Medicine*, *41*, 1439–1446. doi:10.1016/0277-9536(95)00117-P
- Gavrilova, N. S., & Gavrilov, L. A. (2009). Rapidly aging populations: Russia/Eastern Europe. In P. Uhlenberg (Ed.), *International handbook of population aging* (pp. 113–131). Netherlands: Springer. doi:10.1007/978-1-4020-8356-3\_6



- Hungerford, T. L. (2007). The persistence of hardship over the lifecourse. *Research on Aging*, *29*, 491–511. doi:10.1177/0164027507305736
- Hunt, S. M. (1993). Cross-cultural comparability of quality of life measures. *Drug Information Journal*, *27*, 395–400. doi:10.1177/009286159302700223
- Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior*, *38*, 21–37. doi:10.2307/2955359
- Janzen, B. L., & Muhajarine, N. (2003). Social role occupancy, gender, income adequacy, life stage and health: A longitudinal study of employed Canadian men and women. *Social Science & Medicine*, *57*, 1491–1503. doi:10.1016/S0277-9536(02)005440
- Jylhä, M., Guralnik, J. M., Ferrucci, L., Jokela, J., & Heikkinen, E. (1998). Is self-rated health comparable across cultures and genders? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *53*, S144–S152. doi:10.1093/geronb/53b.3.s144
- Kahneman, D., & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences USA*, *107*, 16489–16493. doi:10.1073/pnas.1011492107
- Kessler, R. C., Birnbaum, H. G., Shahly, V., Bromet, E., Hwang, I., McLaughlin, K. A., ... Stein, D. J. (2010). Age differences in the prevalence and co-morbidity of DSM-IV major depressive episodes: Results from the WHO World Mental Health Survey Initiative. *Depression and Anxiety*, *27*, 351–364. doi:10.1002/da.20634
- Kowal, P., Chatterji, S., Naidoo, N., Biritwum, R., Fan, W., Ridaura, R. L., ... Boerma, J. T. (2012). Data resource profile: The World Health Organization Study on global AGEing and adult health (SAGE). *International Journal of Epidemiology*, *41*, 1639–1649. doi:10.1093/ije/dys210
- Kuo, R. N., & Lai, M. S. (2013). The influence of socio-economic status and multimorbidity patterns on healthcare costs: A six-year follow-up under a universal healthcare system. *International Journal for Equity in Health*, *12*, 69. doi:10.1186/1475-9276-12-69
- Lawton, M. P. (1999). Quality of life in chronic illness. *Gerontology*, *45*, 181–183. doi:10.1159/000022083
- Leinonen, R., Heikkinen, E., & Jylhä, M. (2001). Predictors of decline in self-assessments of health among older people—A 5-year longitudinal study. *Social Science & Medicine*, *52*, 1329–1341. doi:10.1016/S0277-9536(00)00249-5
- Litwin, H., & Sapir, E. V. (2009). Perceived income adequacy among older adults in 12 countries: Findings from the survey of health, ageing, and retirement in Europe. *The Gerontologist*, *49*, 397–406. doi:10.1093/geront/gnp036
- Mather, M., & Carstensen, L. L. (2003). Aging and attentional biases for emotional faces. *Psychological Science*, *14*, 409–415. doi:10.1111/1467-9280.01455
- Mather, M., & Carstensen, L. L. (2005). Aging and motivated cognition: The positivity effect in attention and memory. *Trends in Cognitive Sciences*, *9*, 496–502. doi:10.1016/j.tics.2005.08.005
- Mayberry, R. M., Mili, F., & Ofili, E. (2000). Racial and ethnic differences in access to medical care. *Medical Care Research and Review*, *57*(4 suppl), 108–145. doi:10.1177/1077558700574006
- McDade, T. W. (2002). Status incongruity in Samoan youth: A bio-cultural analysis of culture change, stress, and immune function. *Medical Anthropology Quarterly*, *16*, 123–150. doi:10.1525/maq.2002.16.2.123
- McDade, T. W., Stallings, J., & Worthman, C. M. (2000). Culture change and stress in Western Samoan youth: Methodological issues in the cross-cultural study of stress and immune function. *Culture*, *12*, 792–802. doi:10.1002/1520-6300(200011/12)12:6<792::aid-ajhb7>3.3.co;2-6
- McEniry, M. (2013). Early-life conditions and older adult health in low- and middle-income countries: A review. *Journal of Developmental Origins of Health and Disease*, *4*, 10–29. doi:10.1017/S2040174412000499
- Menec, V. H., Shoostari, S., & Lambert, P. (2007). Ethnic differences in self-rated health among older adults a cross-sectional and longitudinal analysis. *Journal of Aging and Health*, *19*, 62–86. doi:10.1177/0898264306296397
- Myers, D. G., & Diener, E. (1995). Who is happy? *Psychological Science*, *6*, 10–19. doi:10.1111/j.1467-9280.1995.tb00298.x
- Naidoo, N. (2012). *SAGE Working Paper No. 5. WHO Study on global AGEING and adult health (SAGE) Waves 0 and 1 - Sampling information for China, Ghana, India, Mexico, Russia, and South Africa*. Geneva, Switzerland: World Health Organization. Retrieved 4 January 2014, from [www.who.int/healthinfo/sage/SAGEWorkingPaper5\\_Wave1Sampling.pdf](http://www.who.int/healthinfo/sage/SAGEWorkingPaper5_Wave1Sampling.pdf)
- Nummela, O. P., Sulander, T. T., Heinonen, H. S., & Uutela, A. K. (2007). Self-rated health and indicators of SES among the ageing in three types of communities. *Scandinavian Journal of Public Health*, *35*, 39–47. doi:10.1080/14034940600813206
- Nummela, O., Sulander, T., Rahkonen, O., Karisto, A., & Uutela, A. (2008). Social participation, trust and self-rated health: A study among ageing people in urban, semi-urban and rural settings. *Health & Place*, *14*, 243–253. doi:10.1016/j.healthplace.2007.06.006
- Ruo, B., Rumsfeld, J. S., Hlatky, M. A., Liu, H., Browner, W. S., & Whooley, M. A. (2003). Depressive symptoms and health-related quality of life: The Heart and Soul Study. *Journal of the American Medical Association*, *290*, 215–221. doi:10.1001/jama.290.2.215
- Salomon, J. A., Tandon, A., & Murray, C. J. (2004). Comparability of self rated health: Cross sectional multi-country survey using anchoring vignettes. *British Medical Journal*, *328*, 258. doi:10.1136/bmj.37963.691632.44
- Shippee, T. P., Wilkinson, L. R., & Ferraro, K. F. (2012). Accumulated financial strain and women's health over three decades. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *67*, 585–594. doi:10.1093/geronb/gbs056
- Smith, K. W., Avis, N. E., & Assmann, S. F. (1999). Distinguishing between quality of life and health status in quality of life research: A meta-analysis. *Quality of Life Research*, *8*, 447–459.
- Stoller, M. A., & Stoller, E. P. (2003). Perceived income adequacy among elderly retirees. *Journal of Applied Gerontology*, *22*, 230–251. doi:10.1177/0733464803022002004
- Tucker-Seeley, R. D., Harley, A. E., Stoddard, A. M., & Sorensen, G. G. (2013). Financial hardship and self-rated health among low-income housing residents. *Health Education & Behavior*, *40*, 442–448. doi:10.1177/1090198112463021
- Ullah, P. (1990). The association between income, financial strain and psychological well-being among unemployed youths. *Journal of Occupational Psychology*, *63*, 317–330. doi:10.1111/j.2044-8325.1990.tb00533.x

- UNESCO. (1997). International Standard Classification of Education 1997. [http://www.unesco.org/education/information/nfsunesco/doc/isced\\_1997.htm](http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm)
- Vera-Sanso, P. (2005). 'They don't need it, and I can't give it': Filial support in South India. In P. Kreager & E. Schröder-Butterfill (Eds.), *Aging without children: European and Asian perspectives on elderly access to support networks* (pp. 77–105). Oxford, UK: Berghahn Books.
- Wilkinson, R. G. (1996). *Unhealthy societies: The afflictions of inequality*. London, UK: Routledge.
- Woolard, I. (2002). *An overview of poverty and inequality in South Africa*. Unpublished briefing paper. Pretoria, South Africa: HSRC.
- The World Bank. (2007). World Bank list of country groups. <http://econ.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~menuPK:64133156~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html>.
- The World Bank. (2015). World Bank list of GNI per capita, PPP (current international \$). <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD?page=1>
- Yazawa, A., Inoue, Y., Li, D., Du, J., Jin, Y., Chen, Y., ... Umezaki, M. (2014). Impact of lifestyle changes on stress in a modernizing rural population in Hainan Island, China. *American Journal of Human Biology*, 26, 36–42. doi:10.1002/ajhb.22467