Using a Micro-Level Model to Generate a Macro-Level Model of Productive Successful Aging

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Purpose of the Study: Aging successfully entails good physical and cognitive health, as well as ongoing participation in social and productive activity. This study hones in on participation in productive activity, a factor that makes an important contribution to successful aging. One conceptual model of productive activity in later life specifies the antecedents and consequences of productivity. This study draws on that micro-level model to develop a corresponding macro-level model and assesses its utility for examining the predictors of and explaining the relationships between one form of productivity (labor force participation rates) and one aspect of well-being (average life expectancy) among males and females.

Design and Methods: Random effects regression models and path analysis were used to analyze cross-national longitudinal data for 24 high-income Organization for Economic Co-operation and Development (OECD) countries at seven time points (1980–2010; 168 observations total).

Results: OECD countries with higher labor force participation rates among older workers have higher life expectancies. Labor force participation mediates the effects of gross domestic product per capita on male and female life expectancy, and it mediates the effect of self-employment rate for men, but it acts as a suppressor with regard to the effect of public spending on male and female life expectancy.

Implications: A well-known micro-level model of productive activity can be fruitfully adapted to account for macro-level cross-national variation in productivity and well-being.

Key words: Successful aging, Productive aging, Cross-cultural, Labor force participation, Life expectancy, Gender

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“Successful aging,” as defined by Rowe and Kahn (1997), refers to the “low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life” (p. 433). This study seeks a better understanding of one type of active engagement with life—productive activity. Sherraden, Morrow-Howell, Hinterlong, and Rozario (2001) offered a widely accepted definition of productivity: “any behavior, whether paid or unpaid, that creates a good or service” (p. 280) and proposed a theoretical model of the antecedents and consequences of productivity among older adults.

This study aims to expand our knowledge by theorizing about productive activity on the level of societies rather than individuals. Scholars have criticized the successful aging concept for its focus on individual choice at the expense of attention to context (Katz & Calasanti, 2014). Similarly, Taylor and Bengtson (2001) suggest that the productive aging conceptualization has suffered from inadequate attention to the macro-social context (e.g., social roles, structures, policies, and trends). Using the micro-model proposed by Sherraden and colleagues (2001) as a source of theoretical inspiration, we develop and empirically assess an analogous macro-model of productivity and well-being for cross-national analysis so that we can identify society-level predictors of productive successful aging. Specifically, we examine how well such a model predicts one measure of productivity (labor force participation rates) and one aspect of well-being (life expectancy) among older adults (age 65+).

Literature Review

The concept of successful aging originated in the 1960s and has since obtained wide recognition (Iwamasa & Iwaski, 2011). Successful aging has been the subject of several recent individual-level studies (e.g., Iwamasa & Iwaski, 2011; Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010). Despite Rowe and Kahn’s (1997) warning that aging processes may differ across cultures, successful aging has not been the subject of much cross-national research, although Hank (2011) used the Survey of Health, Aging, and Retirement data from 15 European countries and found that 8.5% of older (65+) adults age successfully.

There is some controversy associated with how successful aging is defined (Hank, 2011). Some view the Rowe and Kahn (1997) definition as limited or difficult to apply to varying cultural contexts. Whereas Hank (2011) examined the prevalence of successful aging using a multi-dimensional definition, we honed in on one aspect of successful aging—engagement in productive activity—and turned to the Sherraden and colleagues (2001) model for guidance.

The Sherraden and colleagues model (Figure 1) theorizes both the antecedents and consequences of productivity among older adults. The antecedents of productivity include sociodemographic characteristics, public policies affecting individual decisions to be productive, individual capacities (i.e., individual ability and motivation for productive activity), and institutional capacities reflecting institutional demand and opportunities for older adults to be productive. The consequences include benefits to individuals, families, and societies.

To adapt this model for macro-level analysis, we identified country-level phenomena that correspond to these major groups of factors (see Figure 2). Public policies and institutional demand are two groups that are already contextual. Public policies reflect the kinds of governmental interventions that may boost or limit older adults’ productive engagement as well as influence their well-being, such as public spending on old age programs, on health programs, and other safety net expenditures. Institutional demand factors describe countries’ labor market characteristics that may shape older adults’ productive activities (e.g., countries with lower long-term unemployment rates, larger service sectors, and greater self-employment opportunities may have more opportunities for older workers). Further, we reframed sociodemographic factors to refer to the sociodemographic characteristics of population (education levels, urbanization), and individual capacity factors to reflect older adults’ ability and motivation to work for pay (including measures of population health, quality of health care, economic well-being of the population, and levels of poverty among older adults). Importantly, this model is also in line with the propositions of the macro-level political economy of aging perspective that argues that structural factors, such as the economy and public policies, limit choices made by and opportunities available to older adults (Taylor & Bengtson, 2001).

Because of questionable directionality of causal links among the four groups of factors on the country level, this study does not assess the first portion of the Sherraden and colleagues mediation model—instead, all predictors are treated as exogenous and correlated. Moreover, the Sherraden and colleagues model assumes sociodemographic characteristics, individual capacities, public policies, and institutional capacities affect well-being only indirectly, via their impact on productive behavior, and does not allow for direct links from the four groups of predictors to well-being. We consider that to be too restrictive and estimate both direct and indirect effects.

The Sherraden and colleagues model lacks consideration of the potential disparate effects of structural factors on male and female productivity and its outcomes for women.
Feminist scholarship has extensively demonstrated that societies tend to organize productive labor by gender (Gerstel & Sarkisian, 2006), and as a result, men and women exhibit different paid labor behaviors (Evandrou & Glaser, 2004; Flippen & Tienda, 2000; Raymo, Liang, Sugisawa, Kobayashi, & Sugihara, 2004). Even in 2010, the rates of labor force participation among older men in high-income Organization for Economic Co-operation and Development (OECD) countries were more than twice those for older women (13.7% vs. 6.8%). Moreover, with regard to longevity, women tend to live longer than men (Laditka & Laditka, 2009), and we do know that predictors of physical and psychological health among older adults vary by gender (Bowling, 2007; Park, Jang, & Kim, 2009). Individual-level research also shows that men and women differ in terms of levels of satisfaction that they derive from different life spheres, including employment (Aureli & Baldazzi, 2001; Humpert, 2013). Therefore, cross-national gender differences in successful aging require scholarly attention. Based on individual-level research, we expect the relationship between labor force participation rates and life expectancy to be stronger for men than for women.

Although productive activity among older adults has received some attention from cross-national researchers (Hank, 2011; Warburton & Grassman, 2009), individual-level research has dominated the literature. Labor force participation rates for the general adult population were the focus of many cross-national studies (e.g., Clark, Ramsbey, & Adler, 1991). With a few exceptions (Clark & Anker, 1993; Pampel & Park, 1986; Pampel & Weiss, 1983), however, previous cross-national analyses of labor force participation did not examine older adults separately.
Our study builds on previous cross-national studies of older adult labor force participation by using recent data from 24 high-income OECD countries at seven time points and including additional important variables in the context of the Sherraden and colleagues model.

The macro-model we developed on the basis of Sherraden and colleagues model suggests that countries with encouraging social and public policy environments, capable older adults, and more opportunities for employment will have higher labor force participation rates. Table 1 illustrates how we expect each predictor to relate to labor force participation rates.

The Sherraden and colleagues framework offers a new way to explore cross-national variation in longevity. Many analyses of variation in health and mortality were conducted using cross-national data (e.g., Crepaz & Crepaz, 2004; Williamson, 1987; Williamson & Boehmer, 1997). Relatively few such studies, however, explored life expectancy among older adults (Kattler & Williamson, 1988; Munnell, Hatch, & Lee, 2004; Shaw, Horrace & Vogel, 2005). Table 1 also illustrates how we expect each predictor to relate to older adult life expectancies.

Since engagement in productive activity is one aspect of successful aging, we hypothesize that countries with higher labor force participation rates among older adults would have higher life expectancies. This hypothesis is based on the concept of successful aging, as well as the main postulate of the productive aging theory, namely, that productive

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**Figure 2.** Adapted macro-level model of productivity in later life. Variables included in each box are assumed to be correlated with one another. GDP = gross domestic product.
activity is beneficial for older adults’ well-being, including longevity. Paid work may serve as a key part of older adults’ identity and provide them with psychological resources such as enhanced self-esteem; it may supply them with financial resources that can be used for higher quality nutrition or health care; it can facilitate social ties; and it oftentimes creates opportunities for physical activity (Alavinia & Burdorf, 2008). Indeed, while some studies suggested that retirement contributed to improved health (Coe & Zamarro, 2011), the most common finding was that productive behavior in later life had positive health consequences (e.g., Calvo, 2006; Hammerman-Rozenberg, Maaravi, Cohen, & Stessman, 2005; Kim & Ferraro, 2013; Matz-Costa, Besen, Boone James, & Pitt-Catsouphes, 2014).

To be sure, in previous studies, labor force participation status was not randomly assigned, and the causal direction of the link should be interpreted with caution (Calvo, 2006). It is possible that the causal link between life expectancies and labor force participation operates in reverse: That is, older adults’ life expectancies reflect their health, and healthier individuals are more likely to work past age 65. However, individual-level research indicated that work in later life strongly predicts survival, even when controlling for health (Blanc, Katz, & Yelin, 1994). Therefore, in addition to labor force participation, our model utilizes two

### Table 1. Direction of Hypothesized Relationship Between Independent and Dependent Variables

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Link to labor force participation</th>
<th>References</th>
<th>Link to life expectancy</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sociodemographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent urban</td>
<td>Mixed</td>
<td>Clark &amp; Anker, 1993</td>
<td>+</td>
<td>Kaneda, Zimmer, Tang, &amp; Fang, 2005</td>
</tr>
<tr>
<td><strong>Individual capacities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence of tobacco use</td>
<td>–</td>
<td>Cahill, Giandrea, &amp; Quinn, 2008; Flippen &amp; Tienda, 2000; Raymo et al., 2004</td>
<td>–</td>
<td>Crepaz &amp; Crepaz, 2004; Shaw, Horrace, &amp; Vogel, 2005</td>
</tr>
<tr>
<td>Infant mortality rate</td>
<td>–</td>
<td>Cahill, Giandrea, &amp; Quinn, 2008; Flippen &amp; Tienda, 2000; Raymo et al., 2004</td>
<td>–</td>
<td>Crepaz &amp; Crepaz, 2004; Shaw et al., 2005</td>
</tr>
<tr>
<td>Percent of older adults low income</td>
<td>Quadratic</td>
<td>Goldin, 1995</td>
<td>–</td>
<td>Crepaz &amp; Crepaz, 2004</td>
</tr>
<tr>
<td><strong>Public policies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Institutional capacities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>+</td>
<td>Cahill, Giandrea, &amp; Quinn, 2008; Raymo et al., 2004</td>
<td>+</td>
<td>Burstrom, Johannesson, &amp; Diderichsen, 2005; Shkolnikov, Scholz, Jdanov, Stegmann, &amp; von Gaudecker, 2007</td>
</tr>
<tr>
<td>Employment in service sector</td>
<td>+</td>
<td>Cahill, Giandrea, &amp; Quinn, 2008; Pampel &amp; Weiss, 1983</td>
<td>+</td>
<td>Burstrom, Johannesson, &amp; Diderichsen, 2005; Shkolnikov et al., 2007</td>
</tr>
<tr>
<td>Labor force participation</td>
<td></td>
<td>Not applicable</td>
<td>+</td>
<td>Calvo, 2006; Hammerman-Rozenberg, Maaravi, Cohen, &amp; Stessman, 2005; Kim &amp; Ferraro, 2013</td>
</tr>
</tbody>
</table>

**Notes:**
1. Individual-level research showed that good health was positively related to working longer. We expect countries with healthier populations (lower prevalence of tobacco use) and better health care systems (measured by lower infant mortality) to have higher labor force participation rates among older adults.
2. In countries with higher long-term unemployment rates, fewer jobs are available. Based on the Sherraden and colleagues model, we hypothesize that labor force participation rates for older adults would be lower in such countries.
3. Individual-level studies demonstrated that different types of jobs expose workers to different types of risks. We hypothesize that larger service sectors and higher self-employment rates would be linked to higher life expectancies.
measures of poor population health—prevalence of tobacco use and infant mortality (a proxy of the quality of health care system)—as controls when predicting life expectancy.

Importantly, micro-level relationships do not always translate into similar macro-level links. In fact, the time period considered in this study, 1980–2010, witnessed important changes in both life expectancy and labor force participation rates among older adults. During this period, in high-income OECD countries, older adults’ labor force participation rates remained approximately the same for women (6% vs. 6.8%), but decreased substantially (from 17.3% to 13.7%) for men. During the same period, life expectancy at age 65 increased from 17.3 to 21.5 years for women and from 13.5 to 18.1 years for men (International Labour Organization, 2006; OECD 2006b). Especially for men, these trends (a decrease in labor force participation, but an increase in life expectancy) appear to contradict the main premise of the productive aging model. This study aims to examine whether this reverse link holds when we take into account other determinants of life expectancy, such as population health, economic growth, and public spending.

The Sherraden and colleagues model also offers an opportunity to assess the extent to which a component of successful aging, productive activity, mediates or suppresses (MacKinnon, Krull, & Lockwood, 2000) the influence of other predictors on longevity. Specifically, for all variables that we expect to be linked to labor force participation and longevity in the same direction (i.e., education, tobacco use, infant mortality, long-term unemployment, service sector, and self-employment rate), we hypothesize that labor force participation will mediate their effects on longevity. In contrast, for those variables where evidence is mixed (urbanicity, public spending, and potentially gross domestic product [GDP] and elderly poverty), labor force participation rate may act as either a mediator or a suppressor (the latter would happen if that predictor is linked to labor force participation and longevity in opposite directions). For example, results of previous studies on the relationship between access to public financial resources and health outcomes are mixed (Crepaz & Crepaz, 2004; Kattler & Williamson, 1988; Williamson, 1987; Yavari & Mehrnoosh, 2006). One reason might be because labor force participation acts as a suppressor: If that variable is not included in the model, the positive effect of public spending on health may be weak or nonexistent. Therefore, we expect labor force participation rates to partly account for the mixed findings regarding the effects of public spending on life expectancy.

Methods

Sample and Measures
We focus on high-income OECD countries because of better data quality and availability. Limiting the sample to high-income OECD countries also reduces variance, permitting us to include fewer control variables. Our sample includes: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

The study pools data at several times points in order to increase the number of data points, making it possible to include more predictors in the same model. The complete data set contains 168 observations—that is, 24 observations for each of the following time points (or intervals centered at these time points): 1980, 1985, 1990, 1995, 2000, 2005, and 2010.

To obtain measures of the factors specified in our macro-level model, we merged data from 11 sources. When possible, variables reflected conditions relevant to older adults (age 65+) only and for males and females separately. Our dependent variables were life expectancy at age 65 and labor force participation rate for older adults; the latter was also used as an independent variable. In addition, we used four groups of predictors corresponding to the four groups of factors in our adapted Sherraden and colleagues model. Variable descriptions and definitions are presented in Table 2.

Statistical Analysis

Stata 13.0 was used for data management and analysis. Random effects regression models estimated by generalized least squares (GLS) were used to analyze the hypothesized relationships implicit in Figure 2. This modeling technique is frequently used for longitudinal (pooled cross-sectional) data (e.g., Goesling, 2007; Wu, Chen, & Shiu, 2007).

Path analysis was used to calculate indirect effects (either mediating or suppressing; MacKinnon, Krull, & Lockwood, 2000) of sociodemographic, individual capacity, public policy, and institutional capacity variables on life expectancy via labor force participation, as illustrated in Figure 2. Significance tests for the indirect effects were obtained using the Bauer, Preacher, and Gil (2006) stacked models approach; these models were estimated using maximum likelihood estimation; the results were largely similar to those based on GLS estimation.

All required diagnostic tests were conducted to ensure that the assumptions of random effects models were met. When necessary, appropriate transformations were used; these are documented in Table 2. Most variables contained less than 5% missing data. Only one variable had more than 20% missing data; approximately 37% of elderly poverty data were missing. Our dependent variables—life expectancy and labor force participation rates—did not contain any missing data. To handle missing data, we performed multiple imputation by chained equations (Royston, 2004).
This technique involves generating plausible values for missing data on the basis of existing data using regression models. In order to capitalize on the predictive power of repeated measures, we created these imputed data sets in wide format, with multiple variables for each measure corresponding to each study period. All models were estimated over 10 imputed data sets (Graham, Olchowski, & Gilreath, 2007), each including a random component; coefficient estimates were then averaged, and standard errors were combined using Rubin's formula (Rubin, 1977) that incorporates the uncertainty of imputation.

Power analyses were conducted using the G*Power 3.0.10 (Faul, Erdfelder, Lang, & Buchner, 2007). The results of these power analyses suggested that only medium and large effects would be detected if \( p < .05 \) was used. For this reason, we report effects that are significant at the \( p < .10 \) level. This is not uncommon in studies based on country-level data.

### Results

#### Descriptive Analyses

Sample characteristics are summarized in Table 3. Between 1980 and 2010, an average of 6% of older females (65+) and 14% of older males in high-income OECD countries were in the labor force; this rate remained largely unchanged for women but declined for men. The average life expectancies for females and males at age 65 were 19 and 16 years, respectively; as predicted, life expectancy increased for...
both women and men between 1980 and 2010. Education levels and urbanization increased as well, whereas infant mortality declined. The prevalence of tobacco use was higher among men than among women but decreased over time for both. Average GDP per capita increased from $16,054 to $42,104 over this period, whereas older adult poverty declined. The long-term unemployment rate was 31%, and the average self-employment rates were 11% for women and 19% for men. Service sector employment was more prevalent among women than among men; for both groups, it increased by almost 20% points over time.

### Multivariate Analyses

Table 4 presents the results of multivariate analyses. The first two columns of numbers present unstandardized coefficients for models predicting labor force participation. For both men and women, higher levels of public spending were associated with lower levels of labor force participation ($p < .001$). Further, we found significant positive links of labor force participation to GDP and significant negative links to long-term unemployment for both males and females ($p < .01$ and $p < .05$, respectively). We also found a significant positive relationship for self-employment rates for men ($p < .001$) and a significant negative relationship for tobacco use for women ($p < .001$).

The next two columns of Table 4 present the results for models of life expectancy when the labor force participation rate (i.e., the mediator) is not included. These results highlight a few significant predictors of life expectancy. Higher infant mortality rates are linked to lower male and female life expectancy at age 65 ($p < .05$ and $p < .001$, respectively). With higher levels of GDP, male and female life expectancies tend to be higher ($p < .001$ and $p < .01$, respectively). Increases in public spending are also associated with higher male and female life expectancies ($p < .10$ and $p < .05$, respectively). In addition, we find significant positive relationships between male and female life expectancies and self-employment rates ($p < .001$ and $p < .10$, respectively) and employment in the service sector ($p < .01$ and $p < .05$, respectively). Finally, urbanicity is positively associated with female life expectancy at age 65 ($p < .05$).

As the following two columns of Table 4 show, when the labor force participation rate (i.e., the mediator) is included in models of life expectancy, the same predictors are significant. Moreover, urbanicity becomes significantly beneficial.
Table 4. Labor Force Participation and Life Expectancy Random Effects Models and Path Analysis Results, as Unstandardized Coefficients (N = 168)

<table>
<thead>
<tr>
<th></th>
<th>Labor force participation</th>
<th>Life expectancy without mediator</th>
<th>Life expectancy with mediator</th>
<th>Indirect effects on life expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Sociodemographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education index score</td>
<td>-11.530</td>
<td>2.922</td>
<td>1.908</td>
<td>-1.176</td>
</tr>
<tr>
<td>Percent urban</td>
<td>-0.043</td>
<td>0.022</td>
<td>0.011</td>
<td>0.021*</td>
</tr>
<tr>
<td>Individual capacities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence of tobacco use</td>
<td>-0.019</td>
<td>-0.172***</td>
<td>0.012</td>
<td>0.003</td>
</tr>
<tr>
<td>Infant mortality rate (log)</td>
<td>1.102</td>
<td>-1.235</td>
<td>-0.583*</td>
<td>-1.337***</td>
</tr>
<tr>
<td>Gross domestic product per capita (log)</td>
<td>5.105**</td>
<td>2.418*</td>
<td>1.764***</td>
<td>0.855**</td>
</tr>
<tr>
<td>Percent of older adults low income</td>
<td>-0.023</td>
<td>-0.004</td>
<td>0.008</td>
<td>0.014</td>
</tr>
<tr>
<td>Public policies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public spending (log)</td>
<td>-8.336***</td>
<td>-4.870***</td>
<td>0.649*</td>
<td>0.761*</td>
</tr>
<tr>
<td>Institutional capacities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term unemployment rate</td>
<td>-0.132**</td>
<td>-0.042*</td>
<td>-0.003</td>
<td>0.001</td>
</tr>
<tr>
<td>Self-employment rate (log)</td>
<td>7.039***</td>
<td>0.642</td>
<td>1.051***</td>
<td>0.397†</td>
</tr>
<tr>
<td>Employment in service sector (log)</td>
<td>5.977</td>
<td>-0.705</td>
<td>1.740***</td>
<td>0.764*</td>
</tr>
<tr>
<td>Labor force participation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor force participation rate age 65+</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Between-countries $R^2$</td>
<td>.695</td>
<td>.784</td>
<td>.214</td>
<td>.263</td>
</tr>
<tr>
<td>Within-country $R^2$</td>
<td>.355</td>
<td>.111</td>
<td>.942</td>
<td>.915</td>
</tr>
<tr>
<td>Overall $R^2$</td>
<td>.605</td>
<td>.659</td>
<td>.757</td>
<td>.718</td>
</tr>
<tr>
<td>Proportion variance between countries (rho)</td>
<td>.720</td>
<td>.609</td>
<td>.793</td>
<td>.675</td>
</tr>
</tbody>
</table>

Notes: Data set was constructed by the authors from data obtained from a range of OECD, International Labour Organization, United Nations, World Bank, and Luxembourg Income Study sources. Statistical significance is indicated as follows: *p < .05, **p < .01, ***p < .001. OECD = Organization for Economic Co-operation and Development.

for both male and female life expectancy. Importantly, labor force participation rate appears to be positively linked to both male and female life expectancy (p < .01 and p < .05, respectively).

The last two columns of Table 4 present the results of path analyses used to test for mediation and suppression. The labor force participation rates mediate the relationships between GDP per capita and both male and female life expectancies (p < .05 and p < .10, respectively): In addition to its direct positive effect, GDP indirectly further increases life expectancy by virtue of increasing labor force participation; the total effects (direct plus indirect) indicate that higher GDP is associated with higher male (1.598 + 0.176 = 1.774) and female (0.723 + 0.137 = 0.860) life expectancies. In contrast, labor force participation serves as a suppressor for public spending: Whereas the direct effect of public spending on life expectancy is positive, public spending indirectly decreases life expectancy by virtue of lowering labor force participation. Nevertheless, the total effects suggest that higher levels of public spending are associated with higher male (0.897 – 0.288 = 0.609) and female (1.002 – 0.275 = 0.727) life expectancies. The labor force participation rate also mediates relationships between self-employment and male life expectancy (p < .05)—close to one quarter of the total positive effect of self-employment rates (0.24 out of 1.05) can be attributed to the indirect influence of labor force participation. Finally, we also find two significant indirect effects that occur in the absence of significant direct effects: Long-term unemployment has a negative indirect effect on male life expectancy (p < .10) and tobacco use has a negative indirect effect on female life expectancy (p < .10).

Discussion

This study attempted to move our understanding of one component of successful aging, engagement in productive activity, from the individual (micro) level to the country (macro) level. Our findings supported a number of key hypotheses. First, our multivariate analyses confirm a key assumption of the productive aging framework at the macro level: Once we control for other factors such as GDP per capita, public spending, and population health, higher labor force participation rates among older adults facilitate higher life expectancies at age 65 for both women and men. Consequently, we anticipate that
when data from 2015–2025 become available, we will see adverse consequences of the 2008 global recession on the well-being of middle-aged and older adults who experienced high rates of job loss and long-term unemployment.

Importantly, it is possible that the direction of the causal link between life expectancy and labor force participation operates in reverse: That is, older adults’ life expectancies reflect their health, and healthier individuals are more likely to work past age 65. However, we find that societies where higher proportions of older adults are employed appear to have higher life expectancies even when controlling for population health.

Second, with regard to sociodemographic composition, we found no effects of either urbanicity or education levels on labor force participation, but, as hypothesized, countries with higher urbanicity have higher female (but not male) life expectancies at age 65.

Third, as expected, individual capacities shape both labor force participation and life expectancy. Economic well-being of the population is particularly crucial: Higher GDP per capita is linked to higher life expectancies at age 65, as well as higher labor force participation rates among older women and men. Older adult poverty, however, does not have any effects above and beyond those of overall GDP. With regard to health, the population-level prevalence of tobacco use negatively impacts labor force participation among older women but not among men. Finally, as expected, the quality of health care (as proxied by infant mortality rates) is linked to life expectancy.

Fourth, higher public spending is associated with lower labor force participation rates and higher life expectancies. As we hypothesized, direct and indirect effects of public spending on life expectancy operate in opposite directions. This may be one of the reasons why prior research on the effects of public spending on life expectancy has generated mixed findings (Crepaz & Crepaz, 2004; Kattler & Williamson, 1988; Williamson, 1987; Yavari & Mehrnoosh, 2006). In the present study, engagement in productive activity—one component of successful aging—acts as a suppressor as it operates to dampen the total positive effect of public spending on longevity; nevertheless, the overall effect of public spending on life expectancy, when both indirect and direct effects are considered, is positive.

Fifth, as expected, institutional capacities shape labor force participation and life expectancy at age 65. Higher long-term unemployment rates are associated with lower labor force participation rates for both older women and men and indirectly reduce life expectancy for men. Self-employment rates are positively associated with both labor force participation (for men only) and life expectancy.

Interestingly, processes related to labor force participation and longevity are fairly similar for men and women at the macro level. This finding supports structural theories of gender differences that postulate that structural factors affect women and men in similar ways (Gerstel & Sarkisian, 2006). Importantly, we find that the same factors promote longevity among older men and women. Furthermore, higher labor force participation rates boost life expectancies at age 65 for both men and women to a similar extent (Chow test confirmed no significant gender difference), which is in contrast to our hypothesis that employment is more influential for male longevity.

Differences emerge, however, in factors that promote male and female labor force participation rates. These differences appeared in two notable areas: (a) self-employment rates were positively associated with labor force participation for men only; and (b) the prevalence of tobacco use is negatively linked to labor force participation rates for women only. Scholars have thoroughly documented that individual-level employment experiences are highly gendered: Women work in lower status jobs, receive lower pay, and have less continuous work histories due to caregiving responsibilities (Evandrou & Glaser, 2004). Women are typically positioned for retirement with more limited financial resources and restricted access to benefits (Flippen & Tienda, 2000). Our study suggests that macro-level employment processes are gendered as well. Importantly, given that labor force participation rates boost both male and female longevity, societies ought to consider ways to promote individual and institutional capacity for macro-level male and female labor force participation.

Limitations

Cross-national data available through international public agencies often have weaknesses. First, there are potential definitional and data collection differences across countries. Second, international agencies often harmonize national data and fill in missing data using estimation techniques.

There are also some limitations that are specific to our study. First, as mentioned above, this study is correlational; hence, causal inferences should be made with considerable caution. For instance, it is possible that the causal link between life expectancies and labor force participation rates operates in reverse or is bidirectional. Moreover, in adapting the Sherraden and colleagues model for macro-level analysis, we chose not to assess the potential causal relationships among the sociodemographic characteristics, individual capacities, public policy, and institutional capacities because of the questionable directionality. These relationships may be important to assess. For example, certain sociodemographic characteristics (e.g., higher education levels) may enhance population health and hence boost access to employment opportunities. That type
of indirect effect would not be captured by our models. Second, in some cases, we have used proxies as indicators of concepts of interest (e.g., prevalence of tobacco use as a proxy for health risk). Future research should consider alternative measures of population health, such as disability rates. Third, the study lacks the power to detect small effects due to the modest sample size. We would urge future researchers to consider efforts to obtain larger sample sizes by including more time points or examining a wider range of countries. A larger sample size would also allow for the inclusion of additional variables, which is important because additional confounding variables could be responsible for the relationships we observed.

Finally, it is important to avoid the ecological fallacy of inferring individual relationships from our results as they are based on country-level data. This study, however, does suggest that micro-level models can inform macro-level theorizing and model construction. There is a reason to believe that analogous theorizing in the reverse direction may in some situations be just as fruitful. All such cross-level theorizing, however, would do well to take into consideration the risks associated with the atomistic and the ecological fallacies; therefore, it is crucial to test such theoretical models with data at the appropriate level.

Conclusions

This study attempts to explain cross-national variation in two aspects of what many refer to as successful aging—productive activity and longevity. Our results support the main premises of our adapted Sherraden and colleagues model. Countries with older adults who remain active in a paid work capacity tend to have elders who live longer.

Our findings also have a number of important policy implications. Policymakers who are seeking to promote successful productive aging would do well to foster the structural factors that support productive activity and longevity among older adults—that is, to improve health care systems, reduce health risks such as tobacco use, curb long-term unemployment, and promote self-employment. In addition, policymakers aiming to manage the labor market and pressures on social programs may be interested in our findings related to the suppressor effect of labor force participation on the relationship between public spending and life expectancy. Higher public spending directly facilitates longer life expectancies, but, at the same time, indirectly contributes to lower older adult life expectancies by virtue of lowering labor force participation rates of older adults. Overall, higher public spending was still associated with longer life expectancies, but it is possible that by modifying the types of programs supported, governments can achieve an increase in longevity without causing a decline in older adults’ labor force participation rates.

Finally, our results confirm that the Sherraden and colleagues productive aging model can be fruitfully adapted to account for cross-national variation in productivity and well-being, greatly expanding the potential importance and utility of this model and our ability to understand structural predictors and effects of productive activity, one component of successful aging. The study also confirms one of the main premises of successful aging: Engagement in productive activities in later life contributes to greater well-being.

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