

A Cross-National Analysis of Labor Force Participation and Life Expectancy among Older Adults

Author: Jessica K. M. Johnson

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BOSTON COLLEGE
Graduate School of Social Work

A CROSS-NATIONAL ANALYSIS OF LABOR FORCE PARTICIPATION AND
LIFE EXPECTANCY AMONG OLDER ADULTS

A dissertation
by

JESSICA K. M. JOHNSON

Submitted in partial fulfillment
of the requirements for the degree of
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by

Jessica K. M. Johnson

Dissertation Chair: Dr. James Lubben

Abstract

Productive aging is a new and evolving conceptual model that emphasizes the antecedents and consequences of productivity in later life. Proponents of productive aging claim that productive activity in later life is associated with a number of benefits for individuals, communities, and societies, but this assumption has not been widely tested at the country level. In the context of an adapted model of productive aging, the present study identifies the cross-national predictors of and relationship between one form of productivity (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults. Random effects models with pooled cross-sections and path analysis were used to analyze potential relationships with data from several international data sources. The complete cross-national longitudinal dataset consists of variables measured at five time points or during intervals centered at these time points (i.e., 1980, 1985, 1990, 1995, and 2000) for each of thirty countries that belong to the Organisation for Economic Co-operation and Development.

The present study makes one particularly important and new contribution to the cross-national literature on productivity and longevity; the study suggests that work in

later life strongly influences life expectancy among older adults, but that some important gender differences should be noted. The present study also suggests that public policy plays a very important role in country level labor force participation rates and life expectancy. More specifically, higher levels of public spending on social issues are associated with lower rates of labor force participation and higher life expectancies. Finally, the present study confirms that the adapted model of productivity provides a solid foundation for cross-national analyses of labor force participation and life expectancy, but highlights the importance of analyzing male and female behavior and outcomes separately.

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Chapter I – Introduction

Purpose and Overview of Research

The Sherraden et al. (2001) model of productivity in later life inspired the present study. In the context of an adaptation of the Sherraden et al. (2001) model, the present study seeks to identify the cross-national predictors of and relationship between one form of productivity (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults in countries that belong to the Organisation for Economic Co-operation and Development (OECD)¹².

The study has a correlational research design with the country as the unit of analysis. Random effects models with pooled cross-sections and path analysis were used to analyze potential relationships with data from several international data sources. The complete cross-national longitudinal dataset consists of variables measured at five time points or during intervals centered at these time points (i.e., 1980, 1985, 1990, 1995, and 2000) for each of thirty countries that belong to OECD. Data were drawn from several international data such as the World Population Prospects Database (United Nations, 2007b), OECD Health Data 2006 (Organisation for Economic Cooperation and

¹ Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States of America belong to OECD.

² Most OECD countries are high-income countries as per the World Bank's (2007a) country classification system. The remaining countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey) are upper-middle income countries. While upper-middle income OECD countries provide the study sample with a range of values, they are not necessarily representative of all upper-middle income countries. In addition, they are different from high-income OECD countries. Therefore, separate analyses are conducted with and without upper-middle income OECD countries included.

Development, 2006a), and the World Development Indicators database (World Bank, 2007b).

Later life labor force participation research to date has focused primarily on individual level personal and job-based facilitators of employment among older adults. A number of factors are potentially relevant to explaining country level variation in labor force participation among older adults. Under the guidance of an adapted version of the Sherraden et al. (2001) model, the influence of several socio-demographic, individual capacity, public policy, and institutional capacity variables on country level labor force participation among older adults was considered.

While individual level relationships may differ radically from country level relationships, individual level research on labor force participation behavior among older adults may offer important insights. Four possible reasons for continued work among older adults include: (1) social reasons (e.g., to maintain social interaction and friendships); (2) personal reasons (e.g., to maintain self-esteem and personal satisfaction) (3) financial reasons; and (4) generative reasons (e.g., the need to share knowledge with younger generations) (Dendinger, Adams, & Jacobson, 2005). Researchers are still exploring which of these reasons takes priority and whether employment meets older workers' needs.

The meaning of work and, therefore, the decisions people make about whether to work in later life, may differ from country to country. In the United States, staying productive (in paid or unpaid capacities) seems to enhance self-esteem and helps individuals feel they are giving back to society (Bambrick & Bonder, 2005). In

Singapore, many older workers feel ambivalent about working in later life; they think about retirement positively, but are anxious about what it will really be like. Many older Singaporean workers would prefer partial retirement over full retirement (Lim, 2003). Unfortunately, research on this topic is still in its infancy. Clearly, more research is needed to determine what work means to older adults (Bambrick & Bonder, 2005) and whether older adults will continue to work if doing so is one of many options available to them.

The present study seeks, in part, to identify country level factors that promote country level longevity among older adults. The existing literature suggests that a number of factors are potentially relevant. Under the guidance of an adapted version of the Sherraden et al. (2001) model of productive activity in later life, the influence of several socio-demographic, individual capacity, public policy, and institutional capacity variables on country level longevity among older adults was considered. Most importantly, because productive behavior has not played a strong role in cross-national studies of longevity, particular attention was paid to the influence of labor force participation on country level longevity among older adults.

Male and female behaviors were explored separately. Gender is an important factor to consider in studies of productivity among older adults. Largely due to the disproportionate extent to which women take on caregiving responsibilities, men and women often have different work histories and, thus, different retirement options (O'Reilly & Caro, 1994). Women have much less continuous work histories, work in lower-status jobs, and receive lower pay than do men (Evandrou & Glaser, 2004). While

existing bias may allow men to work longer than women (Taylor & Bengtson, 2001), women typically face later life with fewer financial resources than do men because of their disjointed work histories (Flippen & Tienda, 2000; Price, 2000). Clearly, older males and females have very different sets of productive behavior incentives and options. Males and females are, therefore, likely to make different decisions about whether to engage in productive activities. In addition, productive behavior is likely to affect male and female longevity very differently.

Importance of the Study

The study fills a gap in the existing productive aging research literature by focusing on country level predictors. Existing research on productivity in later life focuses on individual level predictors. Several scholars call for a greater emphasis on the macro-level forces that impact productivity among older adults (Estes & Mahakian, 2001; Peel, McClure, & Bartlett, 2005; Sherraden, Morrow-Howell, Hinterlong, & Rozario, 2001; Taylor & Bengtson, 2001). Institutional and organizational factors are important to consider (Morrow-Howell, Hinterlong, Sherraden, & Rozario, 2001). Social structures and roles are also potentially relevant (Taylor & Bengtson, 2001).

The study examines labor force participation among older adults and its implications. It embodies the belief that productive aging research should focus less on whether people should work and more on when, how, and why people work (Schultz, 2001). The results of the study are likely to be of significance to older adults and their families. In addition, in light of the global trend toward longevity and related potential

pressure on countries to adequately provide for their burgeoning older adult populations, the results of the study can have major implications of interest to international and national policy-makers, geriatric social workers, advocates, and researchers.

Drawing conclusions about relationships at the individual level based on the results of the cross-national study would constitute an ecological fallacy (Luke, 2004). For example, if the results of the study suggest that labor force participation and longevity among older adults are positively associated at the country level, it would be inappropriate to conclude that later-life labor force participation would result in greater longevity for any given individual; the results apply to country level relationships, not individual level relationships. However, the study remains very pertinent to individuals and their families.

First, the study helps identify macro-level factors that facilitate labor force participation among older adults. On average, individuals who belong to populations with higher labor force participation rates among older adults are likely to have more opportunities for labor force participation in later life. Older adults who desire later life employment will appreciate information about opportunities to extend their employment prospects. Individuals will be able to advocate for beneficial macro-level factors and against detrimental macro-level factors.

Second, the study can help identify macro-level factors that facilitate longevity among older adults. Longevity among older adults is clearly an important measure of well-being and a desirable goal for all populations and individuals. On average, individuals who belong to populations with longer life spans are likely to fare better than

individuals who belong to populations with shorter life spans. Individuals and their families will appreciate information about opportunities to extend country level longevity among older adults. Individuals will be able to advocate for beneficial macro-level factors and against detrimental macro-level factors.

The results of the study are of significance to policy analysts and leaders at international and national institutions interested in knowing more about the societal level, institutional, and policy-related factors that promote labor force participation among older adults, as well as the implications of labor force participation among older adults. Despite the ongoing debate over the will of productive aging, it has drawn great international interest from analysts and policy makers. The International Labour Organization, the United Nations, and the World Health Organization are calling for more opportunities for older adults to actively participate in and contribute to their societies. While aware that longer work lives will alleviate pressure on vulnerable social security systems in the developed countries (International Labour Organization, 2003), these organizations are also committed to the rights of older adults and view employment as a right for those who want to work (United Nations, 1999; United Nations, 2002; World Health Organization, 2002). Leaders can use the results from this study to enhance the health and well-being of older adult populations.

Finally, the results of the study equip geriatric social workers with important knowledge about the influence of societal level characteristics and resources on labor force participation and longevity among older adults, as well as the relationship between labor force participation and longevity among older adults. Armed with such

information, geriatric social workers will more thoroughly understand the impact of work among older adults. In addition, geriatric social workers will be prepared to advocate for the types of public and workplace policies and individual and institutional resources that promote labor force participation and longevity among older adults. Ultimately, the actions that geriatric social workers and other advocates take based on the results of the study will facilitate the health and well-being of older adult populations.

Organization of Study

The study is organized as follows. Chapter Two gives a summary of the relevant theory and identifies research questions and hypotheses to be tested. Chapter Three details the study design, sample, data collection strategies, and data analysis techniques. The study results are presented in Chapter Four and discussed in Chapter Five.

Chapter II – Theoretical Framework

This chapter is divided into four sections. The first section describes the productive aging conceptual model. The second section details the adapted model of productivity in later life that guides the present study. The conceptual frameworks employed in the present study are discussed in the third section. Finally, the fourth section identifies the study's research questions and hypotheses.

Productive Aging Conceptual Model

Productive aging is an emergent and somewhat controversial conceptual model. It is distinct from three alternative conceptual frameworks: active aging, successful aging, and healthy aging. Active aging is the notion that sustained participation in social, economic, cultural, spiritual, and civic affairs benefits individuals as they age (World Health Organization, 2002). Healthy aging is a lifelong medical, psychological, and sociological process of adaptation and compensation in order to function optimally when it comes to physical, cognitive, social, and spiritual activities (Hansen-Kyle, 2005; Peel et al., 2005). Successful aging, which is thought to result from healthy aging (Hansen-Kyle, 2005), entails good physical and cognitive health, as well as ongoing participation in social and productive activities (Motta, Bennati, Ferlito, Malaguarnera, & Motta, 2005; Rowe & Kahn, 1997). Productive aging emphasizes the contributions that older adults make, and research on productive aging focuses on the causes and effects of productive behavior among older adults (Hinterlong, Morrow-Howell, & Sherraden, 2001).

Some scholars question the motives of productive aging theorizing. Proponents claim that the framework developed in the United States out of a desire to combat ageism and negative stereotypes of older adults (O'Reilly & Caro, 1994; Schultz, 2001; Taylor & Bengtson, 2001). Traditionally, aging is associated with illness and dependence, and productive aging highlights the important roles that older adults can and do play (Bass & Caro, 2001; Burr, Caro, & Moorhead, 2002). Some advocates suggest that older adults are, in fact, oppressed because of the lack of productive opportunities available to them (Sherraden et al., 2001). Individuals may need and/or want to work longer in order to maintain financial security, keep healthy and active, feel useful, or help others (Pitt-Catsouphes & Smyer, 2005). Proponents cannot deny the timeliness of the movement toward productive aging, however, given the global trend toward increased longevity and related growing pressure on health care systems, social services, and income support programs (Choi & Dinse, 1998; David & Patterson, 1997; Ranzijn, 2001). Societies and economies will surely benefit from longer work lives (Bass, 2000). For example, there is a great need for more volunteers and community service workers, and older adults might be able to fill some of these roles if they are living longer (Morris & Caro, 1995). Critics warn that productive aging could be used to undermine programs that support older adults and require older adults to work and maintain self-sufficiency (Holstein, 1992). Holstein (1992) suggests that productive aging superficially dichotomizes aging as a productive or a dependent process.

The controversy surrounding productive aging stems largely from the elusive definition of productivity. At the heart of the debate over the definition of productivity

are three questions: (1) Do non-market activities qualify as productive? (2) Who benefits from the so-called productive activities? and (3) Do the productive activities have monetary value? Bass, Caro, and Chen (1993) define productive activities as those that produce goods and/or services, or the capacity to produce them. Another definition of productivity includes activities of benefit to communities, societies, and families, as well as to the self (Butler & Schechter, 1995). Paid work, volunteer services, family assistance, and self improvement activities qualify as productive under this early definition (David & Patterson, 1997). Sherraden et al. (2001) define productivity as “any behavior, whether paid or unpaid, that creates a good or service” (p. 280).

The Sherraden et al. (2001) model of productivity in later life inspired the present study (see Figure 1).

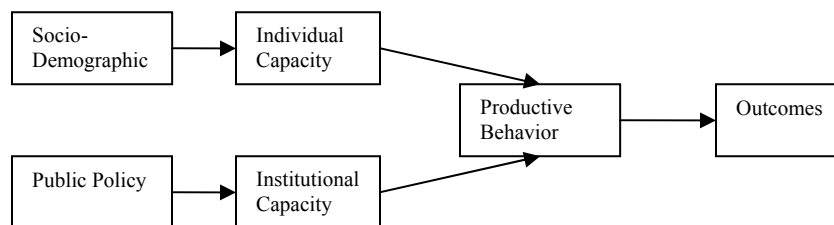


Figure 1. The Sherraden et al. (2001) model of productivity in later life

The Sherraden et al. (2001) model emphasizes the antecedents and consequences of productivity among older adults. The prospective antecedents of such productivity include both micro- and macro-level variables grouped as socio-demographics, public policies, individual capacities, and institutional capacities. At the heart of the Sherraden et al. (2001) model is the notion that an individual chooses whether to engage in

productive activities based on an assessment of his or her capabilities and options.

Later life productivity is thought to result in benefits relevant to individuals, families, and societies. As per the Sherraden et al. (2001) model:

- *socio-demographic* variables include micro-level characteristics such as education, race/ethnicity, gender, urban-rural location, and age;
- *individual capacity* variables include micro-level characteristics that affect individual decisions about whether to engage in productive activities (e.g., physical functioning, cognitive functioning, time available, income, assets, knowledge and skills, social support, and transportation);
- *public policy* variables include macro-level characteristics that affect individual decisions about whether to engage in productive activities, as well the development of institutional structures that facilitate later life productivity (e.g., the existence of particular programs, regulation, and tax laws);
- *institutional capacity* variables include micro-level factors related to institutional demand for productive older adults (e.g., the extent to which institutions make productive opportunities available to older adults, and the number, types, and quality of those roles);
- *productive behavior* refers to market activities, non-market activities with economic value, formal social and civic activities, and informal social assistance; and
- *outcomes* refer to effects on the well-being of individuals, families, and societies.

Adapted Model of Productivity in Later Life

The study builds on previous research by evaluating an adaptation of the Sherraden et al. (2001) model (see Figure 1). The following adaptations to the Sherraden et al. (2001) model were made in order to conduct the present study:

- No individual level measures are included in the analysis; all predictors and outcomes are country level measures that represent the macro-level variables or aggregates of the micro-level variables included in the Sherraden et al. (2001) model. The present study focuses on the influence of country level predictors in an effort to respond to the recent call for a greater emphasis on societal level forces that impact productivity among older adults (Estes & Mahakian, 2001; Peel et al., 2005; Sherraden et al., 2001; Taylor & Bengtson, 2001). When possible, aggregated variables reflect trends among or conditions relevant to older adults only and for males and females separately (see Table 1 in the Appendix).
- While not part of the Sherraden et al. (2001) model, two measures of cultural values are included in the analysis. One major critique of productive aging is that it is driven by particular value-based assumptions about what activities are considered productive and how participation in such productive activities will benefit individuals. Cultural values influence how individuals and societies view old age and aging (Takamura, 2001; World Health Organization, 2002), as well as opinions about the extent to which governments, families, and individuals are responsible for caring for older adults (Cox, 2001). Such values are likely to

influence opinions about and actual patterns of productive behavior and its outcomes.

- Older male and female behaviors are explored separately. While the Sherraden et al. (2001) model includes gender as a predictor, it lacks sufficient consideration of the potential disparate affects of socio-demographics, individual capacities, public policies, and institutional capacities on male and female productive behavior and its outcomes. Gender is an important factor to consider in studies of productivity among older adults. Largely due to the disproportionate extent to which women take on caregiving responsibilities, men and women often have different work histories and, thus, different retirement options (O'Reilly & Caro, 1994). Women have much less continuous work histories, work in lower-status jobs, and receive lower pay than do men (Evandrou & Glaser, 2004). Older males and females have very different sets of productive behavior incentives and options. Males and females are, therefore, likely to make different decisions about whether to engage in productive activities. In addition, productive behavior is likely to affect males and females differently.
- The present study identifies predictors of one form of productive behavior (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults.
- The present study does not assess the first portion of the Sherraden et al. (2001) mediation model (see Figure 1). Because of the potential debate over the direction of the relationships between socio-demographic, individual capacity,

public policy, and institutional capacity variables when studied at the country level, all predictors are treated as exogenous variables. Therefore, no assumptions about the causal links between socio-demographic and individual capacity variables and public policy and institutional capacity variables are made. If the mediation suggested by the Sherraden et al. (2001) model is complete mediation, then the socio-demographic and public policy variables should have no direct effects on productivity in the presence of individual and institutional capacity variables. The present study, however, allows for the direct effects of the socio-demographic and public policy variables on country level labor force participation behavior among older adults.

Conceptual Frameworks of Present Study

The following conceptual frameworks illustrate the relationships analyzed in the present study. Figure 2 is a representation of the hypothesized relationships between socio-demographics, individual capacities, public policy, institutional capacities, and labor force participation among older adults. Figure 3 is a representation of the hypothesized relationships between socio-demographics, individual capacities, public policy, institutional capacities, labor force participation, and life expectancy among older adults. Figure 4 is a representation of the hypothesized mediating effects of labor force participation on the relationships between life expectancy and socio-demographics, individual capacities, public policy, and institutional capacities among older adults.

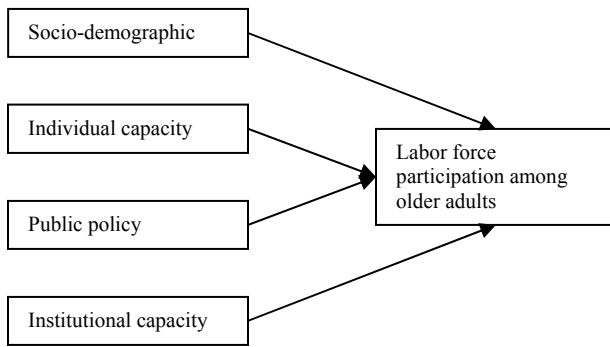


Figure 2: Labor force participation among older adults

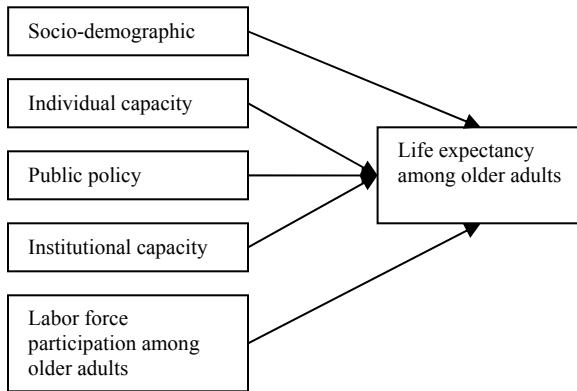


Figure 3: Life expectancy among older adults

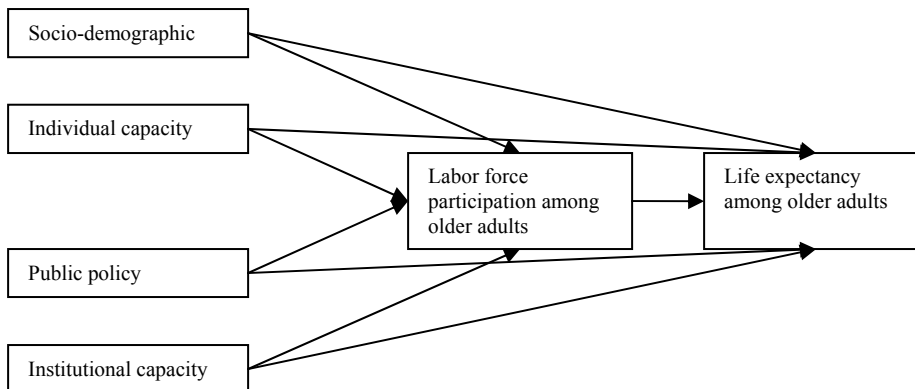


Figure 4: Combined mediation model

Research Questions and Hypotheses

Proponents of so-called productive aging claim that productive activity in later life is associated with a number of benefits for individuals, communities, and societies, but this assumption has not been widely tested. The present study investigates the extent to which productive aging really enhances life. It poses three major research questions.

Research Question 1: What are the predictors of country level labor force participation among older adults and are they the same for males and females (see Figure 2)?

In response to the call for a greater emphasis on the societal level forces that impact productivity among older adults (Estes & Mahakian, 2001; Peel et al., 2005; Sherraden et al., 2001; Taylor & Bengtson, 2001), the present study identifies country level factors that promote labor force participation among older males and females. Cross-national research indicates that labor force participation rates in all age groups tend to be higher for males than for females (International Labour Organization, 2006a). Later life labor research to date has focused primarily on personal and job-based facilitators of employment among older adults. Such research indicates that males and females exhibit very different work behaviors and the differences may be due to a number of factors including individual desires, social expectations, and institutional opportunities.

Individual level research suggests that role preferences can differ by gender. An analysis of employment among older adults in twenty countries that belong to OECD suggests that older women experience stronger work-life conflict feelings than do older

men (Ginn & Fast, 2006). Female early private sector retirees in the United States are less likely to seek out bridge employment than are male early private sector retirees (Davis, 2003).

Social norms tend to encourage men to work longer than women (Taylor & Bengtson, 2001). In many countries, families rely on older adults, particularly female older adults, to provide childcare and organize socially integrative activities (Ginn & Fast, 2006). In Japan, a cultural norm emphasizing a gender-based division of labor where men are in paid employment situations and women are in caregiving roles is still strong (Williamson & Higo, 2007).

Institutional discrimination influences the extent to which jobs are available to older women. Women traditionally have less access to a variety of resources, including meaningful work (World Health Organization, 2002). They earn less than men and are more likely to work part-time and have interrupted careers than are men (Munnell & Jivan, 2005). One individual level analysis of Current Population Survey data indicates that, in the United States, female elders are more likely to be underemployed (i.e., work less than they desire, are unemployed, or work for very low pay) than are male elders (Slack & Jensen, 2008).

Individual level research points to the importance of assessing predictors of male and female labor force participation behavior separately. Predictors of labor force participation among older males may differ from predictors of labor force participation among older females. McNamara & Williamson (2004) find that, in the United States, the effects of health, education, and income on work among older adults vary by gender.

Research conducted in Japan illustrates the differential impact of various economic and family-related factors on employment among older males and females (Raymo, Liang, Sugisawa, Kobayashi, & Sugihara, 2004).

Research Question 2: What are the predictors of country level life expectancy among older adults and are they the same for males and females (see Figure 3)?

Several analyses of variation in health and mortality have been conducted using quantitative, cross-national data (Mathers, Murray, Lopez, Sadana & Salomon, 2002; Ouweneel, 2002; Veenhoven, 2005; Williamson, 1987; Young, 2001). Some of this literature has focused on predictors of infant and child mortality (Boehmer & Williamson, 1996; Bradshaw & Huang, 1991; Bradshaw, Noonan & Buchmann, 1993; Cutright & Adams, 1984; Firebaugh & Beck, 1994; Frey & Field, 2000; Hertz, Hebert & Landon, 1994; Lena & London, 1993; Neumayer, 2004; Shandra, Nobles, London & Williamson, 2004; Shen & Williamson, 1997; Shen & Williamson, 2001; Wimberley, 1990; Young, 2001). Other cross-national studies have explored the correlates of maternal mortality (Hertz et al., 1994; Shen & Williamson, 1999; Shiffman, 2000). A third group of quantitative, cross-national studies of mortality has focused on the determinants of life expectancy at birth (Crepaz & Crepaz, 2004; Hertz et al., 1994; Husain, 2002; Mazumdar, 2001; Neumayer, 2004; Williamson & Boehmer, 1997; Young, 2001). To date, only three cross-national studies have explored the predictors of life expectancy among older adults (e.g., life expectancy at age 60 or 65) to date (Kattler

& Williamson, 1988; Munnell, Hatch, & Lee, 2004; Shaw, Horrace, & Vogel, 2005). Kattler & Williamson (1988) focuses on the relationship between welfare state development and life expectancy among older adults. Shaw et al. (2005) investigates the influence of various health indicators on life expectancy among older adults. Munnell et al. (2004) considers a wider array of predictors of life expectancy among older adults, but employs a very small sample size. The present study identifies country level factors that promote longevity among older adults. None of the previous cross-national studies of the predictors of life expectancy among older adults considers the diversity of predictors that the present study does or employs as large a sample size as the present study does.

While females are known to live longer than males almost universally (Kinsella & Velkoff, 2001; Laditka & Laditka, 2002), the gender gap in longevity varies across countries. Few cross-national studies specifically explore the different causes of male and female life expectancy. The present study identifies country level factors that promote longevity among older males and females.

Research Question 3: To what extent does labor force participation mediate the relationships between the country level predictors of life expectancy among older adults and country level life expectancy among older adults (see Figure 4)?

The third research question was developed to explore the extent to which labor force participation among older adults mediates the relationship between country level life expectancy among older adults and its country level predictors. Virtually no research

has been conducted on these potential mediating effects thus far. Therefore, the third research question is based on the Sherraden et al. (2001) model of productivity in later life, which suggests that productivity mediates the relationships between health outcomes and their predictors. Males and females will be explored separately because of their divergent employment behaviors and life expectancies.

Hypotheses

Hypothesis 1. Countries with the following socio-demographic characteristics will have higher labor force participation rates among older adults than will other countries:

- a. higher levels of education (i.e., higher Education Index scores)³;

Previous individual level research indicates that higher levels of education are associated with higher levels of employment among older adults living in several countries that belong to OECD (Cahill, Giandrea, & Quinn, 2008; Erlinghagen & Hangk, 2006; Ginn & Fast, 2006; (Munnell, Soto, & Zhivan, 2008).

- b. urban populations that represent larger percentages of their total populations;

It was hypothesized that in countries where the urban population represents a larger percentage of the total population, labor force participation rates among

³ Countries with high levels of education are those that have high Education Index Scores. These countries generally have high adult literacy and school enrolment rates (United Nations Development Programme, 2006).

older adults would be higher than in other countries simply because urban areas have a greater diversity and number of jobs than do rural areas.

- c. higher old-age dependency ratios⁴;

It was hypothesized that countries with higher old-age dependency ratios would have higher labor force participation rates among older adults than would other countries because fewer younger adults are available to support the older adults in these countries.

- d. an emphasis on secular-rational, as opposed to traditional, values; and

Countries with traditional values tend to emphasize religiosity, patriotism, authority, obedience, and family. People living in these societies idealize their parents and strongly desire making their parents proud. These people do not support divorce, abortion, euthanasia, or suicide. Social conformity and national pride are common. Countries with secular-rational values are less likely to hold these characteristics. Countries with strong secular-rational values are more likely to emphasize human choice, as opposed to human constraint (Inglehart & Welzel, 2005). Therefore, it was hypothesized that older adults in countries with strong secular-rational values would be more likely to pursue work in later life than in other countries.

- e. an emphasis on self-expression, as opposed to survival, values.

Countries that value self-expression over survival emphasize freedom, expression, nonconformity, self-direction, and human trust. Countries that

⁴ The old age dependency ratio is the ratio of the population aged 65 years or over to the population aged 15-64 (United Nations, 2007b).

value survival over self-expression tend not to emphasize these characteristics; instead, economic security and safety are considered very important in these countries. People living in survival-oriented countries tend to feel threatened by foreigners and cultural diversity (Inglehart & Welzel, 2005). Countries with strong self-expression values are more likely to emphasize human choice, as opposed to human constraint (Inglehart & Welzel, 2005). Therefore, it was hypothesized that labor force participation rates in countries with strong self-expression values may be more likely to pursue work in later life than in other countries.

Hypothesis 2. Countries with the following individual capacity characteristics will have higher labor force participation rates among older adults than will other countries:

- a. better health records (i.e., lower prevalence of health risks, lower prevalence of tuberculosis, and better perceived health)⁵;

Existing individual level research indicates that good health is positively related to working longer (Agree & Clark, 1991; Calvo, 2006; Cahill, Giandrea, & Quinn, 2008).

- b. access to fewer social resources (i.e., higher percentages of older adults living alone)⁶;

⁵ Countries with better health records have lower rates of tuberculosis, better perceived health, and fewer people engaging in risky health behaviors.

⁶ Countries with fewer social resources are those where there are higher percentages of older adults living alone.

Individual level research suggests that personal access to social resources (e.g., co-residence and marriage) is likely to influence labor force participation behavior among older adults. Existing individual level research findings related to co-residence are mixed, however (Agree & Clarke, 1991; Cahill, Giandreas, & Quinn, 2008; Clark, York, & Anker, 1999; Davis, 2003; Ekerdt, Hackney, Kosloski, & DeViney, 2001; Ginn & Fast, 2006; Hill, 2002; Johnson, 2004; Johnson & Favreault, 2001; McNamara & Williamson, 2004; Munnell & Jivan, 2005; Pienta, 2003; Raymo, et al., 2004).

- c. higher gross domestic product; and

In highly developed countries, labor force participation rates tend to increase with economic growth, particularly for women (International Labour Organization, 2006a).

- d. larger low-income older adult populations (i.e., higher percentages of older adults living at or below 50% of the median income)⁷.

It was hypothesized that countries with larger older adult low-income populations would have higher labor force participation rates than would other countries simply because more people need additional income than in other countries.

Hypothesis 3. Countries with the following public policy characteristics will have higher labor force participation rates among older adults than will other countries:

⁷ The low-income older adult population is defined as those living at or below 50% of the median income as determined by the Luxembourg Income Study (2005).

- a. lower public spending⁸; and

Access to greater public benefit coverage is associated with shorter work lives in the existing literature (Boyle & Lahey, 2007; Campolieti, 2002; Mermin, Johnson & Murphy, 2006; Munnell & Sass, 2007; Munnell, Triest, & Jivan, 2004).

- b. policies that allow for access to old-age pensions while working.

It was hypothesized that the existence of policies that allow for access to old-age pensions while working would be associated with higher labor force participation rates among older adults simply because work is option.

Hypothesis 4. Countries with the following institutional capacity characteristics will have higher labor force participation rates among older adults than will other countries:

- a. lower long-term unemployment rates;

In countries with higher long-term unemployment rates, fewer jobs are likely to be available and, therefore, it was hypothesized that labor force participation rates among older adults would be lower.

- b. higher self-employment rates; and

⁸ Public spending is a scale combining three variables: (1) public spending on old-age (per capita, at current prices, in US dollars); (2) public spending on health (per capita, at current prices, in US dollars); and (3) public social spending on issues besides old-age and health (per capita, at current prices, in US dollars) (Organisation for Economic Co-operation and Development, 2007c).

Individual level research indicates that self-employed workers tend to work longer than others in the United States and Japan (Cahill, Giandrea, & Quinn, 2008; Fuchs, 1982; Raymo et al., 2004).

c. larger service sectors.

Since agricultural and industrial work typically entails physical labor, which can be more difficult for older adults, labor force participation rates among older adults are likely to be higher in countries with smaller agricultural and industrial employment sectors and higher services sectors than in other countries.

Hypothesis 5. The effect of access to social resources on labor force participation among older adults will be stronger for females than for males. Women are largely responsible for family care (Zimmerman, Mitchell, Wister & Gutman, 2000). Living alone may influence female work behavior more strongly than male work behavior.

Hypothesis 6. The effect of gross domestic product per capita on labor force participation among older adults will be stronger for females than for males. In highly developed countries, labor force participation rates tend to increase with economic growth, particularly for women (International Labour Organization, 2006a).

Hypothesis 7. The effects of the size of the low-income older adult population on labor force participation among older adults will be stronger for females than for males.

Women are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000), making them particularly vulnerable, given the fact that their life expectancies are longer than men's life expectancies (Price, 2000). While based on findings from individual level research, older female labor force participation behavior is likely to be more sensitive to cross-national differences in access to financial resources than is older male labor force participation behavior.

Hypothesis 8. The effects of public spending on labor force participation among older adults will be stronger for females than for males. It was hypothesized that female labor force participation would be more sensitive to cross-national differences in access to public financial resources than would male labor force participation behavior. Women are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000), making them particularly vulnerable, given the fact that their life expectancies are longer than men's life expectancies (Price, 2000).

Hypothesis 9. The effects of policies that allow for access to old-age pensions while working on labor force participation among older adults will be stronger for females than for males. Because women are typically positioned for retirement with fewer financial resources than are men (Flippen & Tienda, 2000; Price, 2000), older female labor force

participation behavior is likely to be more sensitive to cross-national differences in access to financial resources than is older male labor force participation behavior.

Hypothesis 10. Countries with the following socio-demographic characteristics will have higher life expectancies among older adults than will other countries.

- a. higher levels of education (i.e., higher Education Index scores);

Previous cross-national and individual level studies illustrate that higher educational attainment is associated with lower rates of infant mortality and higher life expectancies (Bronnum-Hansen & Baadsgaard, 2007; Frey & Field, 2000; Shandra, Nobles, London, & Williamson, 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006).

- b. urban populations that represent larger percentages of their total populations;

On the country level, urbanicity might be considered a measure of level of development, and so, older adults might live longer, on average, in countries with higher rates of urbanicity.

- c. higher old-age dependency ratios;

Countries with proportionately larger older adult populations are likely to be more supportive of older adults.

- d. an emphasis on secular-rational, as opposed to traditional, values; and

Inglehart & Welzel (2005) find that economic development is associated with particular societal value changes. That is, highly developed countries are more likely to have populations that exhibit secular-rational and self-

expression values, as opposed to traditional and survival values, than are other countries. It was hypothesized that the effect of economic development would be attenuated when the effects of societal values were considered; societal values would account for part of the effect of economic development on longevity.

- e. an emphasis on self-expression, as opposed to survival, values.

Based on Inglehart & Welzel (2005), it was hypothesized that the effect of economic development would be attenuated when the effects of societal values were considered; societal values would account for part of the effect of economic development on longevity.

Hypothesis 11. Countries with the following individual capacity characteristics will have higher life expectancies among older adults than will other countries.

- a. better health records (i.e. lower prevalence of health risks, lower prevalence of tuberculosis, and better perceived health);

Previous studies illustrate the importance of diet and positive health behaviors in promoting individual longevity (Diehr et al., 2008; Hasegawa & Hoshi, 2007; Heyden & Fodor, 1988; Kaplan, Anderson, & Kaplan, 2007; Merrill, 2004; Munnell, Hatch, & Lee, 2004; Phillips, Wannamethee, Walker, Thomson, & Smith., 1996; Prescott et al., 1998; Reynolds, Saito, & Crimmins, 2005; Tafaro et al., 2004; Trichopoulou, 2004; Wong et al., 2006; Yavari & Mehrnoosh, 2006).

- b. access to more social resources (i.e., lower percentages of older adults living alone);

The relationship between access to social support and health among older adults on the individual level is well established; supportive social ties promote good physical and mental health in later life (Lubben et al., 2006).

The results of country level research on this topic are mixed (Eriksson, Hessler, Sundh, & Steen, 1999; Kennelly et al., 2003).

- c. higher gross domestic products; and

Previous cross-national studies illustrate that economic development is a strong predictor of mortality (Crepaz & Crepaz, 2004; Kennelly et al., 2003; Munnell, Hatch, & Lee, 2004; Shandra et al., 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006).

- d. smaller older adult low-income populations (i.e., lower percentages of older adults living at or below 50% of the median income).

Individual level research suggests that there is a positive relationship between personal income and longevity among older adults (Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007; von Gaudecker & Scholz, 2007).

Hypothesis 12. Countries with the following public policy characteristics will have higher life expectancies among older adults than will other countries.

- a. higher public spending; and

Several recent cross-national studies have focused on the relationship between access to public financial resources and health outcomes (Crepaz & Crepaz, 2004; Kattler & Williamson, 1988; Ouweneel, 2002; Williamson, 1987; Young, 2001; Yavari & Mehrnoosh, 2006). Results of these studies are mixed.

- b. policies that allow for access to old-age pensions while working.

The literature suggests that having access to additional financial resources can only help promote longevity among older adults (Arendt, 2005; Crepaz & Crepaz, 2004; Kennelly et al., 2003; Munnell, Hatch, & Lee, 2004; Shandra et al., 2004; Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007; von Gaudecker, 2007; von Gaudecker & Scholz, 2007; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006).

Hypothesis 13. Countries with the following institutional capacity characteristics will have higher life expectancies among older adults than will other countries.

- a. lower long-term unemployment rates;

Individual level research suggests that unemployment contributes to poor physical and mental health (Ouweneel, 2002; Potter, 1991).

- b. higher self-employment rates; and

Different types of jobs expose workers to different types of risks. Manual laborers do not live as long as non-manual laborers in Sweden (Burstrom, Johannesson, & Diderichsen, 2005). Managers live longer than manual

laborers in France (Cambois, Robine, & Hayward, 2001). In Germany, older manual laborers suffer greater rates of mortality than do older salaried workers (Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007). Based on existing individual level research, it was hypothesized that countries with higher self-employment rates would have higher life expectancies than would other countries.

c. larger service sectors.

Different types of jobs expose workers to different types of risks. Based on existing individual level research (Burstrom, Johannesson, & Diderichsen, 2005; Cambois, Robine, & Hayward, 2001; Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007), it was hypothesized that countries with larger service sectors would have higher life expectancies than would other countries.

Hypothesis 14. Countries with higher labor force participation rates among older adults will have higher life expectancies among older adults than will other countries. Recently conducted individual level research suggests that productive behavior in later life has positive health consequences (Aquino, Russell, Cutrona, & Altmaier, 1996; Calvo, 2006; Hammerman-Rozenberg, Maaravi, Cohen, & Stessman, 2005; Hinterlong, Morrow-Howell, & Rozario, 2007; Ranzijn, 2001; Rozario, Morrow-Howell, & Hinterlong, 2004; Schooler, Mulatu, & Oates, 1999).

Hypothesis 15. The effect of gross domestic product per capita on life expectancy among older adults will be stronger for females than for males. Since women often leave the workforce to attend to caregiving responsibilities and, thus, have less continuous work histories than do men (Evandrou & Glaser, 2004), they are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000). Access to higher levels of financial resources is likely to benefit females more than it does males.

Hypothesis 16. The effect of the size of the older adult low-income populations on life expectancy among older adults will be stronger for females than for males. Since women often leave the workforce to attend to caregiving responsibilities and, thus, have less continuous work histories than do men (Evandrou & Glaser, 2004), they are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000). Access to higher levels of financial resources is likely to benefit females more than it does males.

Hypothesis 17. The effect of public spending on life expectancy among older adults will be stronger for females than for males. Since women have less continuous work histories than do men (Evandrou & Glaser, 2004), they are typically positioned for retirement with fewer financial resources (Flippen & Tienda, 2000; Price, 2000). Higher levels of public spending are likely to benefit females more than they do males.

Hypothesis 18. The effect of access to social resources on life expectancy among older adults will be stronger for males than for females. Since women disproportionately assume caregiving responsibilities (O'Reilly & Caro, 1994; Zimmerman, Mitchell, Wister & Gutman, 2000), increased access to social resources may serve as a stressor to women. Therefore, increased access to social resources may benefit males more than it does females. In a study of Swiss longevity, married men live longer than single men, while single women live longer than married women (Felder, 2006).

Hypothesis 19. The effect of labor force participation rates among older adults on life expectancy among older adults will be stronger for males than for females. In Japan, whereas more time for leisure and volunteer work is associated with longevity among males at age 65, but not females; participation in educational classes and access to a higher number of hospitals is associated with longevity among females at age 65 (Okamoto, 2006).

Hypothesis 20. Country level labor force participation partially mediates the effects of socio-demographic, individual capacity, public policy, and institutional capacity characteristics on country level life expectancy among older males and females. Virtually no research has been conducted on the potential mediating effects of labor force participation on the effects of socio-demographic, individual capacity, public policy, and institutional capacity characteristics on life expectancy thus far. Therefore, Hypothesis

20 is based on the Sherraden et al. (2001) model of productivity in later life, which suggests that productivity mediates the relationships between health outcomes and the predictors of health outcomes. Partial mediation is expected because it is anticipated that socio-demographic, individual capacity, public policy, and institutional capacity characteristics will have both direct and indirect effects on life expectancy.⁹

⁹ A direct effect is the direct influence of one variable on another (Schumacker & Lomax, 2004). An indirect effect involves a mediating variable that transmits some of the effect of one variable on another (Kline, 2005).

Chapter III – Methods

This chapter is divided into six sections. The first section summarizes the study design. The second section contains a description of the study population. Data collection procedures are presented in the third section. The fourth section provides details on the measures employed in the present study. Statistical analysis strategies are covered in fifth section. The sixth section is dedicated to a discussion of power analyses conducted as part of the present study.

Study Design

The present study utilizes a correlational research design with the country as the unit of analysis. Random effects models with pooled cross-sections and path analysis are employed to analyze potential relationships with data from several international data sources. The complete cross-national longitudinal dataset consists of variables measured at five time points (i.e., 1980, 1985, 1990, 1995, and 2000) or during intervals centered at these time points for each of thirty countries that belong to OECD.

Some analyses in the present study are considered primary and some are considered supplementary. Primary analyses are the core analyses of the present study. Supplementary analyses offer the opportunity to consider additional exogenous and endogenous variables. In some cases, analyses are supplementary because they contain variables with fewer raw data points than are required of variables in primary analyses. In other cases, analyses are supplementary because they are conducted to confirm the results of primary analyses.

Study Population Description

Because the sample includes all countries of interest, it is not really a sample; it is a study population of all thirty countries that belong to OECD. Causal models relevant to high-income countries are likely to differ from those relevant to low-income countries (Shaw et al., 2005; Williamson & Boehmer, 1997). Therefore, cross-national studies typically limit themselves to either high-income or low-income countries (e.g., Crepez & Crepez, 2004; Frey & Field, 2000; Kennelly, O’Shea, & Garvey, 2003; Munnell et al., 2004; Shandra et al., 2004; Shaw et al., 2005; Williamson, 1987; Williamson & Boehmer, 1997; Young, 2001). OECD countries are a good study population because data for OECD countries are more likely to be available and contain less error than would data for low-income countries. In addition, limiting the study population to countries that belong to OECD reduces variance and thus the need for many control variables as it eliminates the potential influence of political structure, economic orientation, and level of development on the study results. Members of OECD are similar because they each have a democratic government and a market economy. In addition, most OECD countries are high-income (“HI”) countries as per the World Bank’s (2007a) country classification system. The remaining countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey) are upper-middle income (“UMI”) countries. Separate analyses are conducted with and without upper-middle income OECD countries included. Since most OECD countries are HI and only six are UMI, UMI countries were not assessed separately. The complete dataset contains 150 observations for each variable

(i.e., thirty observations for each of the following five time points or during intervals centered at these time points: 1980, 1985, 1990, 1995, and 2000). The 1980-2000 time period was chosen because of high levels of data availability. In addition, the 1980-2000 time period was an interesting time of change in OECD countries; during this period, the health and well-being of the sample countries' populations dramatically improved. Results of the present study are intended to be generalized to OECD countries for the 1980-2000 time period only.

Data Collection Procedures

Data were drawn from fourteen different sources and then merged. Data sources include:

1. Education Index data (Seck, 2007)

Each year, the United Nations Development Programme publishes a Human Development Report with cross-national economic, social, political, and cultural data and analyses. One measure included in the report is the Education Index. The Education Index is a composite measure that assesses the extent to which people are educated. It is calculated using measures of adult literacy and enrolment in school (United Nations Development Programme, 2006). The Education Index is a component of the Human Development Index, another measure included in the annual United Nations Development Report. The United Nations Development Programme warns against using Human Development Index data published in multiple years in the same analysis. Instead, analysts are urged to use trend data based on consistent data and methodology to

make comparisons over time. The Human Development Index trend data are published each year, but the Education Index data are not. Therefore, the United Nations Development Programme was directly contacted and Seck (2007) provided Education Index trend data appropriate for use in a single analysis.

2. World Population Prospects Database: The 2006 Revision (United Nations, 2007b)

The Population Division of the United Nations' Department of Economic and Social Affairs produces estimates and projections of population trends and indicators of economic and social development and publishes them in the World Population Prospects Database. Data are available on-line and updated regularly for 196 countries.

3. OECD Health Data 2006: Statistics and Indicators for 30 Countries (Organisation for Economic Co-operation and Development, 2006a)

OECD publishes annual data on health and health systems in countries that belong to OECD in OECD Health Data, a database available on-line to subscribers and in CD-ROM format.

4. WHO Statistical Information System (World Health Organization, 2007b)

The WHO Statistical Information System contains health statistics for 193 World Health Organization Member States. Data are published annually and available on-line.

5. Society at a Glance 2005 – OECD Social Indicators (Organisation for Economic Co-operation and Development, 2005)

Society at a Glance contains data related to how OECD societies progress, demographic and family characteristics, employment, poverty, public expenditures, and life

satisfaction, as well as other measures. The database is updated regularly and available on-line.

6. World Development Indicators (World Bank, 2007b)

The World Development Indicators database contains approximately 800 indicators of development. Data are available for 153 countries and updated annually. Some measures are available on-line and others are available via subscription.

7. Luxembourg Income Study Key Figures (Luxembourg Income Study, 2005)

The Luxembourg Income Study is a cross-national data archive and research institute. The Luxembourg Income Study provides access to cross-national and longitudinal data for 32 countries. Some data are available only to registered users. The Luxembourg Income Study Key Figures are available on-line and contain measures of country level poverty and inequality.

8. OECD Factbook 2007 (Organisation for Economic Co-operation and Development, 2007a)

The OECD Factbook contains social and environmental indicators for OECD countries. The OECD Factbook is updated annually and available on-line.

9. Social Expenditures Database (Organisation for Economic Co-operation and Development, 2007c)

The Social Expenditure Database contains indicators of social policy for OECD countries. It is updated annually and available on-line.

10. Social Security Programs and Mechanisms Database (International Labour Organization, 2006b)

The Social Security Programs and Mechanisms Database contains indicators of social security for over 130 countries. Measures include indicators of sickness, maternity, old-age, disability, survivors, family allowance, work injury, and unemployment social security coverage. Data were last updated in 2005 and are available on-line.

11. Key Indicators of the Labour Market (International Labour Organization, 2006a)

The Key Indicators of the Labour Market is updated bi-annually and contains data related to key elements of national labour markets. Data were once available only for purchase, but are now available to registered users.

12. Cultural values data (Inglehart, 2007)

The cultural values data employed in the present study were collected as part of the World Values Survey. The World Values Survey is an international initiative focused on studying cultural values and their impacts on society. Most of the data collected via the World Values Survey are available on-line. The World Values Survey principal investigators created national-level factor scores for two variables included in the present study, but they are not available on-line. Therefore, the World Values Survey principal investigators were directly contacted and Inglehart (2007) provided the national-level factor scores.

13. OECD Labour Force Statistics (Organisation for Economic Co-operation and Development, 2006b)

The OECD Labour Force Statistics database contains statistics on population, labour force, and employment for OECD member countries. Data are updated annually and are mostly available on-line.

14. World Values Survey Data Files (World Values Survey, 2006)

The World Values Survey Data Files contain information about values and their impact on social and political life in 97 societies. The World Values Survey is a nationally representative survey of individuals administered periodically. Data are updated periodically and available on-line. Data from the World Values Survey employed in the present study were aggregated to the country level (Inglehart & Welzel, 2005).

Measures

The complete dataset includes variables measured at five time points (or during five intervals centered at these time points): 1980, 1985, 1990, 1995, and 2000. Variables included in the study are intended to capture the intent of those in the Sherraden et al. (2001) model of productivity in later life. The Sherraden et al. (2001) model emphasizes the antecedents and consequences of productivity among older adults. The prospective antecedents of such productivity include both micro- and macro-level variables grouped as socio-demographics, public policies, individual capacities, and institutional capacities. Variables included in the present study represent macro-level variables or aggregates of micro-level variables included in the Sherraden et al. (2001) model. When possible, variables reflect conditions relevant to older adults only and for males and females separately. Older adults are defined as individuals age 55 and above, but some variables are available for different time points or intervals during the 55 and above age span.

Variables

Below is a summary of the variables included in the study and a description of how each was calculated, transformed, and utilized. In some cases, variables were bottom-coded; in others, variables were top-coded. Bottom-coding implies that values falling below the normal range of values were coded to a number near the bottom of the normal range. Top-coding implies that values falling above the normal range of values were coded to a number near the top of the normal range. Table 1 in Appendix C lists each measure and its source.

Outcome Variable

The following measure is included as an endogenous *outcome* variable: life expectancy (Organisation for Economic Co-operation and Development, 2005). Life expectancy is the average number of years of life remaining at age 65. This measure is available for males and females separately. Both versions are included in primary and supplementary analyses.

Productive Behavior Variables

The following measures are included as *productive behavior* variables:

1. Labor force participation rate among older adults (International Labour Organization, 2006a; Organisation for Economic Co-operation and Development, 2006b)
The labor force participation rate is defined as the ratio of the older adult labor force (i.e., the economically active population age 55-64, including those who are employed,

unemployed, and seeking work for the first time) to the total older adult (i.e., age 55-64) population (Organisation for Economic Co-operation and Development, 2007b).

This measure is available for males and females separately. The male version was top-coded at 85.93 to eliminate outliers and transformed using the cubic function to achieve bivariate linearity. It was then divided by 10,000 to ease the interpretation of labor force participation rate regression coefficients. The female version was top-coded at 60.00 to eliminate outliers. Both versions are included in primary and supplementary analyses.

Because this variable is a mediator in the present study, it is an endogenous variable.

2. Employment per population ratio among older adults (Organisation for Economic Co-operation and Development, 2006b)

The employment per population ratio is defined as the proportion of the older adult population (i.e., age 55-64) that is employed (i.e., in paid employment or self-employment) (Organisation for Economic Co-operation and Development, 2007b). This measure is available for males and females separately. The male version was top-coded at 88.84 to eliminate outliers and transformed using the cubic function to achieve bivariate linearity. It was then divided by 10,000 to ease interpretation of employment per population ratio regression coefficients. The female version was top-coded at 64.67 to eliminate outliers. Both versions are included in supplementary analyses.

3. Unpaid work rate among older adults (World Values Survey, 2006)

The unpaid work rate is the percent of individuals age 55 and above working in some capacity for no pay. Unpaid work includes social welfare service for elderly, handicapped, or deprived people; work for a religious or church organization;

educational, artistic, musical, or cultural work; work for labor unions; work for political parties or political action groups; human rights work; work for the environment or animal rights; work for professional organizations; youth work; work for sports or recreation; work for women's groups; work for peace movements; work for health organizations; and work for consumer groups (World Values Survey, 2006). This measure was top-coded at .56 to eliminate outliers and is included in supplementary analyses.

Socio-demographic Variables

The following measures are included as *socio-demographic* variables¹⁰:

1. Education Index score (Seck, 2007)

There are several ways to measure educational attainment. Data availability limits the measurement options available to cross-national researchers. One commonly used cross-national measure of educational attainment is “gross secondary school enrolment (Shandra, Nobles, London, & Williamson, 2005; Shandra, Nobles, London, & Williamson, 2004; Shen & Williamson, 2001; Shen & Williamson, 1999). School enrolment alone may not be the best measure of educational attainment, however, because several variables (e.g., school size, parental involvement, and school socioeconomic composition) moderate the impact of school enrolment on academic

¹⁰ While race/ethnicity is identified as an important socio-demographic measure in the Sherraden et al. (2001) model, it is not included in the present study. Country level racial/ethnic composition is difficult to measure for the study population because relevant demarcations differ from country to country. In addition, race and ethnicity have different meanings for each the countries included in the study.

achievement (Ramirez, 2006). Therefore, a better measure of educational attainment might emphasize the outcomes of school enrolment. Literacy is a commonly employed alternative measure of educational attainment (Marks, 2005; van Langen, Bosker, & Dekkers, 2006). The present study employs Education Index data to measure country level educational attainment. The Education Index score is a composite measure that assesses the extent to which people are educated. It was calculated using measures of adult literacy and enrolment in school. The adult (i.e., individuals age 15 and above) literacy rate represents two-thirds of a country's Education Index score and the combined primary, secondary, and tertiary gross enrolment ratio represents one-third of a country's Education Index score (United Nations Development Programme, 2006). Critics may express concern about the use of such a variable, since it has not been extensively employed in other cross-national studies. The Education Index score is highly correlated with the more commonly employed "gross secondary school enrolment;" in 2000, the Education Index score and gross secondary school enrolment were correlated at $r=.75$. The Education Index score was bottom-coded at .88 to eliminate outliers and multiplied by ten to ease the interpretation of Education Index score regression coefficients. It is included in primary and supplementary analyses.

2. Old-age dependency ratio (United Nations, 2007b)

The old-age dependency ratio is the ratio of the population aged 65 years or over to the population aged 15-64. This measure is included in primary and supplementary analyses.

3. Percent living in urban areas (United Nations, 2007b)

The percent living in urban areas is the urban population as a percentage of the total population in each country. This measure was bottom-coded at 53.00 to eliminate outliers and is included in primary and supplementary analyses.

4. Traditional / secular rational score and survival / self-expression score (Inglehart, 2007)

Two World Values Survey (2006) measures of cultural values are included in the analyses: (1) the traditional / secular rational score and (2) the survival / self-expression score. The traditional / secular rational score measures the extent to which populations of countries value secular-rational authority over tradition. The survival / self-expression score measures the extent to which countries value self-expression over survival. The cultural value scores were calculated based on a factor analysis of ten World Values Survey items using data aggregated to the country level (Inglehart & Welzel, 2005). The traditional / secular-rational score was bottom-coded at -1.18 and the survival /self-expression score was bottom-coded at -.95 to eliminate outliers. These measures are included in primary and supplementary analyses. The measures of cultural values are included in the socio-demographic conceptual category because pertain to country-level social circumstances.

Individual Capacity Variables

Individual capacity is measured using the following variables:

1. Prevalence of health risks (Organisation for Economic Co-operation and Development, 2006a)

The prevalence of health risks is the sum of three standardized variables: (1) the average number of decayed, missing, and filled teeth at age 12; (2) the percent of individuals age 15 and above who smoke daily; and (3) liters of alcohol consumption per capita among individuals age 15 and above. Each of these variables came from OECD Health Data 2006 (Organisation for Economic Co-operation and Development, 2006a). The percent of individuals age 15 and above who smoke daily is available for males and females separately, as well as for males and females together. Therefore, separate male and female versions of the health risk measure, as well as a combined male and female version, were created. The male version was top-coded at 4.29, the female version was top-coded at 3.03, and the combined male and female version was bottom-coded at -3.51 and top-coded at 4.51 to eliminate outliers. These measures are included in primary and supplementary analyses.

2. Tuberculosis prevalence (World Health Organization, 2007b)

Tuberculosis prevalence is the number of cases of tuberculosis at a given point in time per 100,000 individuals. This measure was transformed using the logarithmic function to achieve univariety normality and is included in supplementary analyses.

3. Perceived health status (Organisation for Economic Co-operation and Development, 2006a)

Perceived health status is measured as the percentage of individuals age 45-64 with perceived good health. This measure is available for males and females separately, as well as for males and females together. The separate male and female versions are included in supplementary analyses.

4. Gross domestic product per capita (World Bank, 2007b)

Gross domestic product per capita variable is the gross domestic product per capita in constant 2000 United States dollars. This measure was top-coded at 37,165.00 to eliminate outliers and transformed using the logarithmic function to achieve bivariate linearity and is included in primary and supplementary analyses.

5. Percent of older adults at or below 50% of the median income (Luxembourg Income Study, 2005)

The percent at or below 50% of the median income is the percent of older adults with disposable incomes at or below 50% of the median income for the total population. It is a measure of poverty among older adults. This measure was top-coded at 28.30, bottom-coded at 2.40, and transformed using the logarithmic function to eliminate outliers and achieve bivariate linearity. It is included in primary and supplementary analyses.

6. Percent of older adults living alone (Organisation for Economic Co-operation and Development, 2005)

The percent living alone is the percent of individuals age 65 and above living alone. This measure is included in primary and supplementary analyses.

Public Policy Variables

Public policy variables included in the study are:

1. Public spending (Organisation for Economic Co-operation and Development, 2007c)

Public spending is a scale combining the following three variables: (1) public spending on old-age (per capita, at current prices, in US dollars); (2) public spending on health (per capita, at current prices, in US dollars); and (3) public social spending on survivors benefits, incapacity related benefits, family benefits, active labour market programmes, unemployment benefits, and housing (per capita, at current prices, in US dollars). These variables come from the Social Expenditure Database (Organisation for Economic Co-operation and Development, 2007c). The combined public spending measure was transformed using the square root function and top-coded at 2.05 to achieve bivariate linearity and eliminate outliers. It is included in primary and supplementary analyses.

2. Access to old-age pensions while working (International Labour Organization, 2006b)

This measure is an indicator of whether individuals in a given country are permitted to accumulate any old-age pensions while also earning incomes for employment. This measure is included in supplementary analyses.

Institutional Capacity Variables

The following measures are included as *institutional capacity* variables:

1. Long-term unemployment rate (Organisation for Economic Co-operation and Development, 2007a)

The long-term unemployment rate is the number of persons unemployed for 12 months or more as a percentage of the total number of unemployed persons. This measure is included in primary and supplementary analyses.

2. Employment in the service sector (International Labour Organization, 2006a)

Employment in the service sector is the percentage of the employed population working in the service sector. The service sector consists of wholesale and retail trade, restaurants and hotels, transport, storage and communications, finance, insurance, real estate and business services, and community, social, and personal services. This measure is available for males and females separately, as well as for males and females together. The female version was bottom-coded at 45.60 to eliminate outliers and divided by ten to ease the interpretation of regression coefficients. It is included in primary and supplementary analyses. The male version was bottom-coded at 40.40 and the combined version was bottom-coded at 40.00 to eliminate outliers. These variables are included in the primary and supplementary analyses.

3. Self-employment rate (International Labour Organization, 2006a)

The self-employment rate is the number of self-employed persons as a percentage of the total number of employed persons. This measure is available for males and females separately, as well as for males and females together. The male and female versions were transformed using the logarithmic function to achieve univariate normality and are included in primary and supplementary analyses.

Missing Data

There are no clear guidelines on how much missing data is too much. The type of missing data is more important than the amount of missing data (Tabachnick & Fidell,

2007). The three types of missing data are Missing Completely at Random (MCAR), Missing at Random (MAR), and Not Missing at Random (NMAR). When missing values are randomly distributed across all cases, the data are MCAR. When cases with missing data differ from cases with complete data, but the pattern of data missingness on any given variable can be predicted from other variables in the dataset and not the given variable, the data are MAR. When the given variable is the only explanation for data missingness on the given variable, the data are NMAR. NMAR data are more problematic than are MCAR or MAR data (Tabachnick & Fidell, 2007). Data employed in the present study are assumed MAR.

Less than 25% of the data for most of the variables in the primary analyses were missing. The approximate total percentage of data missing for each variable is listed below:

Outcome Variables

Male life expectancy: 6%

Female life expectancy: 6%

Productive Behavior Variables

Male labor force participation rate: 20%

Female labor force participation rate: 20%

Male employment per population ratio: 20%

Female employment per population ratio: 20%

Unpaid work rate: 61%

Socio-demographic Variables

Education Index score: 9%

Old-age dependency ratio: 0%

Percent living in urban areas: 0%

Traditional / secular rational score and survival / self-expression score: 45%

Individual Capacity Variables

Male prevalence of health risks: 23%

Female prevalence of health risks: 23%

Combined male and female prevalence of health risks: 24%

Tuberculosis prevalence: 40%

Male perceived health status: 55%

Female perceived health status: 55%

Gross domestic product per capita: 3%

Percent at or below 50% of the median income: 41%

Percent living alone: 45%

Public Policy Variables

Public spending: 6%

Access to old-age pensions while working: 71%

Institutional Capacity Variables

Long-term unemployment rate: 25%

Male employment in the service sector: 19%

Female employment in the service sector: 19%

Combined male and female employment in the service sector: 9%

Male self-employment rate: 25%

Female self-employment rate: 25%

The strategy one uses to handle missing data becomes more important when more than 20% of a dataset is missing (Raymond & Roberts, 1987; Tsiriktsis, 2005). One strategy to handle missing data is to drop cases with missing data (Tabachnick & Fidell, 2007). This practice is commonly employed in cross-national research (Shandra, Nobles, London, & Williamson, 2005; Shandra, London, Whooley, & Williamson, 2004; Shandra, Nobles, London, & Williamson, 2004; Shen & Williamson, 2005; Williamson & Boehmer, 1997). However, if a dataset has many missing data points and all cases with missing data are deleted, sample sizes dramatically decline (Tabachnick & Fidell, 2007). Another strategy to handle missing data is to estimate missing values. Several estimation strategies exist (Tabachnick & Fidell, 2007). Multiple imputation is one highly regarded estimation strategy (Graham, Olchowski, & Gilreath, 2007).

Multiple imputation by chained equations (MICE) was used to handle missing data in the present study. MICE runs regression models to generate plausible values for missing data with information from available data. Variables with missing data are regressed on other variables in the dataset and missing values are simulated. The process is repeated multiple times for each imputed dataset. Each time, variables with simulated values are used to predict missing values again. Simulations are updated with each iteration until the model converges. Multiple datasets are imputed. MICE can be used on incomplete data that are missing at random (MAR), even if the fraction of missing data is large.

MICE was used to impute eleven datasets (one for preliminary analyses and ten for final analyses) so that medium and large effects could be identified in final analyses. Fewer imputations might result in lower levels of power and higher standard errors (Graham, Olchowski, & Gilreath, 2007). Because the dataset includes so many variables, a Stata program called PRED_EQ was used to select groups of predictors for each variable with missing values. PRED_EQ selects predictors based on bivariate correlations (Medeiros, 2007).

MICE was conducted in two phases. First, MICE ran in wide format (i.e., with data from each study period for each variable as a separate variable), so that data from one study period could be used to estimate data from another study period. Wide format variables with completely missing data were not included in the wide format dataset when running MICE. Next, MICE ran in long format (i.e., with data from all study periods for each variable combined) to estimate values on variables with data completely missing for one or more study periods. This second phase of imputation was used only for variables in supplementary analyses. The wide and long format datasets were then merged and redundant estimated values from the long format dataset were dropped. Imputed values were top-coded, bottom-coded, and rounded to bring imputed values within the normal range for each variable. Imputed dependent variable values were dropped to improve the estimation of regression parameters (von Hippel, 2007).

Supplementary Variables

Measures with raw data missing for more than 50% of the data points for at least two of the study periods are supplementary variables and are part of supplementary analyses only. The following independent variables are included only in supplementary analyses because they have extensive missing raw data: tuberculosis prevalence, perceived health status, and access to old-age pensions while working. The unpaid work rate is included as a dependent variable only in supplementary analyses because it has extensive missing raw data. Because productive behavior is thought to include more than just paid employment and labor force participation (e.g., non-market activities with economic value, formal social and civic activities, and informal social assistance (Sherraden et al., 2001), supplementary analyses using the unpaid work rate allow for a more comprehensive assessment of productivity among older adults. Unpaid work models contain smaller study population sizes because unpaid work data are available for only three out of five of the study periods and the values for the study periods with completely missing raw data were not estimated.

Statistical Analysis

Stata 10 was used to manage and analyze data utilized in the present study. All required diagnostic tests were conducted to ensure that the assumptions required of pooled cross sections regression and path analysis were met.

Univariate diagnostics were administered first. Skewness tests and distributional plots and tests were used to assess and find resolutions for problems related to univariate

outliers and normality. When necessary, variables were bottom-coded, top-coded, and transformed to eliminate univariate outliers and achieve univariate normality.

Bivariate diagnostics were administered next. Bivariate regression plots were used to assess problems related to bivariate outliers, bivariate normality, and bivariate linearity. Skewness tests and distributional plots and tests were used to find resolutions for problems related to bivariate outliers, bivariate normality, and bivariate linearity. When necessary, variables were bottom-coded, top-coded, and transformed to eliminate bivariate outliers and achieve bivariate normality and linearity. In addition, higher order terms were added to models where necessary for the following variables: Education Index score, old-age dependency ratio, percent living in urban areas, traditional / secular rational score, survival / self-expression score, prevalence of health risks, tuberculosis prevalence, perceived health status, gross domestic product per capita, percent of older adults at or below 50% of the median income, percent of older adults living alone, public spending, employment in the service sector, and self-employment rate. Ultimately, most higher order terms that were insignificant in the multivariate context were dropped in order to keep models as parsimonious as possible.

Finally, multivariate diagnostics were administered. Multivariate plots and residual analyses in Stata were used to assess multivariate linearity. In some cases, significant higher order terms were added to models in order to achieve multivariate linearity. Transformations and coding strategies were attempted in some problematic cases, but because they showed no improvement, no alternate transformations or coding strategies were actually employed. In some cases where multivariate linearity problems

exist in relation to predictors with insignificant higher order terms, these terms were not included to keep models parsimonious.

Variance inflation factors were assessed to identify multicollinearity problems. Multicollinearity was discovered in three cases: (1) the primary model of male life expectancy in all OECD countries; (2) the supplementary model of male life expectancy in all OECD countries; and (3) the supplementary model of male life expectancy that includes the employment per population ratio as an independent variable in all OECD countries. In these cases, insignificant higher order terms were dropped in order to avoid multicollinearity.¹¹ Formulas were estimated with and without robust standard errors to identify heteroscedasticity problems. All final models were estimated with robust standard errors. Diagnostic plots were used to assess multivariate normality. No multivariate normality problems were discovered.

Bivariate analyses are conducted in order to determine whether HI countries differ significantly from UMI countries. Linear combination tests are run in order to determine whether the differences between HI and UMI means differ significantly from zero. The MIM prefix command in Stata is used to run these bivariate analyses on ten imputed datasets simultaneously.

Random effects models with pooled cross-sections are used to analyze the potential relationships illustrated in Figures 2 and 3 (see Appendix A) using ten imputed datasets. Such models are commonly used in a variety of disciplines to analyze data that

¹¹ In some cases, insignificant higher order terms were included in life expectancy models if they were included in the related labor force participation or employment per population ratio models in order to facilitate path analysis. Only when these insignificant higher order terms caused multicollinearity problems were they dropped.

are both cross-sectional and longitudinal (e.g., Coile & Levine, 2007; Goesling, 2007; Messner et al., 2007; Wu, Chen & Shiu, 2007). They allow cross-sectional data at several time points to be pooled to increase the study population size in any analysis, which is an asset for the present study because of the small number of OECD countries. The MIM prefix command in Stata is used to run random effects models on ten imputed datasets simultaneously. As explained in Allison (2000), MIM averages parameter estimates across the imputed datasets and calculates standard errors according to a simple formula first developed by Rubin (1977).

Dependent variables in the present study are modeled as per the following random effects equation:

$$Y_{ti} = \beta_0 + \beta_1 X_{ti} + \dots + r_{ti} + u_i,$$

where Y_{ti} is the value of the dependent variable at time t for country i , β_0 is the intercept, β_1 is the effect of X_{ti} on Y_t , X_{ti} is value of the first independent variable at time t for country i , r_{ti} is the residual effect for time t within county i , and u_i is the effect of membership in country i . In random effects models, u_i is a normally distributed, random variable that is assumed to be uncorrelated with βX .

An alternative to random effects modeling is fixed effects modeling. Both strategies allow for the decomposition of variance in the dependent variable into a within-group variance component (i.e., σ_e) and a between-group variance component (i.e., σ_u). In the present study, σ_e refers to variability across time and σ_u

refers to variability across countries. Fixed effects models aim to explain changes over time and, in fixed effects models, each country residual, u_i , is assigned a specific value that can correlate with independent variables in the model. Fixed effects models work well on datasets that contain many time periods because each study country is assigned a dummy variable and each dummy variable removes one degree of freedom from the model. To preserve degrees of freedom, random effects models can be employed instead. In addition, random effects models allow us to estimate the effects of independent variables, as well as changes over time and differences among units, because cross-sectional variation is considered when estimating the effects of independent variables. Random effects models are also more appropriate for the present study than fixed effects models because of the high stability of the dependent variables utilized.

Model Development

Models analyzed in the present study were developed based on theory and data availability. Separate analyses of these models were conducted with and without upper middle income OECD countries included. The Sherraden et al. (2001) model suggests socio-demographic, individual capacity, public policy, and institutional capacity variables to be included in individual level research studies of productive behavior and its outcomes. Because the present study is cross-national, variables included in the present study represent macro-level variables or aggregates of micro-level variables included in the Sherraden et al. (2001) model. Potential variables were identified in several international data sources. Potential variables were eliminated when too few data points

were available for the present study or when better alternatives existed. Better alternatives are those that more completely capture the intent of the variables suggested in the Sherraden et al. (2001) model or correlate as expected with dependent variables included in the present study.

Some analyses in the present study are considered primary and some are considered supplementary. Primary analyses are the core analyses of the present study. Supplementary analyses offer the opportunity to consider additional exogenous and endogenous variables. In some cases, analyses are supplementary because they contain variables with fewer raw data points than are required of variables in primary analyses. In other cases, analyses are supplementary because they are conducted to confirm the results of primary analyses.

Each primary model of labor force participation contains all primary socio-demographic, individual capacity, public policy, and institutional capacity variables selected for inclusion in the present study. Each primary model of life expectancy contains all primary socio-demographic, individual capacity, public policy, and institutional capacity variables selected for inclusion in the present study, as well as the labor force participation rate. Supplementary models of labor force participation and life expectancy include primary variables, as well as supplementary variables.

Models of male and female employment per population ratios are used to confirm the results of models of labor force participation. Each primary model of employment contains all primary socio-demographic, individual capacity, public policy, and institutional capacity variables selected for inclusion in the present study. Models of life

expectancy with the employment per population ratio included as an independent variable (instead of the labor force participation rate) were developed to facilitate path analysis with models of employment. Each of these primary models of life expectancy contains all primary socio-demographic, individual capacity, public policy, and institutional capacity variables selected for inclusion in the present study, as well as the employment per population ratio. Supplementary models of employment and life expectancy include primary variables, as well as supplementary variables.

An attempt was made to use healthy life expectancy at age 60 as a supplementary outcome measure to confirm the results of primary analyses. Because longer lives may not necessarily be healthy longer lives, healthy life expectancy is an even better measure of older adult well-being than is life expectancy. However, because the World Health Organization (2007a) only recently made this measure available, data are only available for OECD countries for one of the study periods, providing too few data points for the analyses.

Models of the unpaid work rate, a supplementary dependent variable, allow for a more comprehensive assessment of productivity among older adults. Unpaid work models contain smaller study population sizes because unpaid work data are available for only three out of five of the study periods. In addition, because they contain smaller study population sizes, unpaid work models contain fewer independent variables. Independent variables for these models were selected based on theory; the most crucial variables from the socio-demographic, individual capacity, public policy, and institutional capacity conceptual categories were selected.

The R-squared value was used to determine the proportion of variance in each dependent variable that each model explains. R-squared values were used to compare model fit and identify superior models. To generate these R-squared values, R-squared values produced for each model when run separately on each of the ten imputed datasets were averaged.

Gender Comparisons

Gender differences are of particular interest in the present study. Because female labor force participation and male labor force participation are measured in different units, standardized regression coefficients allow for comparisons of the strength of each predictor across labor force participation models. Because female and male life expectancy are measured in the same units, unstandardized regression allow for comparisons of the strength of each predictor across life expectancy models. In cases where a linear version of a predictor is significant for one gender and a higher order (i.e., quadratic or cubic) version of the same predictor is significant for the other gender, the impact of the predictor on the female and male model R-squared values is compared.

Path Analysis

The adapted version of Sherraden et al. (2001) model employed in the present study suggests the following effects: (1) direct effects of socio-demographic, individual capacity, public policy, and institutional capacity variables on labor force participation; (2) direct effects of socio-demographic, individual capacity, public policy, and

institutional capacity variables on life expectancy; and (3) indirect effects of socio-demographic, individual capacity, public policy, and institutional capacity variables on life expectancy via labor force participation. The present study evaluates these suggested direct and indirect effects. A direct effect is the direct influence of one variable on another (Schumacker & Lomax, 2004). Direct effects are calculated using random effects models with pooled cross-sections in the present study. An indirect effect involves a mediating variable that transmits some of the effect of one variable on another (Kline, 2005). Indirect effects are calculated as the products of direct effects.

In the present study, path analysis is used to calculate indirect effects illustrated in Figure 4 (see Appendix A). The following system of equations is estimated with algebraic methods using the regression coefficients identified in the random effects models with pooled cross-sections developed for Figures 2 and 3 (see Appendix A):

$$Y_{1ti} = B_{11}X_{1ti} + B_{12}X_{2ti} + B_{13}X_{3ti} + B_{14}X_{4ti} + r_{ti} + u_i$$

$$Y_{2ti} = B_{21}X_{1ti} + B_{22}X_{2ti} + B_{23}X_{3ti} + B_{24}X_{4ti} + B_{25}Y_{1ti} + r_{ti} + u_i$$

where Y_{1ti} represents the labor force participation rate at time t for country i , Y_{2ti} represents life expectancy at time t for country i , B represents path coefficients (with the first subscript identifying the dependent variable and the second subscript identifying the independent variable), X_{1ti} represents socio-demographic variables at time t for country i , X_{2ti} represents individual capacity variables at time t for country i , X_{3ti} represents public policy variables at time t for country i , X_{4ti} represents institutional capacity variables at

time t for country i , r_{it} is the residual effect for time t within country i , and u_i is the effect of membership in country i .

Indirect effects are calculated as products of B_{25} and the coefficients in the Y_{1ti} equation. Significance tests for the indirect effects are obtained using the Aroian version of the Sobel test (Preacher & Leonardelli, 2003). The Aroian version of the Sobel test is recommended because it does not assume that the product of the standard errors of the independent and mediating variables is so small that it can be overlooked (Preacher & Leonardelli, 2003).

Power Analysis

Tests of statistical significance are not required in the present study because the present study analyzes labor force participation and life expectancy in the population of OECD countries; tests of statistical significance are required when studies are conducted on samples representative of populations (Bollen, 1995). Nevertheless, the present study relies on tests of statistical significance because doing so is conventional practice (Berk, Western, & Weiss, 1995a; Berk, Western, & Weiss, 1995b; Bollen, 1995). In order to determine the power of the analyses conducted in the present study, as well as to identify the appropriate significance level to employ, power analyses were conducted using G*Power 3.0.10 (Faul, Erdfelder, Lang & Buchner, 2007).

G*Power allows researchers to vary effect size, sample size, significance level, and number of predictors to assess statistical power. Because the effect sizes for the dissertation analyses were unknown, effect size was allowed to vary in each of the power

analyses conducted. Power analyses typically assume a simple random sample. A simple random sample was not drawn for the present study. However, because the present study analyzes labor force participation and life expectancy in the population of OECD countries and no attempt is made to generalize results beyond OECD countries, the nonrandom sample is not problematic. Nevertheless, data points in the present study are not independent because cross-sectional data at several time points are pooled. Therefore, each study sample size needs to be corrected to consider the relevant interclass correlation coefficient. A corrected sample size was calculated for each dependent variable using the following formula:

$$\text{Corrected sample size} = N / (1 + (m-1) * ICC), \text{ where}$$

N = the total study population size

m = the number of units per cluster (i.e., number of time points per country); and

ICC = the interclass correlation coefficient

The total study population size is 150 (i.e., 30 countries at 5 time points or during intervals centered at these time points). The number of time points per country is 5.

Analyses in Stata 10 indicate that, when labor force participation is the dependent variable, the interclass correlation coefficients are .8858 and .9493 for males and females, respectively, and when life expectancy is the dependent variable, the interclass correlation coefficients are .5650 and .6577 for males and females, respectively. The corrected sample sizes when labor force participation is the dependent variable are 33 and 31 for males and females, respectively. The corrected sample sizes when life expectancy is the dependent variable are 46 and 41 for males and females, respectively.

Results of power analyses conducted for a selection of the primary dissertation analyses are presented here. First, power analyses for two models with labor force participation as the dependent variable were conducted. The number of predictors in each labor force participation model varies depending on whether supplementary independent variables are included and on the number of higher order terms included. Conventional guidelines for multiple regression indicate that small effects (f^2) are around .02, medium effects are .15, and large effects are around .35 (Cohen, 1977). The powers to detect small, medium, and large effects in a model of male labor force participation with sixteen predictors at a significance level of .05 are approximately .10, .55, and .88, respectively (see Figure 5). The powers to detect small, medium, and large effects in a model of male labor force participation with sixteen predictors at a significance level of .10 are approximately .15, .70, and .92, respectively (see Figure 5). The powers to detect small, medium, and large effects in a model of female labor force participation with fourteen predictors at a significance level of .05 are approximately .09, .52, and .85 respectively (see Figure 6). The powers to detect small, medium, and large effects in a model of female labor force participation with fourteen predictors at a significance level of .10 are approximately .15, .65, and .92, respectively (see Figure 6).

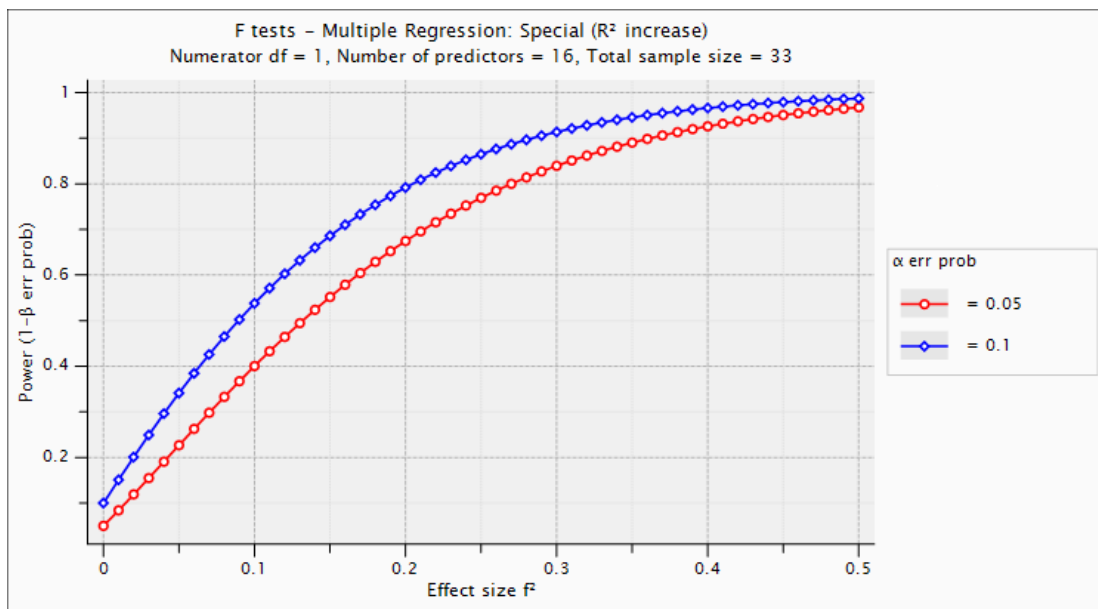


Figure 5. Power analysis of male labor force participation model with sixteen predictors

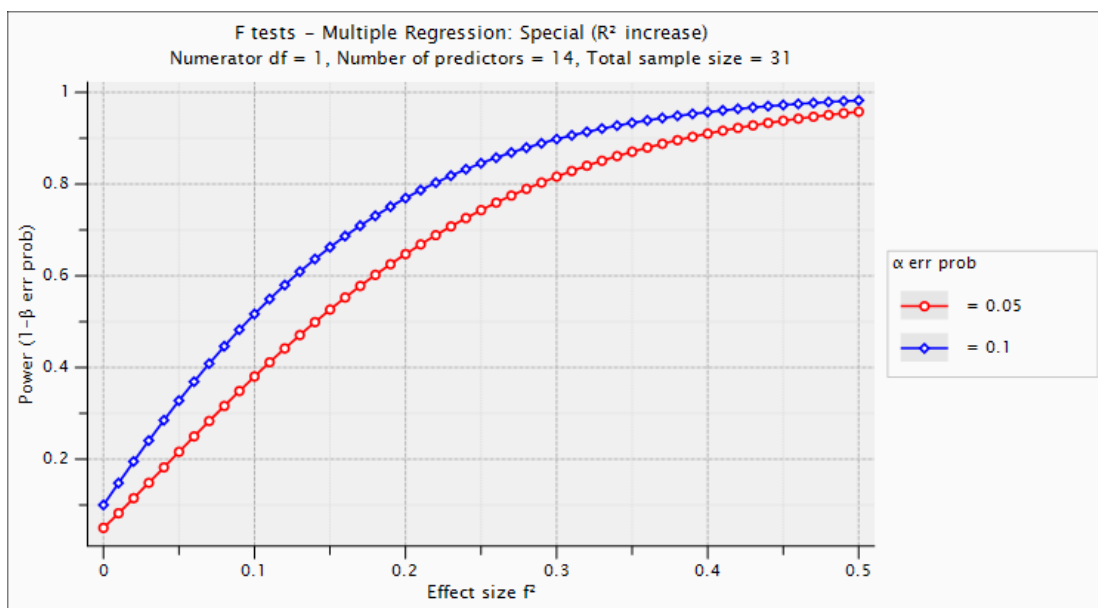


Figure 6. Power analysis of female labor force participation model with fourteen predictors

Next, power analyses for two models with life expectancy as the dependent variable were conducted. The powers to detect small, medium, and large effects in a model of male life expectancy with fourteen predictors at a significance level of .05 are approximately .10, .72, and .99, respectively (see Figure 7). The powers to detect small, medium, and large effects in a model of male life expectancy with fourteen predictors at a significance level of .10 are approximately .18, .82, and .99, respectively (see Figure 7). The powers to detect small, medium, and large effects in a model of female life expectancy with sixteen predictors at a significance level of .05 are approximately .10, .66, and .98, respectively (see Figure 8). The powers to detect small, medium, and large effects in a model of female life expectancy with sixteen predictors at a significance level of .10 are approximately .18, .78, and .99, respectively (see Figure 8).

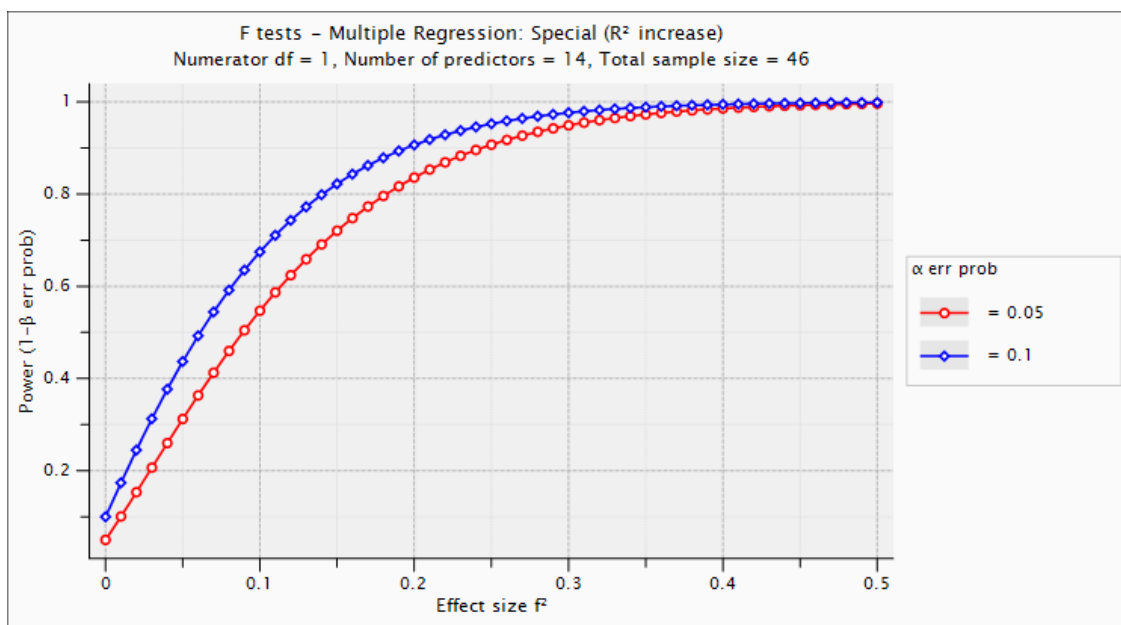


Figure 7. Power analysis of male life expectancy model with fourteen predictors

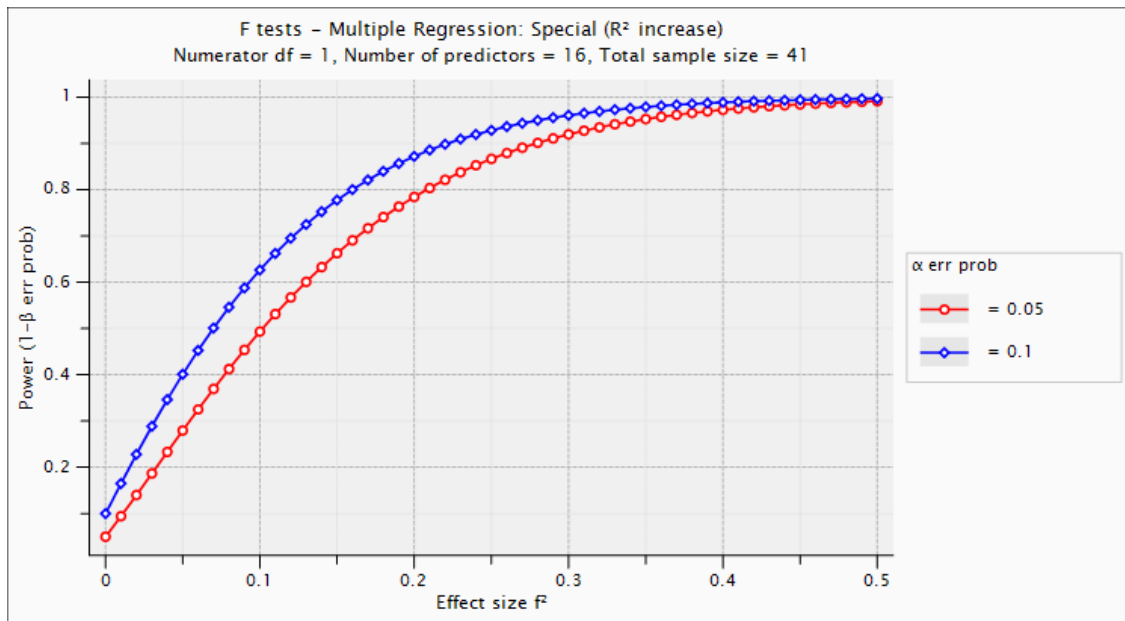


Figure 8. Power analysis of female life expectancy model with sixteen predictors

The results of these power analyses suggest that only medium and large effects will be detected in the present study. Null hypotheses are traditionally rejected when p-values associated with relevant statistical tests are less than .05 (Rubin & Babbie, 2007). Because the statistical tests conducted as part of the present study are not powerful enough to detect small effects, relationships between independent and dependent variables are considered statistically significant when p-value associated with relevant regression coefficient is less than .10. However, as previously mentioned, tests of statistical significance are not required in the present study because the present study analyzes models in the population of OECD countries; tests of statistical significance are required when studies are conducted on samples representative of populations. Because the study population is limited to countries that belong to OECD and it is not a random

sample of all countries, results of the present study should not be generalized to all countries; results only apply to countries that belong to OECD.

Chapter IV – Results

This chapter is divided into three sections. The first section contains the results of descriptive analyses. The second section contains the results of random effects models and path analysis to examine the following research questions: (1) What are the predictors of country level labor force participation among older adults and are they the same for males and females? (2) What are the predictors of country level life expectancy among older adults and are they the same for males and females? and (3) To what extent does labor force participation mediate the relationships between the country level predictors of life expectancy among older adults and country level life expectancy among older adults? The chapter ends with a summary of the present study's findings.

Descriptive Analyses

The socio-demographic, individual capacity, public policy, institutional capacity, labor force participation, and life expectancy characteristics of the complete sample are summarized in Table 1. Between 1980 and 2000, an average of 33% of older females and 27% of males in OECD countries were in the labor force. The average life expectancy for females and males was 18 and 14 years, respectively. Females faced more health risks than did males and also had lower perceived health statuses than did males. An average of 2.5% of older adults lived at or below the median income in each OECD country and an average of 28% of older adults lived alone. The average long-term unemployment rate was approximately 31% and the average self-employment rate for females and males was 2% and 3%, respectively.

Insert Table 1

Table 2 separately examines these characteristics for the 1980 and 2000 panels. Separate descriptive analyses of the 1980 and 2000 panels were conducted in order to explore possible changes over time on the variables considered in the present study. Some interesting changes occurred during the study period. In general, the health and well-being of the sample countries improved over the study period. More specifically, the 2000 panel had higher values for older male and female life expectancy, Education Index scores, and male and female perceived health. In addition, the 2000 panel had significantly lower values for the prevalence of health risks among males and females and the prevalence of tuberculosis. Some interesting economic shifts occurred during the last two decades of the twentieth century in OECD countries. Gross domestic product per capita and public spending increased and the service sector grew. While older adults represented an increasing proportion of the population, the percent of older adults living at or below 50% of the median income remained the same. Finally, older female labor force participation and employment remained the same, but older male labor force participation and employment decreased.

Insert Table 2

Results of Bivariate Analyses and Random Effects Models with Pooled Cross-Sections

Labor Force Participation in All OECD Countries

Random effects models with pooled cross-sections were used to address the first research question: *What are the predictors of country level labor force participation among older adults and are they the same for males and females?* Figure 2 in Appendix A is a representation of the hypothesized relationships between socio-demographic, individual capacity, public policy, and institutional capacity characteristics and labor force participation among older adults.

Hypothesis 1. Countries with the following socio-demographic characteristics will have higher labor force participation rates among older adults than will other countries:

- a. higher levels of education (i.e., higher Education Index scores)¹²;
- b. urban populations that represent larger percentages of their total populations;
- c. higher old-age dependency ratios¹³;
- d. an emphasis on secular-rational, as opposed to traditional, values; and
- e. an emphasis on self-expression, as opposed to survival, values.

¹² Countries with high levels of education are those that have high Education Index Scores. These countries generally have high adult literacy and school enrolment rates (United Nations Development Programme, 2006).

¹³ The old age dependency ratio is the ratio of the population aged 65 years or over to the population aged 15-64 (United Nations, 2007b).

Hypothesis 2. Countries with the following individual capacity characteristics will have higher labor force participation rates among older adults than will other countries:

- a. better health records (i.e. lower prevalence of health risks, lower prevalence of tuberculosis, and better perceived health)¹⁴;
- b. access to fewer social resources (i.e., higher percentages of older adults living alone)¹⁵;
- c. higher gross domestic product; and
- d. larger low-income older adult populations (i.e., higher percentages of older adults living at or below 50% of the median income)¹⁶.

Hypothesis 3. Countries with the following public policy characteristics will have higher labor force participation rates among older adults than will other countries:

- a. lower public spending¹⁷; and
- b. policies that allow for access to old-age pensions while working.

¹⁴ Countries with better health records have lower rates of tuberculosis, better perceived health, and fewer people engaging in risky health behaviors.

¹⁵ Countries with fewer social resources are those where there are higher percentages of older adults living alone.

¹⁶ The low-income older adult population is defined as those living at or below 50% of the median income as determined by the Luxembourg Income Study (2005).

¹⁷ Public spending is a scale combining three variables: (1) public spending on old-age (per capita, at current prices, in US dollars); (2) public spending on health (per capita, at current prices, in US dollars); and (3) public social spending on issues besides old-age and health (per capita, at current prices, in US dollars) (Organisation for Economic Co-operation and Development, 2007c).

Hypothesis 4. Countries with the following institutional capacity characteristics will have higher labor force participation rates among older adults than will other countries:

- a. lower long-term unemployment rates;
- b. higher self-employment rates; and
- c. larger service sectors.

Table 3 presents the results of labor force participation random effects models in all OECD countries. Significant predictors of male labor force participation in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending; and (4) Education Index scores (only in the model with supplementary variables). Significant predictors of female labor force participation in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending; and (4) the prevalence of tuberculosis (only in the model with supplementary variables). A discussion of the effects of these variables, as well male and female differences follows.

Insert Table 3

Eq-3a is a model of older male labor force participation in all OECD countries that includes only primary independent variables under consideration. One socio-demographic characteristic (i.e., the old-age dependency ratio), one individual capacity characteristic (i.e., the gross domestic product per capita), and one public policy

characteristic (i.e., public spending) are significant predictors of older male labor force participation when only primary independent variables are considered. The relationship between the old-age dependency ratio and the male labor force participation rate is quadratic; as the old-age dependency ratio increases, the male labor force participation rate decreases at first and then increases ($p < .01$; see Figure 9). The relationship between the gross domestic product per capita and the labor force participation rate is cubic, but generally, positive; as the gross domestic product per capita increases, the labor force participation rate generally increases ($p < .01$; see Figure 10). The relationship between public spending and the labor force participation rate is linear; as predicted, as public spending increases, the male labor force participation rate decreases ($p < .001$). These effects generally remain unchanged when supplementary independent variables are added to the model (EQ-3c). However, in EQ-3c, one additional socio-demographic characteristic, the Education Index score, is significantly associated with male labor force participation ($p < .10$). The relationship between the Education Index score and the male labor force participation rate is cubic; as the Education Index score increases, the male labor force participation rate increases, decreases, and then increases again (see Figure 11). In contrast to what was predicted, the remaining independent variables are insignificant predictors of male labor force participation. No institutional capacity characteristics are significantly associated with older male labor force participation.

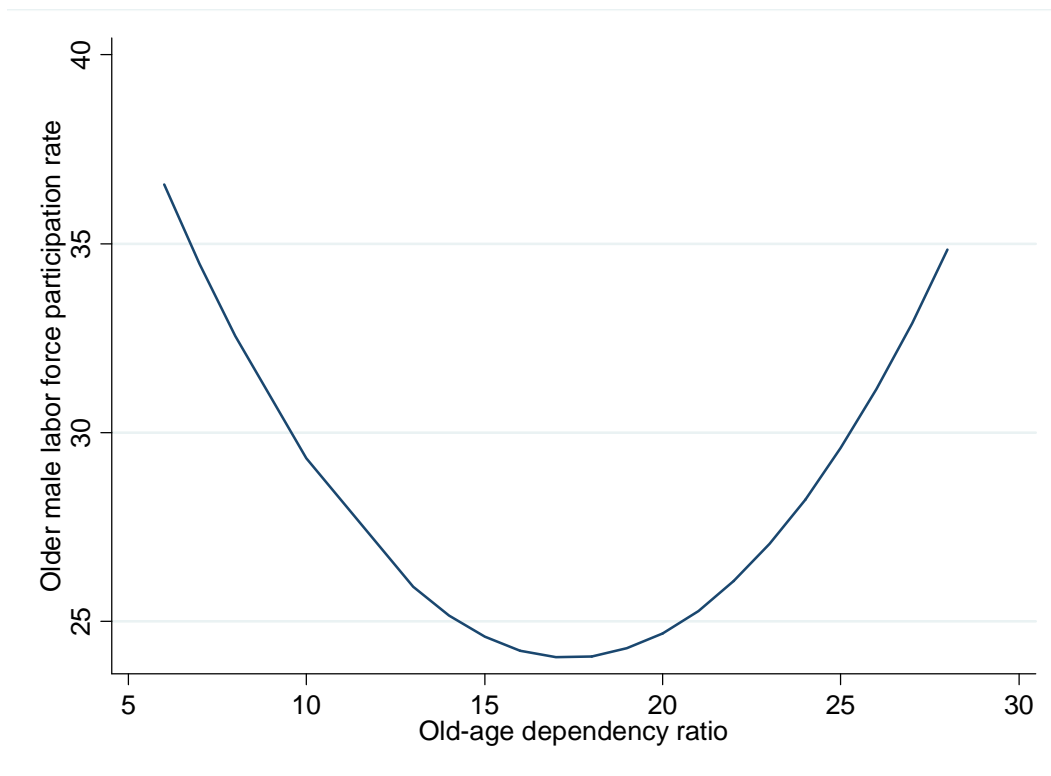


Figure 9. Old-age dependency ratio and older male labor force participation rate

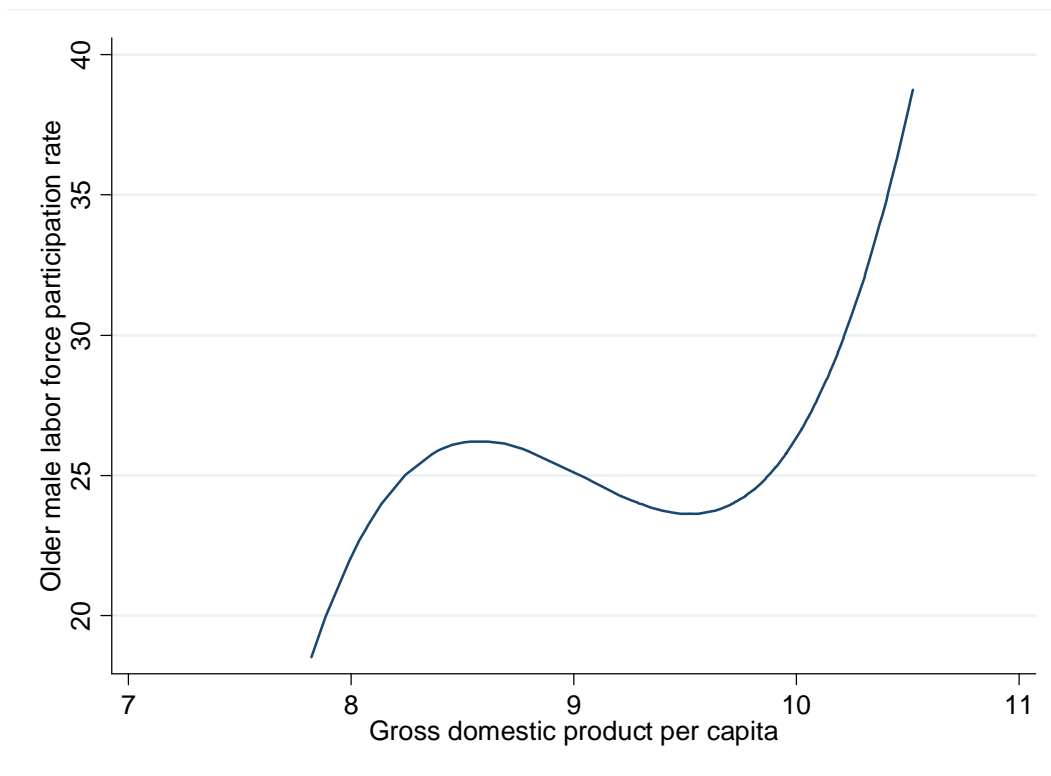


Figure 10. Gross domestic product per capita and older male labor force participation rate

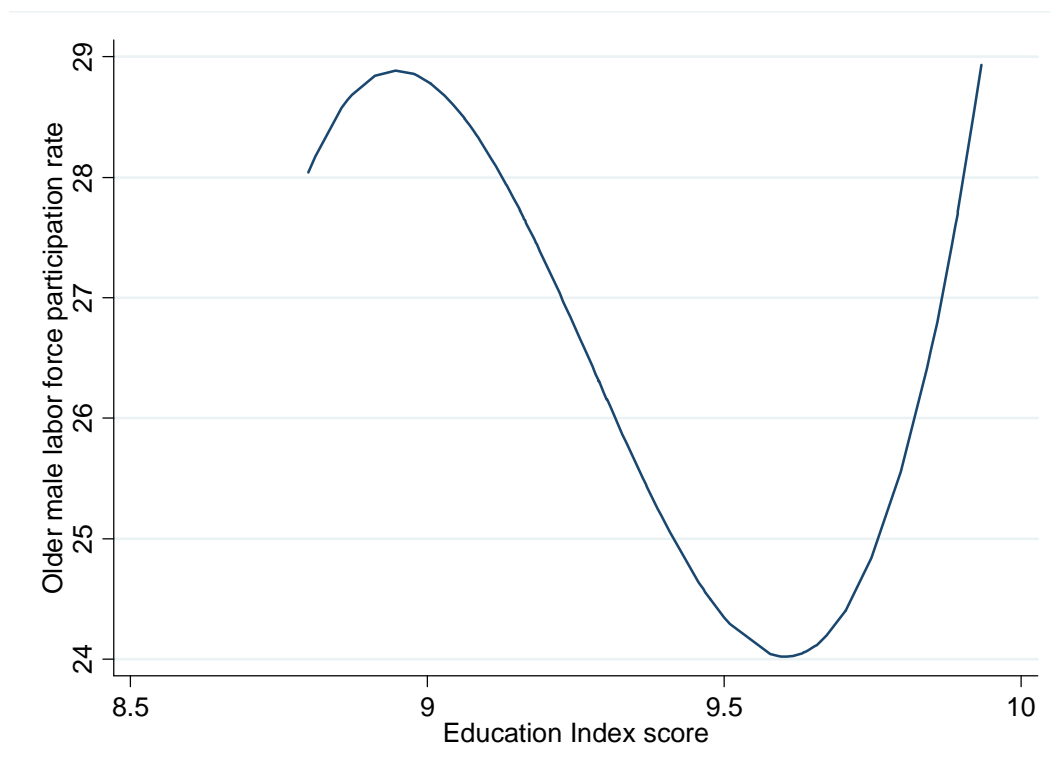


Figure 11. Education Index score and older male labor force participation rate

EQ-3b is a model of older female labor force participation in all OECD countries that includes only primary independent variables under consideration. One socio-demographic characteristic (i.e., the old-age dependency ratio) and one individual capacity characteristic (i.e., the gross domestic product per capita) significantly predict older female labor force participation when only primary independent variables are considered. The relationship between the old-age dependency ratio and the female labor force participation rate is quadratic; as the old-age dependency ratio increases, the female labor force participation rate decreases and then increases ($p < .10$; see Figure 12). The relationship between the gross domestic product per capita and the female labor force

participation rate is positive and linear ($p < .01$). As the gross domestic product per capita increases, so does the female labor force participation rate. When supplementary independent variables are added to the model (EQ-3d), the old-age dependency ratio and the gross domestic product per capita remain significant predictors of female labor force participation ($p < .05$ and $p < .001$, respectively). In addition and as predicted, one public policy characteristic significantly predicts older female labor force participation; as public spending decreases, the female labor force participation rate increases ($p < .10$). Finally, one additional individual capacity characteristic, the prevalence of tuberculosis significantly predicts older female labor force participation in the supplementary model. The relationship between the prevalence of tuberculosis and the female labor force participation rate is quadratic in EQ-3d ($p < .05$); as the prevalence of tuberculosis increases, the female labor force participation rate decreases and then increases (see Figure 13). In contrast to what was predicted, the remaining independent variables in EQ-3b and EQ-3d are not statistically significant as predictors of female labor force participation. No institutional capacity characteristics are significantly associated with older female labor force participation.

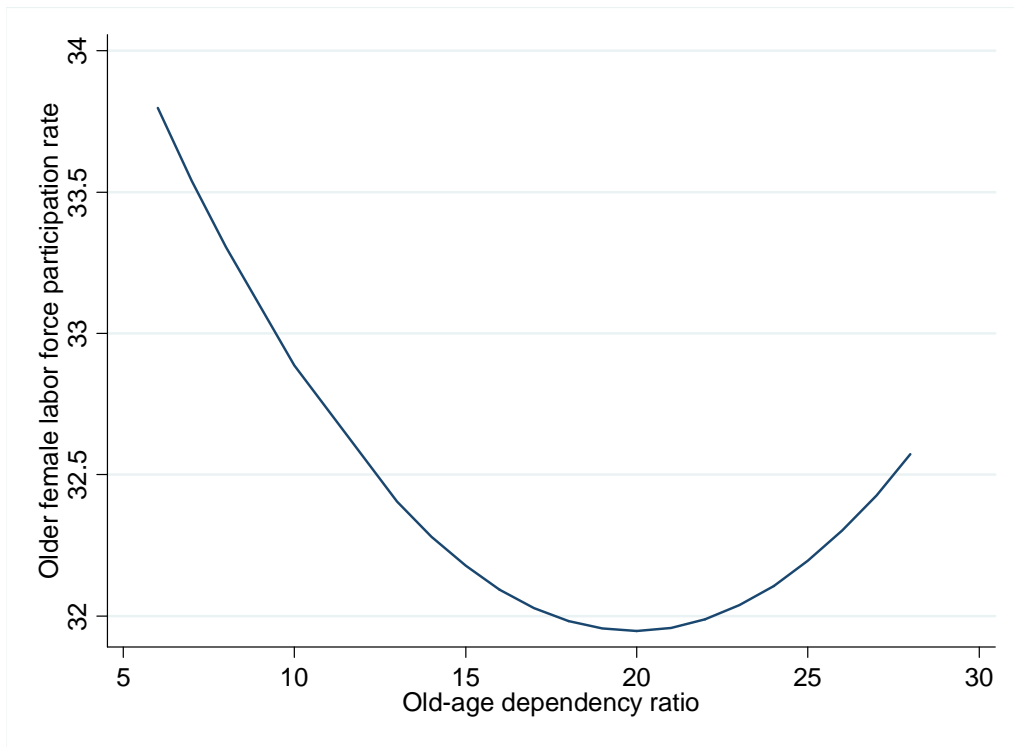


Figure 12. Old-age dependency ratio and older female labor force participation rate

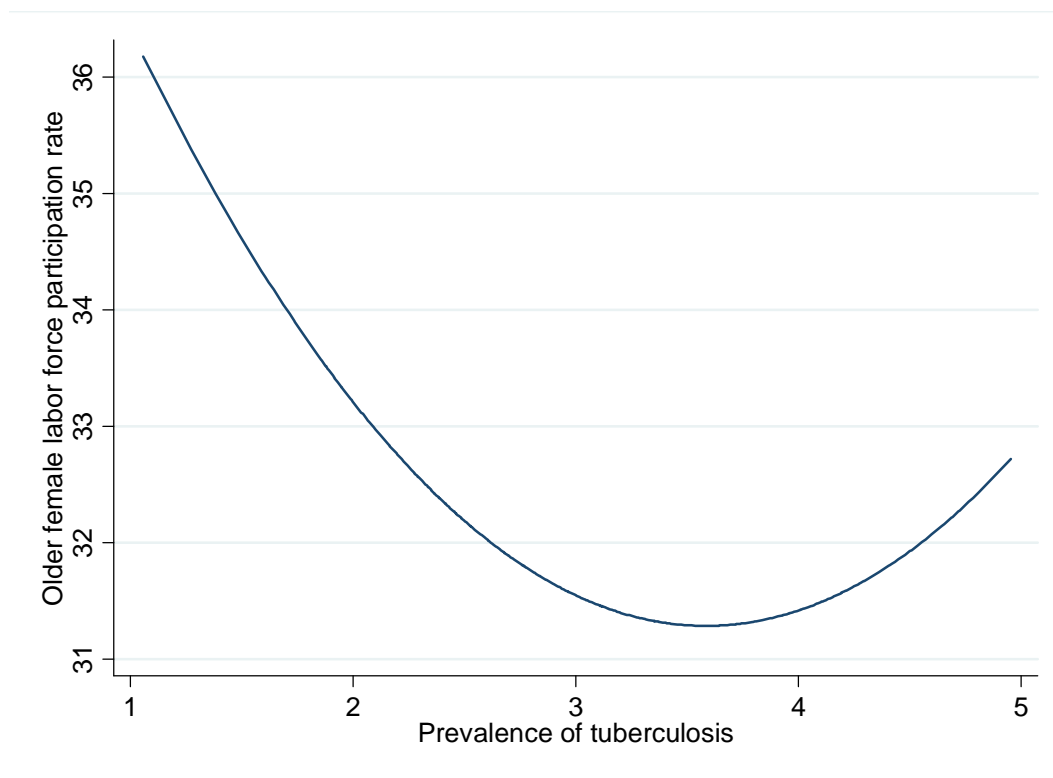


Figure 13. Prevalence of tuberculosis and older female labor force participation rate

Hypothesis 5. The effect of access to social resources on labor force participation among older adults will be stronger for females than for males.

Hypothesis 6. The effect of gross domestic product per capita on labor force participation among older adults will be stronger for females than for males.

Hypothesis 7. The effects of the size of the low-income older adult population on labor force participation among older adults will be stronger for females than for males.

Hypothesis 8. The effects of public spending on labor force participation among older adults will be stronger for females than for males.

Hypothesis 9. The effects of policies that allow for access to old-age pensions while working on labor force participation among older adults will be stronger for females than for males.

The standardized regression coefficients presented under EQ-3a, EQ-3b, EQ-3c, and EQ-3d in Table 3 allow for comparisons of the strength of each predictor across models. Gender differences are of particular interest here. Three of the variables assessed for gender differences are not significant predictors of male or female labor force participation: (1) the percent of older adults living alone; (2) the size of the low-income older adult population, as measured by the percent of older adults at or below 50% of the median income; and (3) the existence of policies that allow for access to old-age pensions while working.

Male labor force participation is more sensitive to changes on the remaining predictors of interest. Gross domestic product per capita is a significant predictor of labor force participation for both males and females in EQ-3a, EQ-3b, EQ-3c, and EQ-3d. In contrast to what was predicted, however, the effect of gross domestic product is stronger for males than for females. Public spending is significantly associated with male and female labor force participation in EQ-3a, EQ-3c, and EQ-3d and not significantly associated with female labor force participation in EQ-3b. Each model trend suggests

that as public spending increases, the male and female labor force participation rates decrease. In contrast to what was predicted, the effect of public spending is stronger for males than for females.

Male and female employment per population ratios were used as supplementary measures of productivity in an attempt to explore whether predictors of labor force participation differed from predictors of employment. Table 4 presents the results of employment per population ratio random effects models in all OECD countries. The employment models confirm the results of the labor force participation models.

Insert Table 4

The results of the older male employment per population ratio models are essentially the same as the results of older male labor force participation rate models. EQ-4a is a model of older male employment in all OECD countries that includes only primary independent variables under consideration. The results of EQ-4a are essentially the same as the results of EQ-3a, a model of older male labor force participation in all OECD countries that includes only primary independent variables. One socio-demographic characteristic (i.e., the old-age dependency ratio), one individual capacity characteristic (i.e., the gross domestic product per capita), and one public policy characteristic (i.e., public spending) are significant predictors of older male employment when only primary independent variables are considered. The relationship between the old-age dependency ratio and the male employment per population ratio is quadratic; as

the old-age dependency ratio increases, the male employment per population ratio decreases and then increases ($p < .01$; see Figure 14). The relationship between the gross domestic product per capita and the male employment per population ratio is cubic, but generally positive; as the gross domestic product per capita increases, the male employment per population ratio generally increases ($p < .05$; see Figure 15). The relationship between public spending and the male employment per population ratio is linear; as predicted, as public spending increases, male employment decreases ($p < .001$). In contrast to what was predicted, the remaining independent variables are not significant predictors of male employment per population ratios. The effects in EQ-4a generally remain unchanged when supplementary independent variables are included in the model (EQ-4c). The only difference to note is that one additional socio-demographic characteristic, the Education Index score, is significantly associated with male employment in EQ-4c ($p < .05$), but not in EQ-4a. The relationship between the Education Index score and the male employment per population ratio in EQ-4c is cubic; as the Education Index score increases, the male employment per population rate increases, decreases, and then increases again (see Figure 16). The results of the supplementary older male employment per population ratio model are essentially the same as the results of supplementary older male labor force participation rate models. No institutional capacity characteristics are significantly associated with older male employment.

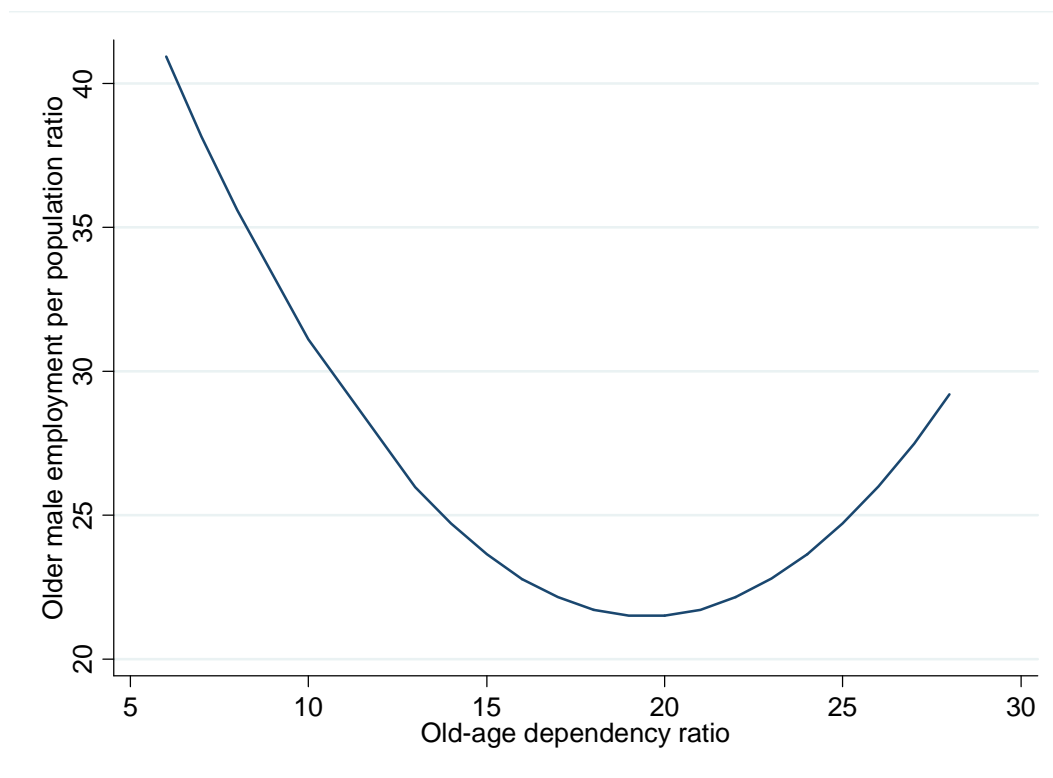


Figure 14. Old-age dependency ratio and older male employment per population ratio

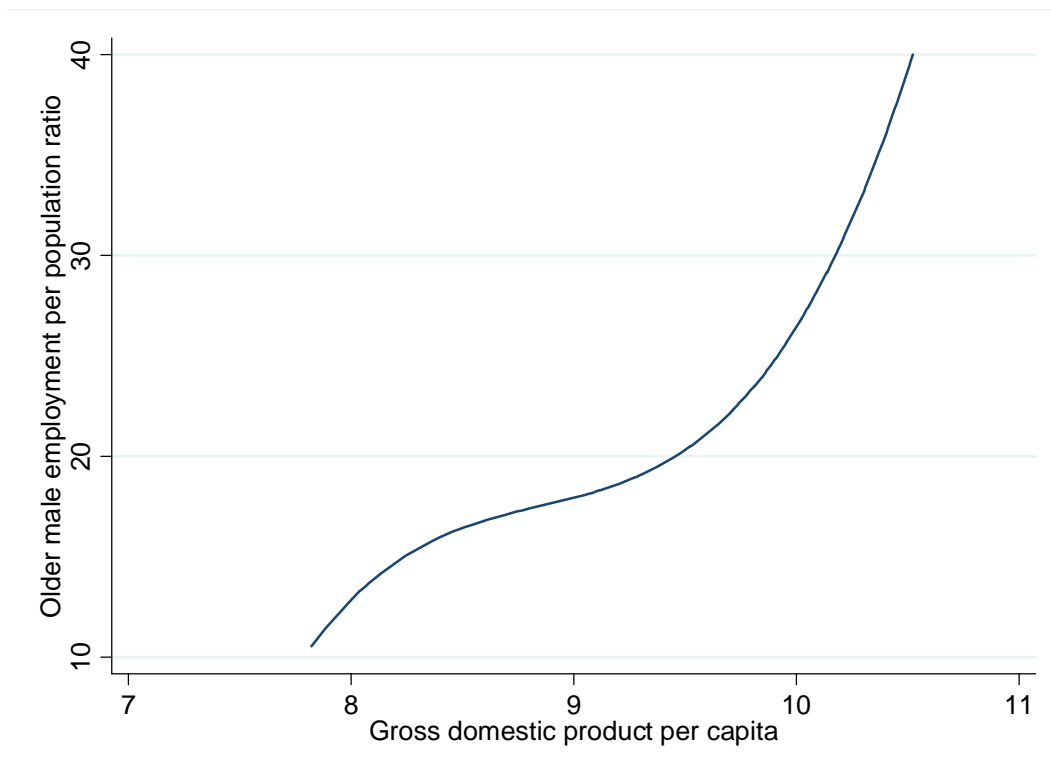


Figure 15. Gross domestic product per capita and older male employment per population ratio

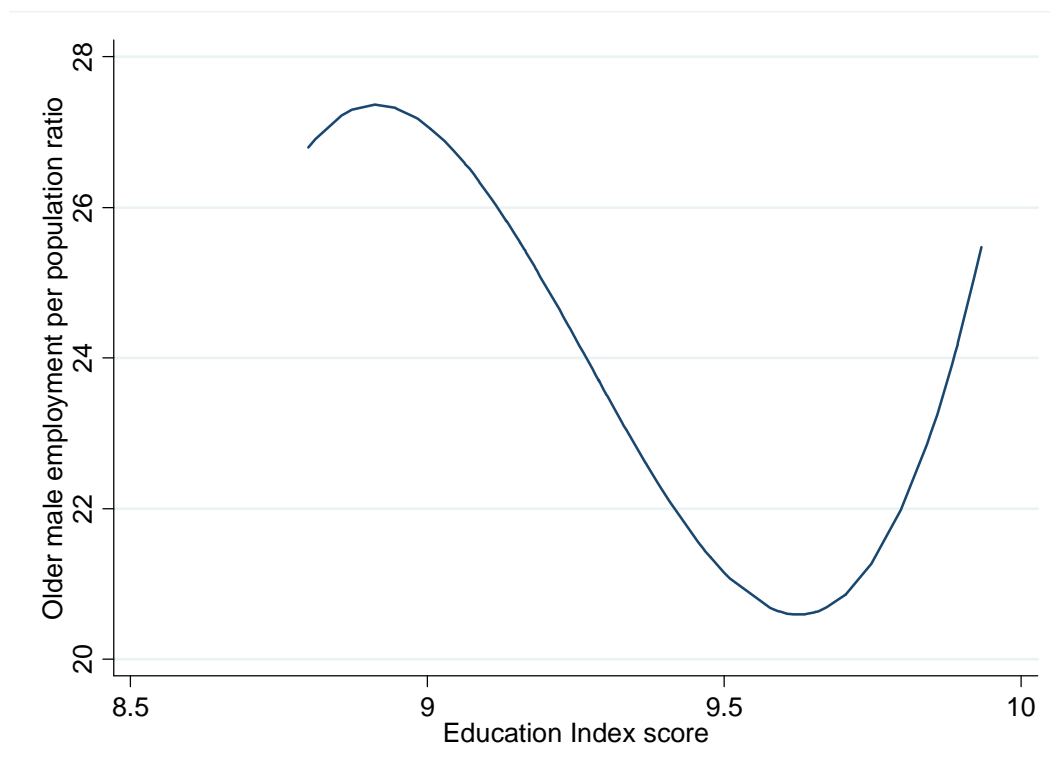


Figure 16. Education Index score and older male employment per population ratio

EQ-4b is a model of female employment in all OECD countries that includes only primary independent variables under consideration. The results of the primary older female employment per population ratio model are very similar to the results of the primary older female labor force participation rate model (EQ-3b). The only difference to note is that one institutional capacity characteristic, the long-term unemployment rate, is negatively and significantly associated with the female employment per population ratio in EQ-4b ($p < .10$), while it is not significantly associated with the female labor force participation rate in EQ-3b. This finding is consistent with what was predicted. It makes sense that unemployment would more strongly affect employment than labor force

participation, given that latter includes the unemployed. Otherwise, EQ-4b and EQ-3b have essentially the same results. One socio-demographic characteristic (i.e., the old-age dependency ratio) and one individual capacity characteristic (i.e., the gross domestic product per capita) significantly predict older female employment when only primary independent variables are considered. The relationship between the old-age dependency ratio and the female employment per population ratio is quadratic; as the old-age dependency ratio increases, the female employment per population ratio decreases and then levels off ($p < .10$; see Figure 17). Also, as predicted, as the gross domestic product per capita increases, female employment increases ($p < .001$). The effects in EQ-4b generally remain unchanged when supplementary independent variables are included in the model (EQ-4d). Two differences should be noted. First, in the supplementary model, one additional individual capacity characteristic, the prevalence of tuberculosis, significantly predicts female employment. The relationship between the prevalence of tuberculosis and the female employment per population ratio is quadratic; as the prevalence of tuberculosis increases, the female employment per population ratio decreases and then increases ($p < .05$; see Figure 18). Second, in the supplementary model, one public policy characteristic, public spending, significantly predicts female employment; as public spending increases, female employment decreases ($p < .10$). In contrast to what was predicted, the remaining independent variables are not significant predictors of female employment per population ratios. The results of EQ-4d are very similar to the results of EQ-3d (i.e., when the labor force participation rate is the dependent variable). The only difference, once again, is that the long-term

unemployment rate is an important predictor of female employment per population ratios, while it is not an important predictor of female labor force participation.

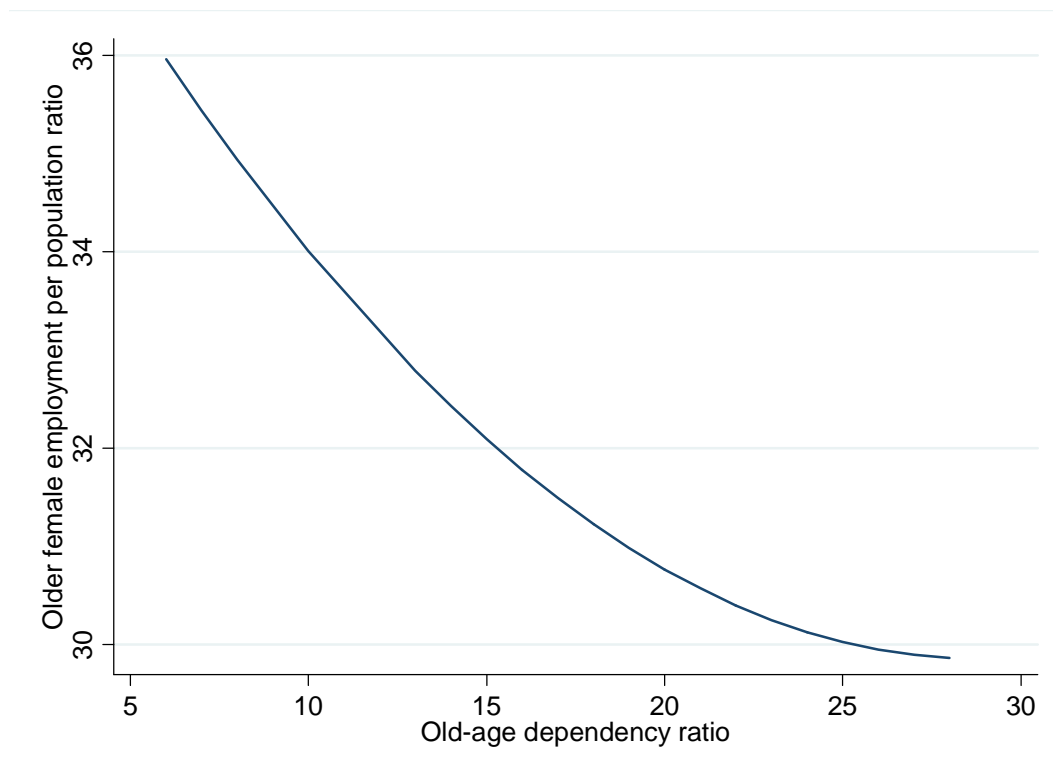


Figure 17. Old-age dependency ratio and Older female employment per population ratio

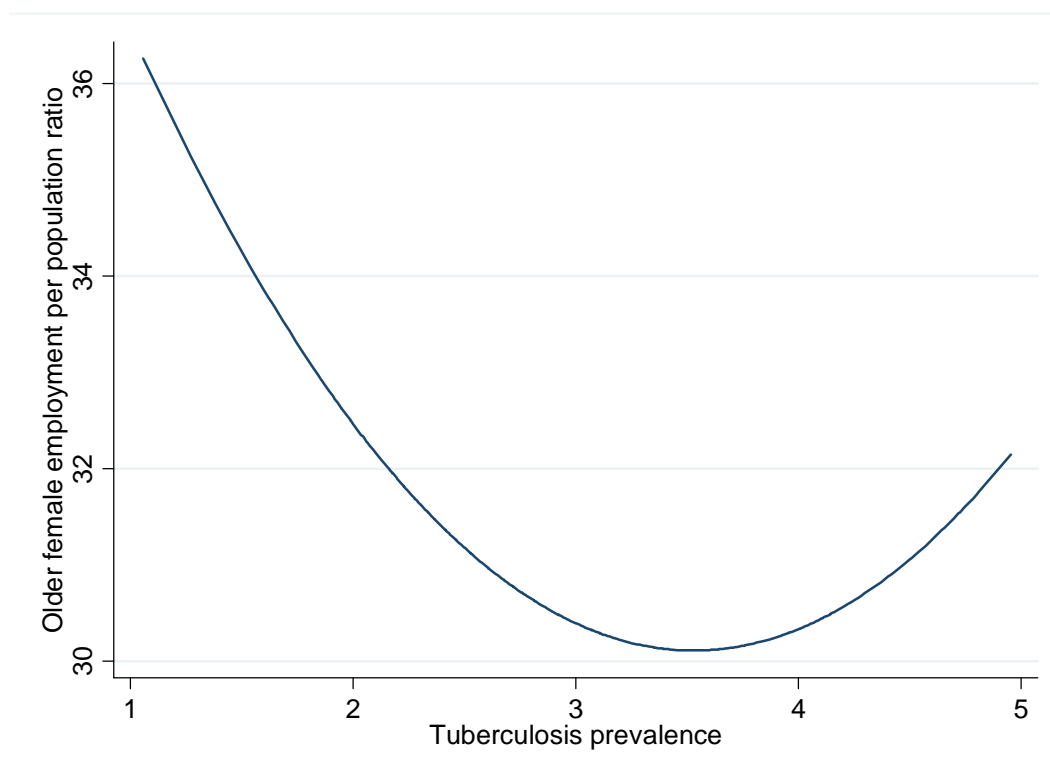


Figure 18. Tuberculosis prevalence and older female employment per population ratio

The standardized regression coefficients presented under EQ-4a, EQ-4b, EQ-4c, and EQ-4d in Table 4 allow for comparisons of the strength of each predictor across models by gender. Gender comparisons of important coefficients across these models are the same as gender comparisons of important coefficients across models of labor force participation (EQ-3a, EQ-3b, EQ-3c, and EQ-3d).

Labor Force Participation in High-Income OECD Countries

Table 5 separately examines socio-demographic, individual capacity, public policy, institutional capacity, labor force participation, and life expectancy characteristics

in high-income OECD (“HI”) and upper-middle income OECD (“UMI”) countries. HI countries were clearly in better shape than were the UMI countries during the study period. More specifically, HI countries had higher values on older male and female life expectancy, Education Index scores, male and female perceived health, and gross domestic product per capita. The prevalence of tuberculosis was significantly higher in UMI countries than in HI countries. HI and UMI countries were different in many other ways, as well. HI countries had significantly higher values on the following characteristics: older male and female labor force participation; older female employment; the unpaid work rate among older adults; the old age dependency ratio; percent urban; support for self-expression over survival; support for secular-rational authority over tradition; public spending; and employment in the service sector. UMI countries had significantly higher values on the following characteristics: the existence of policies that allow for access to old-age pensions while working and the male and female self-employment rates.

Insert Table 5

Because HI and UMI countries look so different, separate analyses were conducted for all OECD and HI countries to determine whether the patterns identified in all OECD countries hold up in HI countries alone. Since most OECD countries are HI and only six are UMI, HI countries were assessed separately and UMI countries were not.

Table 6 presents the results of labor force participation random effects models in HI countries. UMI countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey) were not included in these analyses. The older male models in HI countries look similar to the male models in all OECD countries, except for the following differences: (1) the old-age dependency ratio is not a significant predictor of older male labor force participation in HI countries, whereas it is in all OECD countries; and (2) the Education Index score does not predict older male labor force participation in the model that includes supplementary independent variables in HI countries, whereas it does in all OECD countries. The older female models in HI countries look quite different from the female models in all OECD countries; for older females, the only significant predictor of labor force participation in HI countries is the prevalence of health risks among females. Detailed descriptions of the HI models follow.

Insert Table 6

EQ-6a is a model of older male labor force participation in HI countries that includes only primary independent variables under consideration. One individual capacity characteristic (i.e., the gross domestic product per capita) and one public policy characteristic (i.e., public spending) significantly predict older male labor force participation in HI countries when only primary independent variables are considered. The relationship between the gross domestic product per capita and older male labor force participation is cubic; as the gross domestic product per capita increases, the male

labor force participation rate first stays the same, then decreases, then increases ($p < .10$; see Figure 19). Also, as predicted, as public spending increases, the male labor force participation rate decreases ($p < .001$). Whereas old-age dependency was a significant predictor in the same model in all OECD countries (EQ-3a), it is not here (EQ-6a). These effects remain unchanged when supplementary independent variables are added to the model (EQ-6c). In contrast to what was predicted, the effects of the remaining independent variables on male labor force participation are not significant. Whereas the Education Index score is a significant predictor of male labor force participation in all OECD countries when supplementary independent variables are considered (EQ-3c), it is not in HI countries when supplementary independent variables are considered (EQ-6c). No socio-demographic or institutional capacity characteristics are significantly associated with older male labor force participation in HI countries.

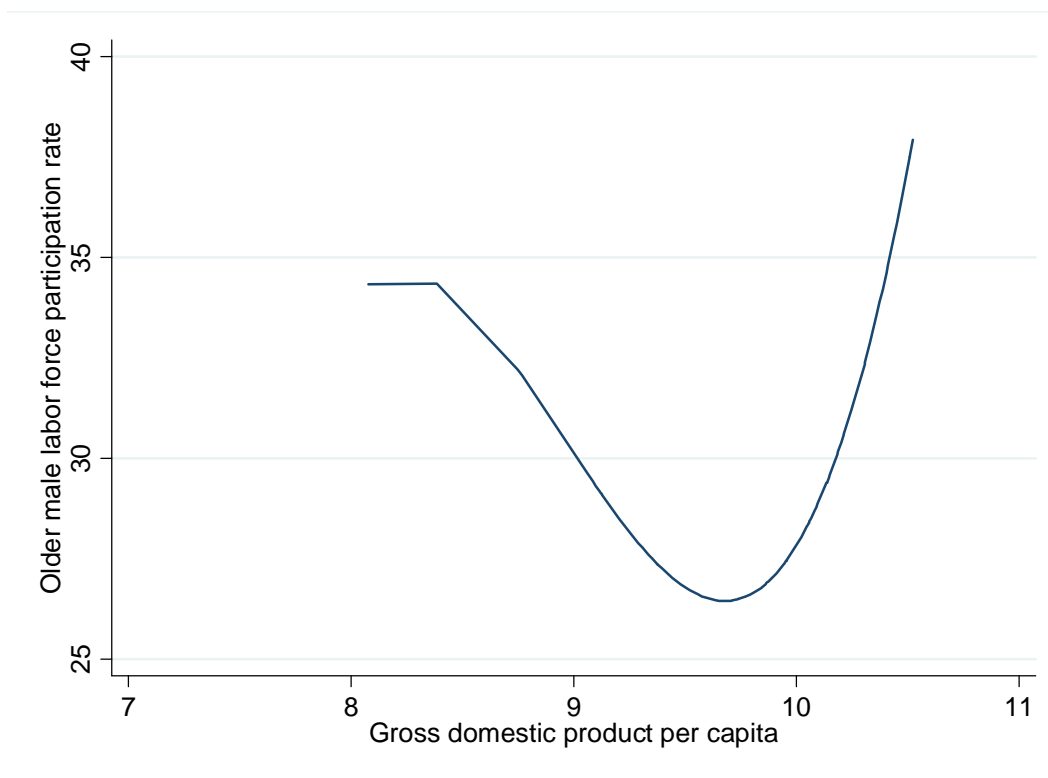


Figure 19. Gross domestic product per capita and older male labor force participation rate

EQ-6b is a model of older female labor force participation in HI countries that includes only primary independent variables under consideration. One individual capacity characteristic, the prevalence of health risks among females, significantly predicts older female labor force participation in HI countries when only primary independent variables are considered. As predicted, as the prevalence of health risks among females increases, the older female labor force participation rate decreases ($p < .05$). This effect did not appear in EQ-3b, a test of this model in all OECD countries. In contrast to what was predicted, the effects of the remaining independent variables on female labor force participation are not significant. Whereas old-age dependency and

gross domestic product per capita were significant predictors in the same model in all OECD countries (EQ-3b), they are not significant here (EQ-6b). These effects remain unchanged when supplementary independent variables are included in the model (EQ-6d). Whereas the prevalence of tuberculosis is a significant predictor of female labor force participation in all OECD countries when supplementary independent variables are considered (EQ-3d), it is not in HI countries when supplementary independent variables are considered (EQ-6d). No socio-demographic, public policy, or institutional capacity characteristics are significantly associated with older female labor force participation in HI countries.

The standardized regression coefficients presented under EQ-6a, EQ-6b, EQ-6c, and EQ-6d in Table 6 allow for comparisons of the strength of each predictor across models. Gender comparisons of important coefficients across these models are the same as the gender comparisons of important coefficients across the same models in all OECD countries (EQ-3a, EQ-3b, EQ-3c, and EQ-3d). Three of the variables assessed for gender differences are not significant predictors of male or female labor force participation: (1) the percent living alone; (2) the size of the low-income older adult population, as measured by the percent at or below 50% of the median income; and (3) the existence of policies that allow for access to old-age pensions while working.

Older male labor force participation is more sensitive to changes on the other variables of interest. Gross domestic product per capita is a significant predictor of male labor force participation in HI countries, but not female labor force participation in HI countries. In contrast to what was predicted, the effect of gross domestic product is

stronger for males than for females in HI countries. Public spending is a significant predictor of male labor force participation in HI countries, but not female labor force participation in HI countries. In contrast to what was predicted, the effect of public spending is stronger for males than for females.

Table 7 presents the results of employment per population ratio random effects models in HI countries. The results of these models are similar to the results of labor force participation rate random effects models in HI countries, with a couple of exceptions. EQ-7a is a model of older male employment in HI countries that includes only primary independent variables under consideration. Only two differences between EQ-7a and EQ-6a (i.e., the model of male labor force participation in HI countries) should be noted. First, whereas long-term unemployment, an institutional capacity characteristic, was not a significant predictor in EQ-6a, it is in EQ-7a. As the long-term unemployment rate increases, male employment decreases ($p < .10$). Second, the relationship between the gross domestic product per capita, an individual capacity characteristic, and the male employment per population ratio is quadratic (not cubic as it is in EQ-6a); as the gross domestic product per capita increases, the employment per population ratio decreases and then increases ($p < .01$; see Figure 20). One public policy characteristic, public spending, also significantly predicts older male employment. As predicted, and consistent with what was suggested in EQ-6a, as public spending decreases, male employment increases ($p < .001$). In contrast to what was predicted, the effects of the remaining independent variables on male employment are not significant. These effects remain unchanged when supplementary independent variables are included

in the model (EQ-7c). No socio-demographic characteristics are significantly associated with older male employment in HI countries.

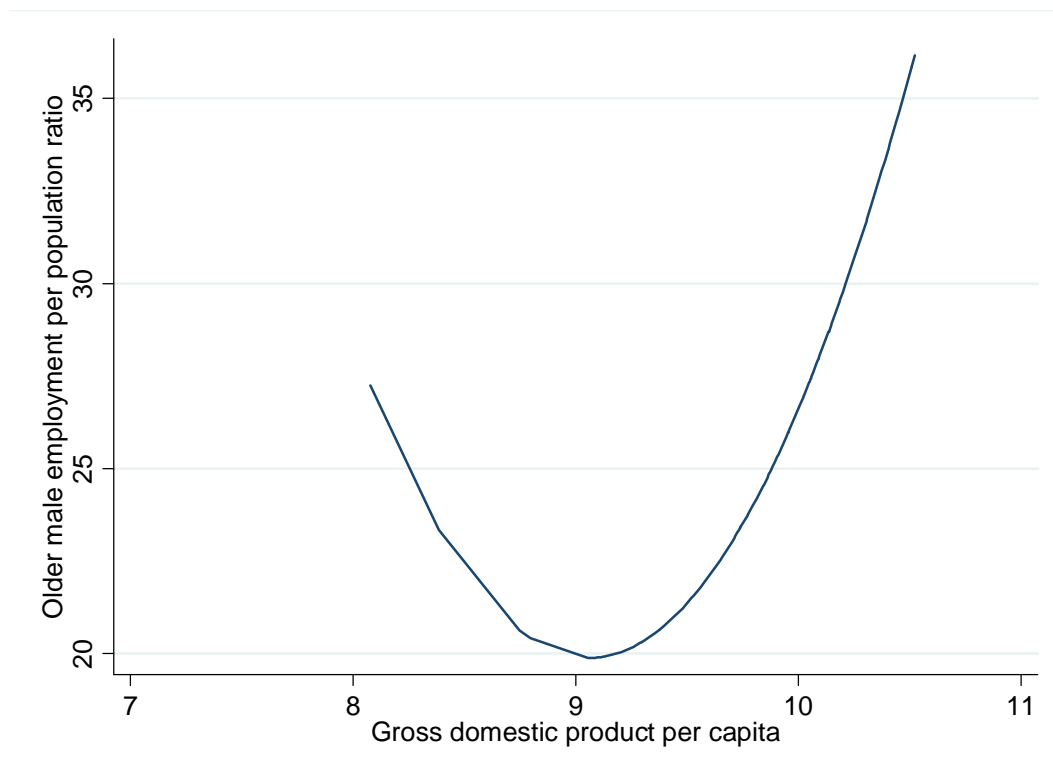


Figure 20. Gross domestic product per capita and older male employment per population ratio

Insert Table 7

EQ-7b is a model of older female employment in HI countries that includes only primary independent variables under consideration. The results of EQ-7b and EQ-6b (i.e., the model of female labor force participation in all OECD countries) are essentially

the same. As predicted, as the prevalence of health risks among females increases, female employment decreases ($p < .10$). In contrast to what was predicted, the effects of the remaining independent variables on female labor force participation are not significant. These effects remain unchanged when the supplementary variables are included in the model (EQ-7d). No socio-demographic, public policy, or institutional capacity characteristics are significantly associated with older female employment in HI countries.

The standardized regression coefficients presented under EQ-7a, EQ-7b, EQ-7c, and EQ-7d in Table 7 allow for comparisons of the strength of each predictor across models. Gender comparisons of important coefficients across these models are the same as gender comparisons of important coefficients across models of labor force participation in HI countries.

Unpaid Work in All and High-Income OECD Countries

The unpaid work rate among older adults was used as an additional supplementary measure of productivity in a set of abbreviated models. Unpaid work models are based on a smaller number of cases and fewer variables because unpaid work data are available for only three out of five of the study periods (i.e., 1980, 1990, and 2000). Table 8 summarizes the socio-demographic, individual capacity, public policy, institutional capacity, labor force participation, and life expectancy characteristics in all OECD, HI, and UMI countries when only the 1980, 1990, and 2000 panels are

considered and is relevant to supplementary analyses of the predictors of unpaid work. The results presented in Table 8 look very similar to the results presented in Table 5 (when all panels of data are included). HI countries were clearly in better shape than were the UMI countries in 1980, 1990, and 2000. HI countries had significantly higher values on the following characteristics: life expectancy among older females and males, the Education Index score, perceived health status, and the gross domestic product per capita than in UMI countries. Tuberculosis prevalence was significantly higher in UMI countries than in HI countries.

Insert Table 8

Because of the descriptive differences between HI and UMI countries, separate analyses of unpaid work were conducted for all OECD and HI countries to determine whether the patterns identified in all OECD countries hold up in HI countries alone. Since most OECD countries are HI and only six are UMI, HI countries were assessed separately and UMI countries were not.

Table 9 presents the results of unpaid work random effects models in all OECD and HI countries. EQ-9a is a model of unpaid work in all OECD countries that includes a selection of important primary independent variables. EQ-9b is a model of unpaid work in HI countries that includes a selection of important primary independent variables.

Insert Table 9

In both EQ-9a and EQ-9b, one individual capacity characteristic, the prevalence of health risks, stands out as an important predictor of unpaid work ($p < .05$ and $p < .01$, respectively). Health is an important predictor of unpaid work; as the prevalence of health risks increases, unpaid work decreases. In all OECD countries (EQ-9a), two socio-demographic characteristics (i.e., the Education Index score and the survival/self-expression score) also significantly predict unpaid work rates. As the Education Index score increases, unpaid work increases ($p < .10$). Also, the more countries value self-expression over survival, the higher the unpaid work rate ($p < .05$). The remaining independent variables are not significant predictors of unpaid work in all OECD countries. In HI countries, one institutional capacity characteristic (i.e., the long-term unemployment rate) significantly predicts unpaid work. As long-term unemployment increases, unpaid work decreases ($p < .05$). The remaining independent variables are not significant predictors of unpaid work in HI countries. No public policy characteristics are significantly associated with unpaid work.

Life Expectancy in All OECD Countries

Random effects models were used to examine the second research question: *What are the predictors of country level life expectancy among older adults and are they the same for males and females?* Figure 3 is a representation of the hypothesized relationships between socio-demographic characteristics, individual capacity characteristics, public policy characteristics, institutional capacity characteristics, labor

force participation, and life expectancy among older adults. In addition, path analysis was used to examine the third research question: *To what extent does labor force participation mediate the relationships between the country level predictors of life expectancy among older adults and country level life expectancy among older adults?*

Figure 4 is a representation of the hypothesized mediating effects of labor force participation on the relationships between life expectancy and socio-demographic, individual capacity, public policy, and institutional capacity characteristics among older adults

Hypothesis 10. Countries with the following socio-demographic characteristics will have higher life expectancies among older adults than will other countries.

- a. higher levels of education (i.e., higher Education Index scores);
- b. urban populations that represent larger percentages of their total populations;
- c. higher old-age dependency ratios;
- d. an emphasis on secular-rational, as opposed to traditional, values; and
- e. an emphasis on self-expression, as opposed to survival, values.

Hypothesis 11. Countries with the following individual capacity characteristics will have higher life expectancies among older adults than will other countries.

- a. better health records (i.e. lower prevalence of health risks, lower prevalence of tuberculosis, and better perceived health);

- b. access to more social resources (i.e., lower percentages of older adults living alone);
- c. higher gross domestic products; and
- d. smaller older adult low-income populations (i.e., lower percentages of older adults living at or below 50% of the median income).

Hypothesis 12. Countries with the following public policy characteristics will have higher life expectancies among older adults than will other countries.

- a. higher public spending; and
- b. policies that allow for access to old-age pensions while working.

Hypothesis 13. Countries with the following institutional capacity characteristics will have higher life expectancies among older adults than will other countries.

- a. lower long-term unemployment rates;
- b. higher self-employment rates; and
- c. larger service sectors.

Hypothesis 14. Countries with higher labor force participation rates among older adults will have higher life expectancies among older adults than will other countries.

Table 10 presents the results of life expectancy random effects models in all OECD countries. Significant direct predictors of male life expectancy in all OECD

countries include: (1) the labor force participation rate among older males; (2) public spending; (3) the Education Index score (only in the primary model); and (4) the male self-employment rate. Significant indirect predictors of male life expectancy in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; and (3) public spending. Significant direct predictors of female life expectancy in all OECD countries include (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending; (4) the Education Index score; and (5) female employment in the service sector. A discussion of the direct and indirect effects of these variables, as well as male and female differences follows.

Insert Table 10

EQ-10a is a model of older male life expectancy in all OECD countries that includes only primary independent variables under consideration. One socio-demographic characteristic (i.e., the Education Index score), one public policy characteristic (i.e., public spending), one institutional capacity characteristic (i.e., male self employment), and male labor force participation are significantly associated with older male life expectancy in all OECD countries when only primary independent variables are considered. As predicted, as the Education Index score, public spending, male self employment, and male labor force participation increase, older male life expectancy increases ($p<.05$, $p<.001$, $p<.05$, and $p<.05$, respectively). These effects generally remain unchanged when supplementary independent variables are included in

the model (EQ-10c). However, the Education Index score is no longer significantly associated with male life expectancy in the supplementary model. In contrast to what was predicted, the remaining independent variables are not significant predictors of male life expectancy. No individual capacity characteristics are significant, direct predictors of older male life expectancy.

EQ-10b is a model of older female life expectancy in all OECD countries that includes only primary independent variables under consideration. Two socio-demographic characteristics (i.e., the Education Index score and the old-age dependency ratio), one individual capacity characteristic (i.e., the gross domestic product per capita), one public policy characteristic (i.e., public spending), and one institutional capacity characteristic (i.e., female employment in the service sector) are significantly associated with older female life expectancy in all OECD countries when only primary independent variables are considered. As predicted, as the Education Index score, the old-age dependency ratio, the gross domestic product per capita, and public spending increase, female life expectancy increases ($p < .10$, $p < .05$, $p < .01$, and $p < .001$, respectively). The relationship between female employment in the service sector and female life expectancy is cubic; as female employment in the service sector increases, female life expectancy decreases, increases, and then decreases again ($p < .10$; see Figure 21). These effects remain unchanged when supplementary independent variables are included in the model (EQ-10d). In contrast to what was predicted, the remaining independent variables are not significant predictors of female life expectancy.

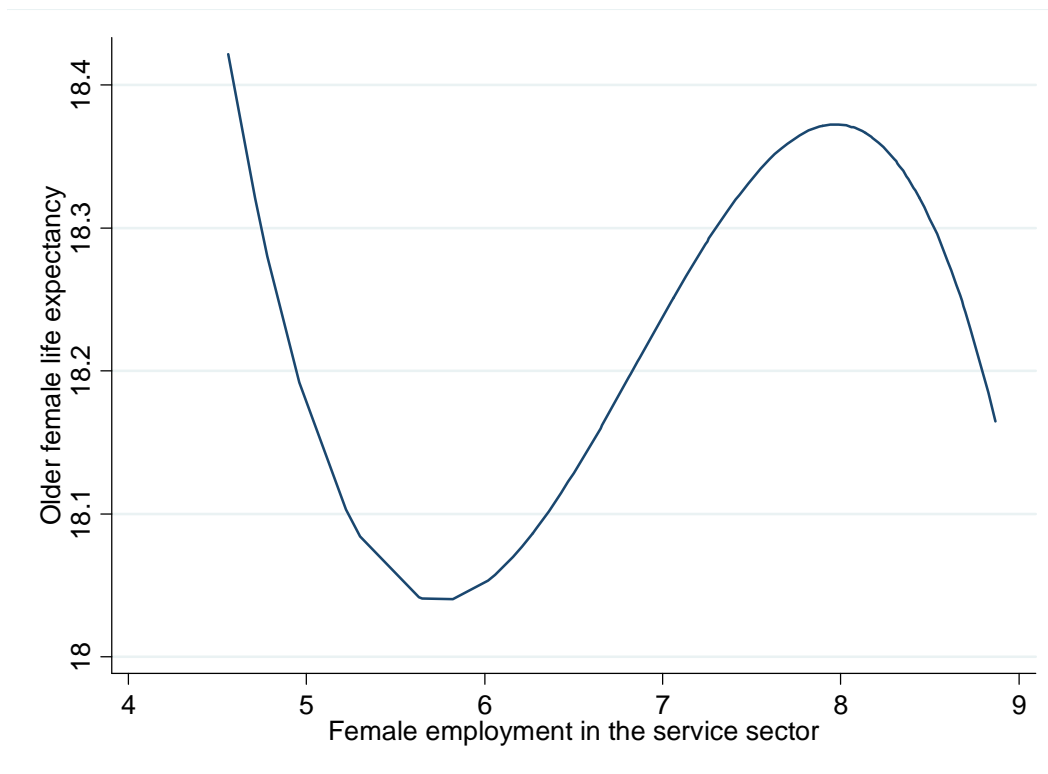


Figure 21. Female employment in the service sector and older female life expectancy

Some readers may inquire about why the labor force participation rate is a significant predictor of life expectancy among older males, but not older females. Perhaps the models tested in the present study do not have sufficient power to detect the relationship between labor force participation and life expectancy among older females. Alternatively, the other variables included in the life expectancy models attenuate the relationship between labor force participation and life expectancy among older females; other factors may simply be more important predictors of female life expectancy than

female labor force participation. It is possible that females simply do not derive the same benefits from paid work as do males in later life.

One likely alternative explanation is that labor force participation and life expectancy among older females are not significantly associated in the present study's time period, but that they will be significantly associated in a later time period. Labor force participation and life expectancy are more strongly correlated among males than among females in 1980, 1985, 1990, 1995, and 2000, but the strength of the correlation between these variables grows between 1980 and 2000 for both males and females. Furthermore, the relationship between female labor force participation and female life expectancy will likely become significant in the coming decades, just as the relationship between male labor force participation and male life expectancy became more important over time between 1980 and 2000. During the first three time points included in the present study (i.e., 1980, 1985, and 1990), male labor force participation is positively associated with male life expectancy in the model of older male life expectancy in all OECD countries, but the relationship is not significant. During the last two time points (i.e., 1995 and 2000) included in the present study, male labor force participation is positively and significantly associated with male life expectancy in the model of older male life expectancy in all OECD countries. During the first three time points included in the present study, female labor force participation is negatively associated with female life expectancy in the model of older female life expectancy in all OECD countries, but the relationship is not significant. During the last two time points included in the present study, female labor force participation is positively associated with female life

expectancy in the model of older female life expectancy in all OECD countries, but the relationship is not significant. The relationship between female labor force participation and female life expectancy will likely remain positive and become significant in the coming decades.

Some critics may say that labor force participation is a proxy for health among older males in the present study and that a significant relationship between higher labor force participation rates and longer life expectancies among males is really just evidence of the positive relationship between better health and longer lives. Perhaps healthier males work longer and live longer. However, male labor force participation is not as strongly negatively correlated with the prevalence of health risks among males as female labor force participation is with the prevalence of health risks among females. If male labor force participation is a proxy for health among older males, one would expect it to be strongly correlated with the prevalence of health risks among males.

Finally, it is possible that employment in some capacity is relevant to both male and female life expectancy, but the type of job relevant to male life expectancy differs from the type of job relevant to female life expectancy. The results of the present study suggest that, for females, the relationship between employment in the service sector and life expectancy is cubic; as female employment in the service sector increases, female life expectancy decreases, increases, and then decreases again. The relationship between male employment in the service sector and male life expectancy is not significant in the present study. However, the relationship between the self-employment rate and male life expectancy is positive and linear; as the self-employment rate increases, male life

expectancy increases. The relationship is not significant for females. Perhaps working generally in some flexible and low-stress capacity is what really matters, not the sector per se. More research is needed to fully understand the cross-national relationships between work and life expectancy among older adults.

Hypothesis 15. The effect of gross domestic product per capita on life expectancy among older adults will be stronger for females than for males.

Hypothesis 16. The effect of the size of the older adult low-income populations on life expectancy among older adults will be stronger for females than for males.

Hypothesis 17. The effect of public spending on life expectancy among older adults will be stronger for females than for males.

Hypothesis 18. The effect of access to social resources on life expectancy among older adults will be stronger for males than for females.

Hypothesis 19. The effect labor of force participation rates among older adults on life expectancy among older adults will be stronger for males than for females.

The unstandardized regression coefficients presented under EQ-10a, EQ-10b, EQ-10c, and EQ-10d in Table 10 allow for comparisons of the strength of each predictor

across models because the dependent variables are measured with the same units.

Gender differences are of particular interest here. Two of the variables assessed for gender differences are not significant predictors of life expectancy: (1) The size of the low-income older adult population, as measured by the percent of older adults at or below 50% of the median income; and (2) access to social resources, as measured by the percent of older adults living alone. Gross domestic product is a significant predictor of life expectancy for females only. As predicted, the effect is stronger for females than for males. Public spending is a significant predictor of male and female life expectancy. As public spending increases, life expectancy increases. In contrast to what was predicted, the effect of public spending on life expectancy is stronger for males than for females. Labor force participation is a significant predictor of male life expectancy only. As predicted, the effect of labor force participation on life expectancy is stronger for males than for females.

Hypothesis 20. Country level labor force participation mediates the effects of socio-demographics, individual capacities, public policy, and institutional capacity characteristics on country level life expectancy among older males and females.

Table 10 presents the results of path analyses used to test for mediation. The labor force participation rate among older adults is a significant mediator between life expectancy and its predictors when the p-value associated with Aroian test is less than .10. A requirement of the Aroian test is that the mediator significantly affects the

dependent variable (Preacher & Leonardelli, 2003). Because the labor force participation rate is a significant predictor of older male life expectancy, and not older female life expectancy, Aroian tests were run only on male models.

As indicated in EQ-10a and EQ-10c, the labor force participation rate mediates three relationships: (1) the relationship between old-age dependency and male life expectancy; (2) the relationship between gross domestic product per capita and male life expectancy; and (3) the relationship between public spending and male life expectancy. The old-age dependency ratio, a socio-demographic characteristic, is not a significant direct predictor of male life expectancy in EQ-10a or EQ-10c; however, there is a significant indirect quadratic relationship between the old-age dependency ratio and male life expectancy (EQ-10a and EQ-10c; $p < .10$). The gross domestic product per capita, an individual capacity characteristic, is not a significant direct predictor of male life expectancy in EQ-10a or EQ-10c; however, there is a significant indirect relationship between the gross domestic product per capita and male life expectancy. In the model of male life expectancy in all OECD countries with only primary independent variables included (EQ-10a) there is a significant indirect cubic relationship between gross domestic product per capita and male life expectancy ($p < .10$). In the model of male life expectancy in all OECD countries with supplementary independent variables included (EQ-10c), there is a significant indirect linear relationship between gross domestic product per capita and male life expectancy; as the gross domestic product per capita increases, male life expectancy increases by virtue of increasing male labor force participation ($p < .10$). Finally, as illustrated in EQ-10a and EQ-10c, public spending, a

public policy characteristic, significantly and directly increases male life expectancy, but it also significantly indirectly decreases male life expectancy by virtue of lowering male labor force participation. The net effect (i.e., direct effect plus indirect effect) is that higher levels of public spending are associated with higher male life expectancies ($2.1945 - .8057 = 1.3888$).

Older male and female employment per population ratios were used as supplementary measures of productivity in an attempt to explore whether employment has the same effect on life expectancy as does labor force participation. Table 11 presents the results of life expectancy random effects models in all OECD countries when the employment per population ratio is included as an independent variable (instead of the labor force participation rate). The results of these models are essentially the same as the results of these models when the labor force participation rate is included as an independent variable (instead of the employment per population ratio), with only one exception. In contrast to what was suggested in EQ-10c, EQ-11c indicates that the Education Index score, a socio-demographic characteristic, is positively and significantly associated with male life expectancy. As the Education Index score increases, male life expectancy increases ($p < .05$). All other direct effects in Table 11 are the same as in Table 10.

Insert Table 11

The mediation results presented in Table 11 (when the employment per population ratio is included as an independent variable) are almost the same as the mediation results presented in Table 10 (when the labor force participation rate is included as an independent variable). Only one difference should be noted. The effect of the male employment per population ratio on the relationship between the gross domestic product per capita, an individual capacity characteristic, and male life expectancy in EQ-11a differs from the effect of the male labor force participation rate on the relationship between gross domestic product per capita and male life expectancy in EQ-10a. In EQ-11a, the gross domestic product per capita is not a significant direct predictor of male life expectancy; however, there is a significant indirect quadratic relationship between gross domestic product per capita and male life expectancy ($p < .10$). The indirect relationship between gross domestic product per capita and male life expectancy is cubic in EQ-10a.

Life Expectancy in High-Income OECD Countries

As shown in Table 5, HI and UMI countries are quite different. Therefore, separate analyses were conducted for all OECD countries and HI countries to determine whether patterns identified in all OECD countries hold up in HI countries. Since most OECD countries are HI and only six are UMI, UMI countries were not assessed separately.

Significant direct predictors of older male life expectancy in HI countries include: (1) the male labor force participation rate; (2) the Education Index score; (3) the gross domestic product per capita; (4) public spending; and (5) the self-employment rate.

Significant indirect predictors of older male life expectancy in HI countries include: (1) the gross domestic product per capita and (2) public spending. Significant direct predictors of older female life expectancy in HI countries include: (1) the Education Index score; (2) the old-age dependency ratio; (3) the gross domestic product per capita; (4) public spending; (5) employment in the service sector; (6) support for secular-rational authority over tradition (only in the supplementary model); and (7) the prevalence of health risks among females (only in the supplementary model).

Some clear differences between direct effects in all OECD and HI countries should be noted. First, the Education Index score, a socio-demographic characteristic, is positively and directly associated with older male life expectancy in both the primary and supplementary models in HI countries (not just the primary model as in all OECD countries). Second, the relationship between the gross domestic product per capita, an individual capacity characteristic, and male life expectancy is significant in HI countries, whereas it was not in all OECD countries. Third, two variables that were significantly associated with female life expectancy in all OECD countries are not important in HI countries when supplementary independent variables are considered: (1) the Education Index score, a socio-demographic characteristic, and (2) employment in service sector, an institutional capacity characteristic. Finally, older female life expectancy is sensitive to two additional variables in HI countries: (1) support for secular-rational authority over tradition, a socio-demographic characteristic, and (2) the prevalence of health risks among females, an individual capacity characteristic. A detailed discussion of the direct

and indirect effects of important independent variables, as well as male and female differences, in HI countries follows.

Table 12 presents the results of life expectancy random effects models in HI countries. UMI countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey) are not included in these analyses. The direct effect results of these models are almost the same as the direct effect results of the same models in all OECD countries. EQ-12a is a model of older male life expectancy in HI countries that includes only primary independent variables under consideration. One socio-demographic characteristic (i.e., the Education Index score), one public policy characteristic (i.e., public spending), one institutional capacity characteristic (i.e., the self-employment rate), and male labor force participation are significantly associated with older male life expectancy in HI countries when only primary independent variables are considered. As predicted and consistent with what was suggested when this model was tested in OECD countries, as the Education Index score, public spending, the self-employment rate, and the male labor force participation rate increase, older male life expectancy increases ($p < .05$, $p < .001$, $p < .10$, and $p < .05$, respectively). Only one direct effect in the primary HI model (EQ-12a) differs from in the primary model in all OECD countries (EQ-10a): in EQ-12a, there is a significant direct relationship between gross domestic product per capita, an individual capacity characteristic, and male life expectancy ($p < .05$). The relationship between the gross domestic product per capita and male life expectancy is cubic, but generally, as gross domestic product per capita increases, male life expectancy increases (see Figure 22). These effects remain

unchanged when supplementary independent variables are considered (EQ-12c).

Two direct effects in the supplementary HI model (EQ-12c) differ from in the supplementary model in all OECD countries (EQ-10c): (1) there is a significant direct and linear relationship between the Education Index score and male life expectancy in EQ12c ($p < .05$); and (2) there is a significant direct and cubic relationship between gross domestic product per capita and male life expectancy in EQ-12c ($p < .10$; see Figure 23)). In contrast to what was predicted, the remaining independent variables are not significant direct predictors of male life expectancy.

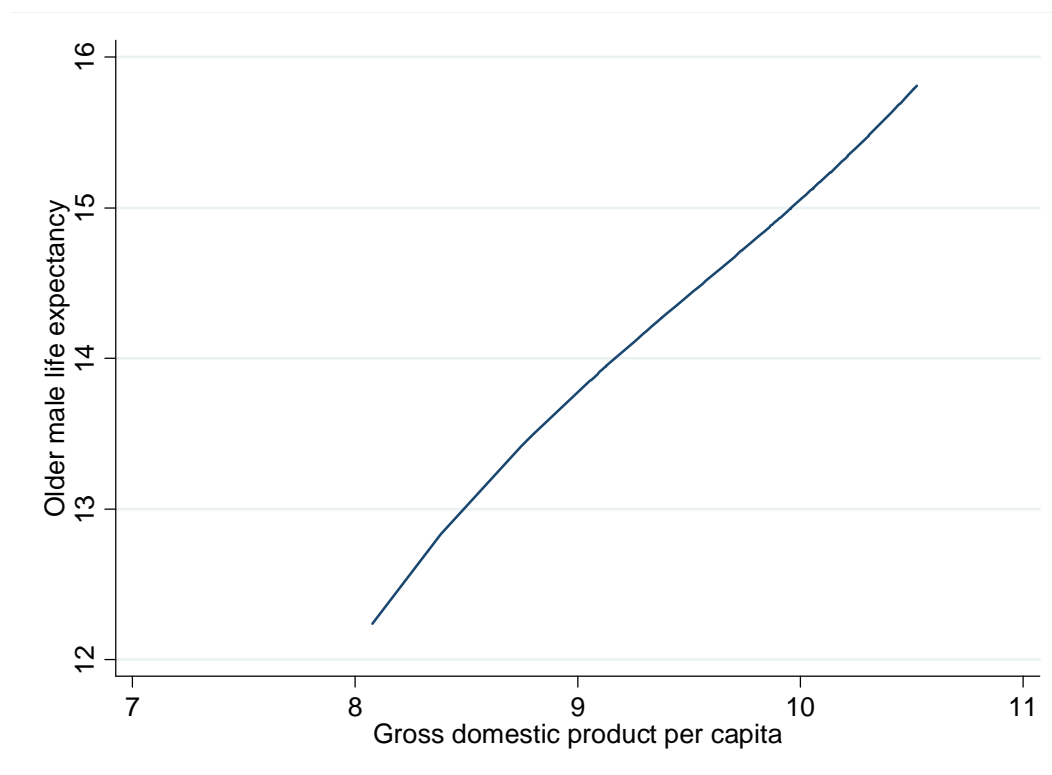


Figure 22. Gross domestic product per capita and older male life expectancy

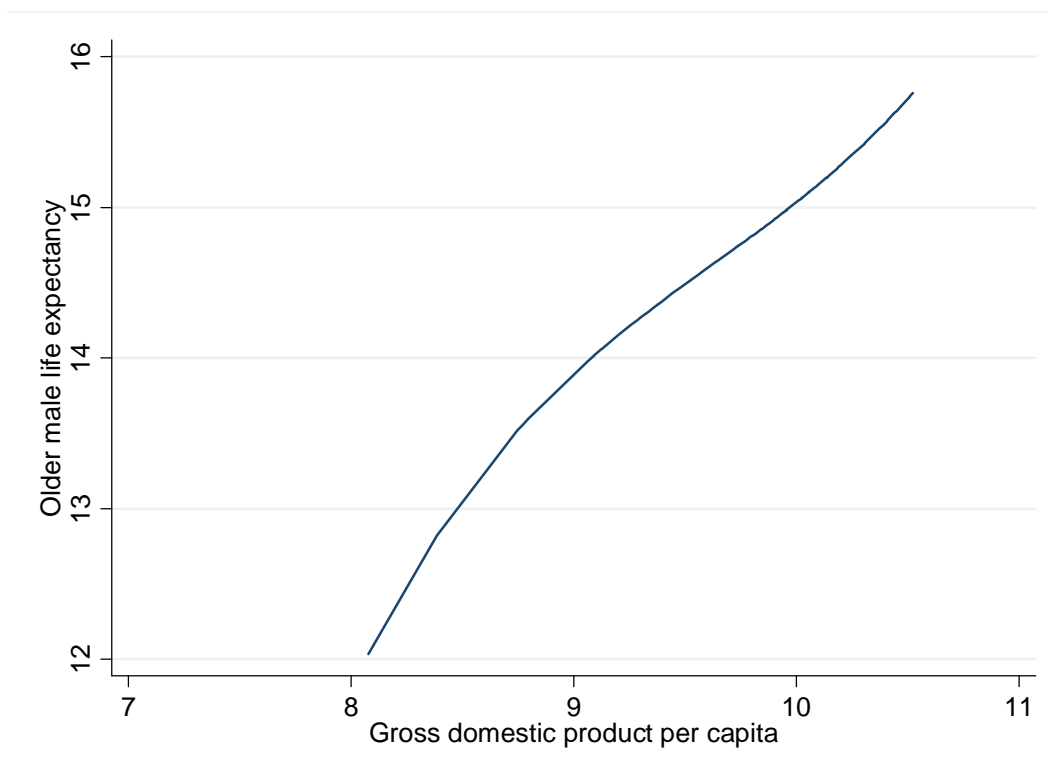


Figure 23. Gross domestic product per capita and older male life expectancy

Insert Table 12

EQ-12b is a model of older female life expectancy in HI countries that includes only primary independent variables under consideration. The primary model of female life expectancy in HI (EQ-12b) countries is essentially the same as the primary model of female life expectancy in all OECD countries (EQ-10b). Two socio-demographic characteristics (i.e., the Education Index score and the old-age dependency ratio), one individual capacity characteristic (i.e., the gross domestic product per capita), one public policy characteristic (i.e., public spending), and one institutional capacity characteristic

(i.e., female employment in the service sector) are significantly associated with older female life expectancy in HI countries when only primary independent variables are considered. As predicted and consistent with what was suggested when this model was tested in all OECD countries (EQ-10b), the Education Index score, the old-age dependency ratio, the gross domestic product per capita, and public spending increase, female life expectancy increases ($p < .05$, $p < .01$, $p < .01$, and $p < .001$, respectively). In contrast to what was predicted, but consistent with what was suggested when the same model was tested in all OECD countries, the relationship between employment in the female service sector and female life expectancy is cubic; as female employment in the service sector increases, female life expectancy decreases, increases, then decreases again ($p < .10$; see Figure 24). These effects generally remain the same when supplementary independent variables are included in the model (EQ-12d). However, in EQ-12d, the Education Index score and female employment in the service sector are not significant predictors of female life expectancy. In addition, and as predicted, as the prevalence of health risks among females, an individual capacity characteristic, decreases, female life expectancy increases in EQ-12d ($p < .10$). Also, the relationship between support for secular-rational authority over tradition, a socio-demographic characteristic, and female life expectancy is cubic; as support for secular-rational authority increases, female life expectancy increases, decreases, then increases again ($p < .10$; see Figure 25). In contrast to what was predicted, the remaining independent variables are not significant predictors of female life expectancy. The supplementary model of female life expectancy in HI countries (EQ-12d) is quite different from the supplementary model of female life

expectancy in all OECD countries (EQ-10d). Two important predictors in all OECD countries are not significant predictors in HI countries: (1) the Education Index score and (2) female employment in the service sector. Two important predictors in HI countries are not significant predictors in all OECD countries: (1) support for secular-rational authority over tradition and (2) the prevalence of health risks among females.

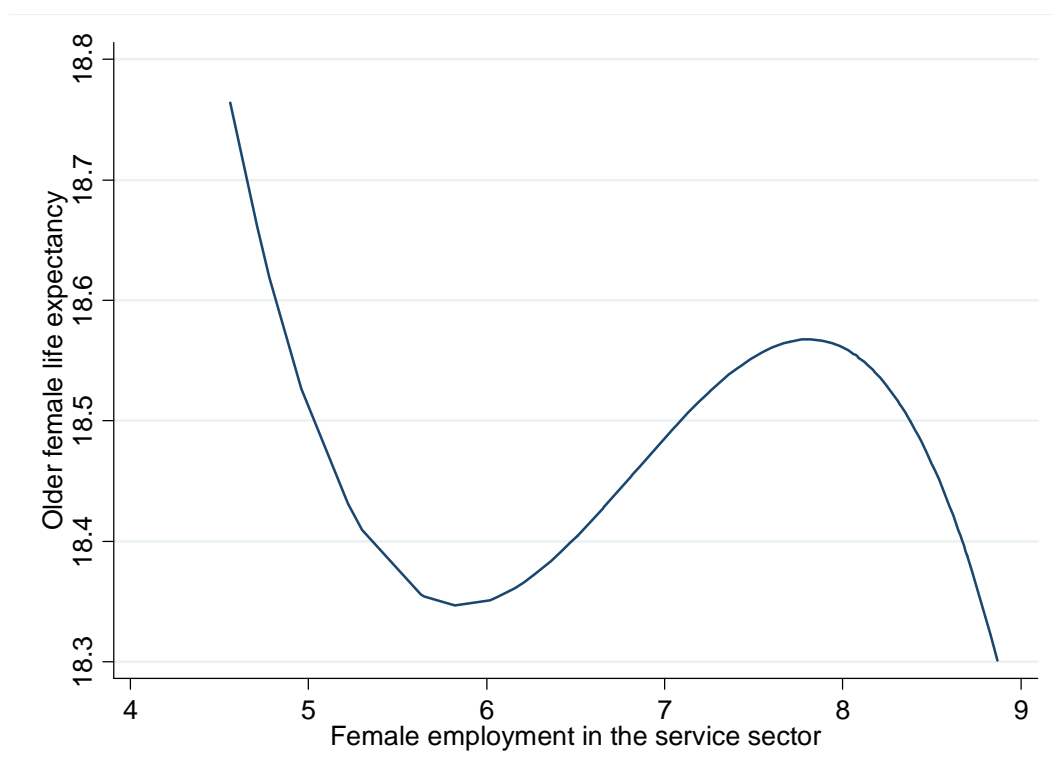


Figure 24. Female employment in the service sector and older female life expectancy

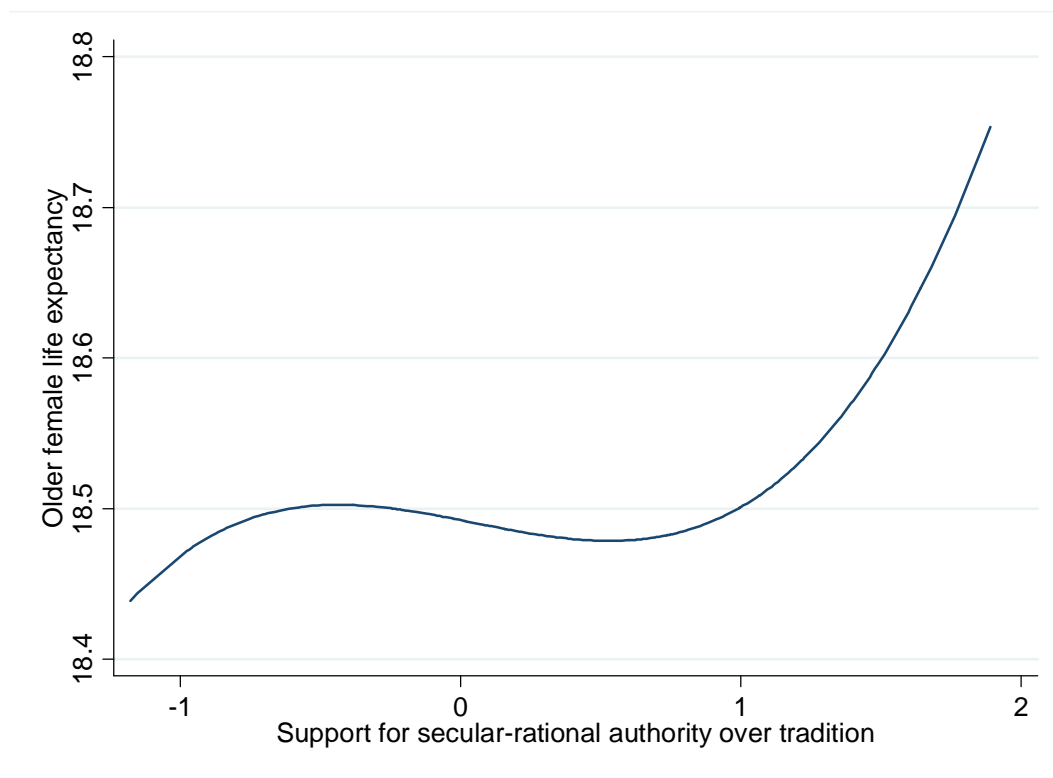


Figure 25. Support for secular-rational authority over tradition and older female life expectancy

The unstandardized regression coefficients presented under EQ-12a, EQ-12b, EQ-12c, and EQ-12d in Table 12 allow for comparisons of the strength of each predictor across models. Gender comparisons of important coefficients across these models are similar to the gender comparisons of important coefficients across the same models in all OECD countries. Only one difference should be noted. Gross domestic product per capita is a significant direct predictor of life expectancy for both males and females in HI countries. In contrast to what was predicted, as well as what was suggested when this

model was tested in all OECD countries, the effect of gross domestic product per capita on life expectancy is stronger for males than for females in HI countries.

Table 12 presents the results of path analyses used to test for mediation in HI countries. Again, because the labor force participation rate significantly predicts male life expectancy in HI countries, and not female life expectancy in HI countries, Aroian tests were run only on the male models. As indicated under EQ-12a and EQ-12c, the labor force participation rate mediates only two relationships: (1) the relationship between gross domestic product per capita, an individual capacity characteristic, and male life expectancy; and (2) the relationship between public spending, a public policy characteristic, and male life expectancy. The direct relationship between gross domestic product per capita and male life expectancy is significant and cubic ($p < .05$ and $p < .05$ in EQ-12a and EQ-12c, respectively). The indirect relationship between gross domestic product per capita and male life expectancy is significant and quadratic ($p < .05$ and $p < .10$ in EQ-12a and EQ-12c, respectively). Public spending directly increases male life expectancy, but it also indirectly decreases male life expectancy by virtue of lowering male labor force participation. The net effect (i.e., direct effect plus indirect effect) is that higher levels of public spending are associated with higher male life expectancies ($2.5607 - .8987 = 1.6620$). Two indirect effects in all OECD countries differ from in HI countries: (1) whereas an indirect relationship between the old-age dependency ratio and male life expectancy exists in all OECD countries (EQ-10a and EQ-10c), such a relationship does not exist in HI countries (EQ-12a and EQ-12c) and (2) the indirect

relationship between gross domestic product per capita is quadratic in EQ-12c, and linear in EQ-10c.

Table 13 presents the results of life expectancy random effects models in HI countries when the employment per population ratio is included as an independent variable (instead of the labor force participation rate). The results of these models are the same as the results of these models when the labor force participation rate is included as an independent variable (instead of the employment per population ratio).

Insert Table 13

Summary of Findings

The present study has some particularly important findings. First, the study suggests that work in later life strongly influences life expectancy among older adults, but that some important gender differences should be noted. Higher rates of labor force participation are associated with higher life expectancies for older males, but not for older females. It is possible that labor force participation and life expectancy among older females are not significantly associated in the present study's time period, but that they will be significantly associated in a later time period. Another explanation is that work in some capacity is relevant to both male and female life expectancy, but that the type of job relevant to male life expectancy differs from the type of job relevant to female life expectancy.

The results of the present study also suggest that public policy plays a very important role in country level labor force participation rates and life expectancy. More specifically, higher levels of public spending on social issues are associated with lower rates of labor force participation and higher life expectancies. Several other important predictors of country-level labor force participation and life expectancy are also identified.

The results of the present study provide support for the relevance of the Sherraden et al. (2001) model of productivity in later life at the country level. When the sample includes all OECD countries, socio-demographic, individual capacity, and public policy characteristics are significant predictors of country-level labor force participation. While institutional capacity characteristics are not significantly associated with country-level labor force participation, they are significantly associated with country-level employment. Socio-demographic, individual capacity, institutional capacity, and public policy characteristics are significant predictors of country-level life expectancy. Some variables are never significant predictors in the models tested; they include percent urban, perceived health status, percent of older adults at or below 50% of the median income, percent of older adults living alone, and access to old-age pensions while working. However, it is likely that these characteristics are important control variables to include in the models tested. Future researchers of country level labor force participation and life expectancy can feel comfortable employing the Sherraden et al. (2001) model or an adapted version of it in their analyses.

There are some important differences between all OECD countries and HI countries. In the present study, all OECD and HI countries look descriptively different. Furthermore, different predictors are important in the random effects models tested in all OECD and HI countries. For example, in the present study, socio-demographic characteristics were less important predictors of male labor force participation and socio-demographic, public policy, and institutional capacity characteristics were less important predictors of females labor force participation when only HI countries were included in the sample than when all OECD countries were included in the sample. Therefore, cross-national analyses should consider all OECD and HI countries separately.

Chapter V – Discussion and Conclusions

In the context of an adapted model of productive aging, the present study aimed to identify the cross-national predictors of and relationship between one form of productivity (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults. In light of the global trend toward longevity and the related potential pressure on countries to consider efforts to promote longer work lives, the results of the study can have major policy implications. In addition, the results are relevant to social workers interested in advocating for policy and programmatic changes that could enhance the well-being of older adults. While the results of the study apply to country level relationships, the study is very pertinent to individuals and their families because the study identifies macro-level factors that facilitate labor force participation and longevity among older adults.

The present study fills a gap in the existing productive aging research literature by focusing on country level predictors. Existing research on productivity in later life focuses on individual level predictors. Several scholars call for a greater emphasis on the macro-level forces that impact productivity among older adults (Estes & Mahakian, 2001; Peel et al., 2005; Sherraden et al., 2001; Taylor & Bengtson, 2001). Under the guidance of an adapted version of the Sherraden et al. (2001) model, the influence of several socio-demographic, individual capacity, public policy, and institutional capacity variables on country level labor force participation and longevity among older adults were considered. Older male and female models were explored separately.

The discussion chapter is organized as follows. The first section is dedicated to an overview and interpretation of findings related to labor force participation. The second section provides an overview and interpretation of findings related to life expectancy. The third section is a discussion of the overall implications of the study for research, policy, and social work practice. The fourth section is a discussion of the limitations of the present study and suggestions for future research. Finally, the chapter ends with a conclusion.

Overview of Findings and Contributions to the Literature: Labor Force

Participation

Labor Force Participation in All OECD Countries

Separate analyses were conducted with and without upper-middle income (“UMI”) countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey). Significant predictors of older male labor force participation in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending; and (4) Education Index scores (only in the model with supplementary independent variables). Significant predictors of older female labor force participation in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending (only in the model with supplementary independent variables); and (4) the prevalence of tuberculosis (only in the model with supplementary independent variables). While supplementary independent variables do not markedly enhance the explanatory power of the male models, they do

dramatically enhance the explanatory power of the female models. A discussion of the results of the study's labor force participation models, as well male and female differences follows.

Two socio-demographic characteristics are significantly associated with labor force participation in all OECD countries in the present study. The old-age dependency ratio is significantly associated with older male and female labor force participation. The Education Index score is significantly associated with male labor force participation when supplementary independent variables are considered.

The relationship between old-age dependency and labor force participation has not been tested before at the country level. It was hypothesized that countries with higher old-age dependency ratios would have higher labor force participation rates than would other countries because fewer younger adults are available to support the older adults in these countries. The results of the present study suggest that the relationship between the old-age dependency ratio and the labor force participation rate is quadratic for both males and females; as the old-age dependency ratio increases, the labor force participation rate decreases and then increases. Perhaps job availability influences the relationship between old-age dependency and labor force participation. Economies may need time to adjust to burgeoning older adult populations. Therefore, labor force participation may initially decrease as old-age dependency increases because jobs are not yet available for older adults interested in working. Once economies adjust to the demographic changes associated with increasing old-age dependency, jobs become available and labor force participation increases. Alternatively, prosperity may affect the relationship between the

old-age dependency ratio and the labor force relationship. As prosperity increases, older adults may be able to retire. Eventually, however, societies may need workers and call on older adults to work.

It was hypothesized that higher Education Index scores would be associated with higher labor force participation rates for both males and females. Previous individual level research indicates that higher levels of education are associated with higher levels of employment among older adults living in several countries that belong to OECD (Cahill, Giandrea, & Quinn, 2008; Erlinghagen & Hangk, 2006; Ginn & Fast, 2006; (Munnell, Soto, & Zhivan, 2008). The results of the present study indicate that the Education Index score is significantly associated with male labor force participation only when supplementary independent variables are considered. In this case, the relationship between the Education Index score and the male labor force participation rate is cubic; as the Education Index score increases, the male labor force participation rate increases, decreases, and then increases again. Education is not related to female labor force participation. The relationship between education and labor force participation is not important in most of the models tested in the present study. Perhaps education is not an important predictor of labor force participation at the cross-national level when other variables are considered, particularly in a sample of countries with similar education levels.

Two individual capacity characteristics are significantly associated with labor force participation in all OECD countries in the present study. The gross domestic product per capita is significantly associated with older male and female labor force

participation. The prevalence of tuberculosis score is significantly associated with female labor force participation when supplementary independent variables are considered.

Country level economic conditions appear to play a strong role in labor force participation behavior. In highly developed countries, labor force participation rates tend to increase with economic growth, particularly for women (International Labour Organization, 2006a). Therefore, it was hypothesized that higher gross domestic products per capita would be associated with higher labor force participation ratios, but that the effect would be stronger for females than for males. The results of the present study indicate that the relationship between the gross domestic product per capita and the labor force participation rate is cubic, but generally positive, for males, and linear for females. In both cases, as the gross domestic product per capita increases, the labor force participation rate generally increases. This finding is consistent with previous research. In contrast to what was predicted, however, the effect of gross domestic product is stronger for males than for females in the present study. Previous research suggesting that the relationship between gross domestic product per capita and labor force participation would be stronger for females than for males has not considered the variety of variables considered in the present study. The effect of gross domestic product per capita on female labor force participation may be attenuated when the effects of socio-demographics, individual capacities, public policy, and institutional capacities are considered; other variables considered in the present study may account for part of the effect of gross domestic product per capita on female labor force participation.

Existing individual level research indicates that good health is positively related to working longer (Agree & Clark, 1991; Calvo, 2006; Cahill, Giandrea, & Quinn, 2008). It was hypothesized that healthier countries would have higher labor force participation rates than would other countries. The prevalence of tuberculosis was used as a proxy measure for health in the present study. The results of the present study indicate that the relationship between the prevalence of tuberculosis and the female labor force participation rate is quadratic; as the prevalence of tuberculosis increases, the female labor force participation rate decreases and then slightly increases. The prevalence of tuberculosis is not significantly related to the male labor force participation rate in the present study. Apparently, female labor force participation is more sensitive to cross-national differences in health than male labor force participation; other factors influence male behavior. The measure of tuberculosis prevalence employed in the present study is a measure of male and female tuberculosis prevalence combined. In order to fully understand the relationship between tuberculosis prevalence and labor force participation among older adults, perhaps separate measures of older male and older female tuberculosis prevalence are required. The female labor force participation rate may initially decline as the prevalence of tuberculosis prevalence increases because females are in worse health and are unable to work. The female labor force participation rate may then increase as the prevalence of tuberculosis prevalence increases because males are in worse health and are unable to work and females need to earn incomes.

One public policy characteristic, public spending, is significantly associated with labor force participation in all OECD countries in the present study. Public policy has

long been cited as having a potentially strong impact on labor force participation behavior among older adults, though recent research suggests that this relationship may be overstated (Anderson, Gustman, & Steinmeier, 1999). Public policy largely determines the extent to which financial resources are available to older adults. Access to greater public benefit coverage is associated with shorter work lives in the existing literature (Boyle & Lahey, 2007; Campolieti, 2002; Mermin, Johnson & Murphy, 2006; Munnell & Sass, 2007; Munnell, Triest, & Jivan, 2004). It was hypothesized that countries that spend more on old-age, health, and other social issues would have lower labor force participation rates than would other countries. The results of the present study support this hypothesis, although the relationship is significant for females only when supplementary independent variables are included in the model.

It was further hypothesized that female labor force participation would be more sensitive to cross-national differences in access to public financial resources than would male labor force participation behavior. Largely because of the disproportionate extent to which women take on caregiving responsibilities, men and women often have different work histories and, thus, different work and retirement options (Evandrou & Glaser, 2004; Munnell & Jivan, 2005; O'Reilly & Caro, 1994; Zimmerman, Mitchell, Wister, & Gutman., 2000). Women are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000), making them particularly vulnerable, given the fact that their life expectancies are longer than men's life expectancies (Price, 2000). In contrast to what was predicted, the results of the present study suggest that the effect of

public spending is stronger for males than for females. When other variables are considered, financial factors do not influence female labor force behavior to the extent that was originally expected. Several other factors strongly influence female labor force participation behavior.

Employment in All OECD Countries

Older male and female employment per population ratios were used as supplementary measures of productivity in an attempt to explore whether predictors of labor force participation differed from predictors of employment. The results of models of employment generally confirm the results of models of labor force participation and both sets of models have similar explanatory power. The only difference to note is that whereas the long-term unemployment rate, an institutional capacity variable, is not a significant predictor of country level labor force participation, it is an important predictor of female employment in all OECD countries.

The Sherraden et al. (2001) model of productivity in later life suggests that several institutional factors are likely to affect productivity among older adults. Employer demand for older workers, as well as the types and quality of jobs available, are important factors to consider. Virtually no cross-national research on the relationship between long-term unemployment and labor force participation among older adults has been conducted. A United States study suggests that one obstacle to employment among older adults may be the lack of well-paying part-time positions available to older adults (Herz & Rones, 1989). An Australian analysis of employment among older workers

suggests that re-employment becomes less likely as the duration of unemployment increases (Encel & Studencki, 2004). In countries with higher long-term unemployment rates, fewer jobs are likely to be available and, therefore, it was hypothesized that labor force participation would be lower. Institutional capacity variables are not significant predictors of labor force participation in the present study. However, as predicted, the long-term unemployment rate is a significant and negative predictor of female employment in all OECD countries; as the long-term unemployment rate increases, the female employment per population ratio decreases. The long-term unemployment rate is not a significant predictor of male employment per population ratios; other factors including the old-age dependency ratio, the Education Index score, the gross domestic product per capita, and public spending strongly influence male employment behavior. Perhaps the long-term unemployment rate is a significant predictor of female employment and not female labor force participation because unemployed people are considered to be part of the labor force.

Labor Force Participation in High-Income OECD Countries

Because high-income (“HI”) and upper-middle income (“UMI”) countries look so different, separate analyses were conducted for all OECD countries and HI countries to determine whether the patterns identified in all OECD countries hold up in HI countries alone. Since most OECD countries are HI and only six are UMI, HI countries were assessed separately and UMI countries were not.

The models of labor force participation in HI countries have less explanatory power than do the models of labor force participation in all OECD countries. Furthermore, a more limited set of predictors of labor force participation is identified as important in HI countries. For older males, the gross domestic product per capita, an individual capacity characteristic, and public spending, a public policy characteristic, are important predictors of labor force participation. This is consistent with what was found when the sample included all OECD countries. No socio-demographic characteristics are significantly associated with older male labor force participation in the present study, however. While significant when the sample included all OECD countries, two socio-demographic characteristics, the old-age dependency ratio and the Education Index score, are not significant predictors of male labor force participation in HI countries. This may be due to the fact that HI countries have similar old-age dependency and education levels. Other variables are strong predictors of male labor force participation in HI countries. In addition, this analysis has a lower power than the analysis in all OECD countries.

The female models in HI countries look quite different from the female models in all OECD countries; for older females, the only significant predictor of labor force participation in HI countries is the prevalence of health risks among females, an individual capacity characteristic. While significant when the sample includes all OECD countries, the old-age dependency ratio, the prevalence of tuberculosis, gross domestic product per capita, and public spending are not significant predictors of female labor force participation in HI countries. This may be due to the fact that HI countries have more similar old-age dependency ratios, tuberculosis levels, gross domestic products per

capita, and public spending levels than do all OECD countries. The prevalence of health risks is the only variable that strongly predicts female labor force participation in HI countries. Previously conducted individual level research suggests that healthier countries are likely to have higher labor force participation rates among older adults than other countries (Agree & Clark, 1991; Calvo, 2006; Cahill, Giandrea, & Quinn, 2008). As predicted, as the prevalence of health risks increase, female labor force participation decreases. The individual level relationship between health and work holds up at the country level for females, particularly in HI countries. Healthier women are clearly more able to and interested in working longer. For males, other factors are important at the cross-national level.

Employment in High-Income OECD Countries

The results of models of employment in HI countries generally confirm the results of models of labor force participation in HI countries and both sets of models have similar explanatory power. Two differences should be noted. First, as predicted, the long-term unemployment rate, an institutional capacity characteristic, is negatively and significantly associated with the male employment per population ratio; as the long-term unemployment rate increases, the male employment per population ratio decreases. In countries with higher long-term unemployment rates, fewer jobs are likely available and, therefore, employment per population ratios are lower. Perhaps the long-term unemployment rate is a significant predictor of male employment and not male labor force participation in HI countries because unemployed people are considered to be part

of the labor force. While the long-term unemployment rate is a significant predictor of female employment per population ratios in all OECD countries, it is not a significant predictor of female employment per population ratios in HI countries; the only significant predictor of female employment in HI countries is the prevalence of health risks. Perhaps this is because the model in HI countries has less power than the model in all OECD countries. The relationship between long-term unemployment and employment among older males is not significant when the sample includes all OECD countries, but it is significant in HI countries. Perhaps this is because the long-term unemployment rate varies less in all OECD countries than in HI countries.

Second, the relationship between the gross domestic product per capita, an individual capacity characteristic, and the male employment per population ratio is quadratic (not cubic, as it is in models of male labor force participation); as the gross domestic product per capita increases, the employment per population ratio decreases and then increases. The power of the employment per population ratio models may not be strong enough to detect the cubed gross domestic product per capita term. Alternatively, the relationship between the gross domestic product per capita and the employment per population ratio may differ from the relationship between the gross domestic product per capita and the labor force participation ratio because of slight definitional differences. It is also possible that in HI countries, older males feel more financially secure and, thus, are less likely to work even as the gross domestic product per capita initially increases. Perhaps, at a certain point, males decide to take advantage of higher earnings, and so male employment per population ratios increase. Alternatively, societies may rely more

heavily on older workers as gross domestic products increase and populations become older. More research is needed to more fully understand the cross-national relationship between the gross domestic product per capita and work among older adults.

Unpaid Work in All and High-Income OECD Countries

The unpaid work rate among older adults was used as an additional supplementary measure of productivity in a set of abbreviated models. Because of the descriptive differences between HI and UMI countries, separate analyses of unpaid work were conducted for all OECD and HI countries to determine whether the patterns identified in all OECD countries hold up in HI countries alone. The model of unpaid work clearly has better explanatory power in HI countries than it does in all OECD countries. Furthermore, the explanatory power of the model of unpaid work in HI countries surpasses the explanatory power of all other productivity models in HI countries.

As predicted, the prevalence of health risks, an individual capacity characteristic, stands out as an important predictor of unpaid work in all OECD and HI countries. Health is an important predictor of unpaid work among older adults; as the prevalence of health risks increases, unpaid work decreases. This finding is consistent with previous individual level research, as well as with findings from tests of models of female labor force participation and employment in HI countries in the present study. Existing individual level research indicates that good health is positively related to working longer (Agree & Clark, 1991; Calvo, 2006; Cahill, Giandrea, & Quinn, 2008). Because the

measure of unpaid work is a combined measure for males and females, it is unclear whether the relationship would exist for males and females separately.

In HI countries, the long-term unemployment rate, an institutional capacity characteristic, is an additional important predictor of unpaid work. As long-term unemployment increases, unpaid work decreases. This finding is consistent with findings from tests of models of female employment in all OECD countries and male employment in HI countries in the present study. More research is needed to fully understand the relationship between long-term unemployment and unpaid work. In countries with higher long-term unemployment rates, one would expect fewer paid jobs to be available. Perhaps fewer unpaid jobs are also available in such economic situations. More research is also needed to determine whether the cross-national relationship between long-term unemployment and unpaid work holds up for both males and females separately.

In all OECD countries, two additional predictors (besides the prevalence of health risks) are important: (1) Education Index scores and (2) support for self-expression over survival. Both of these additional significant predictors are socio-demographic characteristics. As predicted, as Education Index scores increase, unpaid work increases. This finding is consistent with findings from previous individual level research (Cahill, Giandrea, & Quinn, 2008; Erlinghagen & Hangk, 2006; Ginn & Fast, 2006; Munnell, Soto, & Zhivan, 2008), but inconsistent with the general findings of the present study. People living in countries with higher educational levels may be more aware of the need to perform unpaid work than are people living in other countries. More research is needed to fully understand this relationship, as well as to determine whether the cross-

national relationship between education and unpaid work exists for both males and females separately.

The model of unpaid work in all OECD countries is the only model in the present study where valuing self-expression over survival stands out as an important predictor. As support for self-expression increase, unpaid work increases. Previous research suggests that values impact productive behavior among older adults, but the results of these studies are mixed (Chiu & Ngan, 1999; Lam, 2006; Williamson & Higo, 2007). The present study assessed the influence of two value dimensions: (1) the extent to which countries value secular-rational authority over tradition; and (2) the extent to which countries value self-expression over survival. Inglehart (1997) identified these two salient value dimensions based on a factor analysis of aggregated national-level data from over forty societies. Inglehart & Welzel (2005) use World Values Survey data to locate societies on a two-dimensional cultural values map using the measures of traditional versus secular-rational values and survival versus self-expression values. Countries with traditional values tend to emphasize religiosity, patriotism, authority, obedience, and family. People living in these societies idealize their parents and strongly desire making their parents proud. These people do not support divorce, abortion, euthanasia, or suicide. Social conformity and national pride are common. Countries with secular-rational values are less likely to hold these characteristics. Countries that value self-expression over survival emphasize freedom, expression, nonconformity, self-direction, and human trust. Countries that value survival over self-expression tend not to emphasize these characteristics; instead, economic security and safety are considered

very important in these countries. People living in survival-oriented countries tend to feel threatened by foreigners and cultural diversity (Inglehart & Welzel, 2005).

Many older adults choose to continue working because they find work enjoyable (Pitt-Catsouphes & Smyer, 2005). Countries with strong self-expressive and secular-rational values are more likely to emphasize human choice, as opposed to human constraint (Inglehart & Welzel, 2005). Therefore, it was hypothesized that older adults in countries with strong self-expressive and secular-rational values would be more likely to pursue work in later life than in other countries. Neither of the values variables is a significant predictor of labor force participation or employment in the present study. One values variable -- the extent to which countries value self-expression over survival -- stood out as an important predictor in the model of unpaid work in all OECD countries. As support for self-expression increases, the unpaid work rate increases. Populations less concerned with survival may have more time to complete unpaid work than do other populations. Alternatively, unpaid work may be seen as form of self-expression.

Insignificant Independent Variables

Several independent variables were unexpectedly not identified as important predictors in the models of labor force participation and employment among older adults that were tested. They include: perceived health, the percent at or below 50% of median income, the percent living alone, the existence of policies that allow for access to old-age pensions while working, percent urban, valuing secular-rational authority over tradition, the self-employment rate, and employment in the service sector. The power of the

models tested may not be strong enough to detect the cross-national relationships between these variables and productive behavior. Alternatively, these insignificant variables may not be important predictors of productive behavior in the presence of other variables considered. Many of the hypothesized relationships were based on individual level research findings and individual level relationships may not hold up at the cross-national level. More research is needed to fully understand these relationships.

Existing individual level research indicates that good health is positively related to working longer (Agree & Clark, 1991; Calvo, 2006; Cahill, Giandrea, & Quinn, 2008). Cross-nationally, healthier populations are likely to have higher labor force participation rates among older adults than other populations. While tuberculosis prevalence and the prevalence of health risks were significant predictors in various models of productive behavior tested in the present study, perceived health was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

It was hypothesized that countries with larger older adult low-income populations would have higher labor force participation rates than would other countries simply because more people in such countries need additional income than in other countries. The results from previous individual level and cross-national research on this topic are mixed (Agree & Clark, 1991; Clark, York, & Anker, 1999; Munnell, Sass, & Aubry, 2006; Munnell, Soto, & Zhivan, 2008; Pitt-Catsoupes & Smyer, 2005; Williamson & Higo, 2007). The size of the older adult low-income population was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

Individual level research suggests that personal access to social resources (e.g., co-residence and marriage) is likely to influence labor force participation behavior among older adults. Existing individual level research findings related to co-residence are mixed, however (Agree & Clarke, 1991; Cahill, Giandreas, & Quinn, 2008; Clark, York, & Anker, 1999; Davis, 2003; Ekerdt, Hackney, Kosloski, & DeViney, 2001; Ginn & Fast, 2006; Hill, 2002; Johnson, 2004; Johnson & Favreault, 2001; McNamara & Williamson, 2004; Munnell & Jivan, 2005; Pienta, 2003; Raymo, et al., 2004). It was hypothesized that countries with less access to social resources (i.e., where there are higher percentages of older adults living alone) would have higher labor force participation rates than would other countries. The percent of older adults living alone was not a significant predictor of labor force participation, employment, or unpaid work in the present study.

It was hypothesized that the existence of policies that allow for access to old-age pensions while working would be associated with higher labor force participation rates simply because work is option. Existing individual level research indicates that labor force participation behavior among older adults is often influenced by the policy-driven financial incentives inherent in public social security programs (Cahill, Giandrea, & Quinn, 2008; Ginn & Fast, 2006; Mermin, Johnson & Murphy, 2006; Morris & Caro, 1995; O'Reilly & Caro, 1994; Munnell & Sass, 2007; Munnell, Triest, & Jivan, 2004; Quinn, Burkhauser & Myers, 1990; Sherraden et al., 2001). The existence of policies that allow for access to old-age pensions while working is not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

The cross-national relationship between urbanicity and labor force participation among older adults has not been tested before. One individual level analysis indicates that, in the United States, rural elders are more likely to be underemployed (i.e., work less than they desire, be unemployed, or work for very low pay) than are urban elders (Slack & Jensen, 2008). It was hypothesized that in countries where the urban population represents a larger percentage of the total population, labor force participation rates would be higher than in other countries simply because urban areas have a greater diversity and number of jobs than do rural areas. Urbanicity was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

Little is known about the extent to which societal values impact cross-national labor force participation. Individual level research indicates that many older adults choose to continue working because they find work enjoyable (Pitt-Catsouphes & Smyer, 2005). Countries with strong secular-rational values are more likely to emphasize human choice, as opposed to human constraint (Inglehart & Welzel, 2005). Therefore, it was hypothesized that labor force participation rates in countries with strong secular-rational values may be more likely to pursue work in later life than in other countries. The extent to which countries value secular-rational authority over tradition was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

It was hypothesized that countries with higher rates of self-employment would have higher labor force participation rates than would other countries. Individual level

research suggests that job flexibility is highly valued among older workers (Pitt-Catsouphes & Smyer, 2005) and self-employment is often considered a more flexible form of employment (Cahill, Giandria, & Quinn, 2007; Cahill, Giandria, & Quinn, 2008). In fact, on the individual level, research indicates that self-employed workers do tend to work longer than others in the United States and Japan (Cahill, Giandrea, & Quinn, 2008; Fuchs, 1982; Raymo et al., 2004). A cross-state analysis of labor force participation among older males in the United States indicates that higher rates of self-employment are associated with higher rates of labor force participation among older males (Munnell, Soto, & Jhivan, 2008). High rates of self-employment seem to be associated with Japan's high labor force participation rate among older adults, as well (Williamson & Higo, 2007). The self-employment rate was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

It was hypothesized that larger service sectors would be associated with higher labor force participation rates. Since agricultural and industrial work typically entails physical labor, which can be more difficult for older adults, labor force participation rates among older adults are likely to be higher in countries with smaller agricultural and industrial employment sectors and higher services sectors than other countries. Clark, York, & Anker (1999) found that in countries with smaller percentages of employees working in agriculture, labor force participation rates among older adults were lower. Interestingly, the recent convergence of older male and older female employment rates in the United States may be due to the shift from male-dominated industrial labor to female-dominated service and office work (Cotter, Hermsen, & Vanneman, 2002). Employment

in the service sector was not a significant predictor of country level labor force participation, employment, or unpaid work in the present study.

Summary of Findings Related to Lab or Force Participation

The results of the labor force participation models tested in the present study provide support for the relevance of the Sherraden et al. (2001) model of productivity in later life at the country level. Several socio-demographic, individual capacity, public policy, and institutional capacity characteristics are significant predictors in the different models tested. Characteristics that are not significant predictors of labor force participation are likely to be important control variables.

In all OECD countries, significant predictors of older male labor force participation in all OECD countries include two socio-demographic characteristics (i.e., the old-age dependency ratio and the Education Index score), one individual capacity characteristic (i.e., the gross domestic product per capita), and one public policy characteristic (i.e., public spending). Significant predictors of older female labor force participation in all OECD countries include one socio-demographic characteristic (i.e., the old-age dependency ratio), two individual capacity characteristics (i.e., the gross domestic product per capita and the prevalence of tuberculosis), and one public policy characteristic (i.e., public spending). No institutional capacity characteristics are significantly associated with male or female labor force participation in all OECD countries. The lack of significance between institutional capacity characteristics and labor force participation among older adults is somewhat surprising because one would

think that institutional capacity characteristics would affect the extent to which jobs are available to older adults.

There are some important differences between the results of labor force participation models in all OECD countries and HI countries. In HI countries, a more limited set of predictors is significantly associated with older male and female labor force participation. The more limited set of predictors may be due to the fact that HI countries are a less diverse sample than are all OECD countries; variances for most independent variables are smaller in HI countries than in all OECD countries. For males, one individual capacity characteristic (i.e., the gross domestic product per capita) and one public policy characteristic (i.e., public spending) are significant predictors of labor force participation. No socio-demographic or individual capacity characteristics are significantly associated with older male labor force participation in HI countries, however. The female models in HI countries look quite different from the female models in all OECD countries; for females, the only significant predictor of labor force participation in HI countries is the prevalence of health risks among females, an individual capacity characteristic. No socio-demographic, public policy, or institutional capacity characteristic is significantly associated with older female labor force participation in HI countries. The differences between the results of labor force participation models in all OECD countries and HI countries suggest that cross-national analyses should consider all OECD and HI countries separately.

The models of employment, a supplementary dependent variable, generally confirm the models of labor force participation assessed in the present study. However,

one important difference should be noted: while no institutional capacity variables are associated with labor force participation, one institutional capacity characteristic, the long-term unemployment rate, is significantly associated with employment. For males, the long-term unemployment rate is significantly associated with older male employment in HI countries. For females, the long-term unemployment rate is significantly associated with older female employment in all OECD countries. It is not entirely surprising that long-term unemployment is significantly associated with employment and not labor force participation because unemployed people are considered to be part of the labor force.

One of the most interesting findings related to labor force participation in the present study is that public policy appears to play a very important role in country level labor force participation. Higher levels of public spending on social issues are associated with lower rates of labor force participation. In light of the global trend toward longevity and country efforts to promote longer work lives, this finding could have important implications.

Overview of Findings and Contributions to the Literature: Life Expectancy

Life Expectancy in All OECD Countries

Separate analyses were conducted with and without UMI countries (i.e., Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey). Significant direct predictors of older male life expectancy in all OECD countries include: (1) the labor force participation rate among older males; (2) public spending; (3) the Education Index score (only in the primary model); and (4) the male self-employment rate. Significant

indirect predictors of male life expectancy in all OECD countries include: (1) the old-age dependency ratio; (2) the gross domestic product per capita; and (3) public spending. Significant direct predictors of female life expectancy in all OECD countries include (1) the old-age dependency ratio; (2) the gross domestic product per capita; (3) public spending; (4) the Education Index score; and (5) female employment in the service sector. Supplementary independent variables do not markedly enhance the explanatory power of the models of life expectancy in all OECD countries. The models of female life expectancy have more explanatory power than do the models of male life expectancy in all OECD countries. A discussion of the direct and indirect effects of significant predictors, as well as male and female differences follows.

Recently conducted individual level research suggests that productive behavior in later life has positive health consequences (Aquino, Russell, Cutrona, & Altmaier, 1996; Calvo, 2006; Hammerman-Rozenberg, Maaravi, Cohen, & Stessman, 2005; Hinterlong, Morrow-Howell, & Rozario, 2007; Ranzijn, 2001; Rozario, Morrow-Howell, & Hinterlong, 2004; Schooler, Mulatu, & Oates, 1999). Less is known about the cross-national relationship between productive behavior and longevity, but based on individual level research, a positive relationship was hypothesized. Furthermore, it was hypothesized that labor force participation would benefit males more than it does females. In Japan, whereas more time for leisure and volunteer work is associated with longevity among males at age 65, it is not for females; participation in educational classes and access to a higher number of hospitals is associated with longevity among females at age 65 (Okamoto, 2006). In the present study, the effect of the labor force participation

rate on life expectancy is indeed stronger for males than for females. For males, the relationship between labor force participation and life expectancy is positive and linear; as the labor force participation rate increases, male life expectancy increases. In addition, as will be discussed in the following paragraphs, male labor force participation facilitates the effects of the old-age dependency ratio, the gross domestic product per capita, and public spending on male life expectancy. For females, the trend is in the same direction, but the relationship is not significant.

Some readers may inquire about why the labor force participation rate is a significant predictor of life expectancy among older males, but not older females. This finding is curious and requires additional consideration in future research. One possibility is that females simply do not derive the same benefits from paid work as do males in later life. What social or physiological mechanism would cause this sort of a gender difference, however, remains unknown. Alternatively, the models tested in the present study may not have sufficient power to detect the relationship between labor force participation and life expectancy among older females. It is also possible that the other variables included in the life expectancy models attenuate the relationship between labor force participation and life expectancy among older females.

One likely alternative explanation is that labor force participation and life expectancy among older females are not significantly associated in the present study's time period, but that they will be significantly associated in a later time period. The data analyzed in the present study suggest that the relationship between female labor force participation and female life expectancy will likely become stronger in the coming

decades, just as it did between 1980 and 2000. Furthermore, female labor force participation will likely become a significant predictor in similar cross-national models of life expectancy in the coming decades, just as male labor force participation appears to have become a more important predictor of male life expectancy over time between 1980 and 2000.

Some critics may say that labor force participation is a proxy for health among older males in the present study and that a significant relationship between higher labor force participation rates and longer life expectancies among males is really just evidence of the positive relationship between better health and longer lives. Perhaps healthier males work longer and live longer. However, because the study controlled for the prevalence of health risks among males, as well as the prevalence of tuberculosis in supplementary models, it is clear that paid work makes its own contribution to longevity in the present study. In addition, male labor force participation is not as strongly negatively correlated with the prevalence of health risks among males as female labor force participation is with the prevalence of health risks among females. If male labor force participation is a proxy for health among older males, one would expect it to be strongly correlated with the prevalence of health risks among males. Nevertheless, more research on this topic is needed. Future researchers should attempt to control for the influence of health more tightly. The prevalence of health risks measure included in the present study considers only three health issues: (1) the average number of decayed, missing, and filled teeth at age 12; (2) the percent of individuals age 15 and above who smoke daily; and (3) liters of alcohol consumption per capita among individuals age 15

and above. The tuberculosis prevalence measure was included only in supplementary models due to high levels of missing data. Other health problems may be relevant to the health status of older males and females. In addition, future researchers should seek out separate male and female measures of health. Only one of the health risk components was available for males and females separately: the percent of individuals age 15 and above who smoke daily. Tuberculosis prevalence was not available for males and females separately.

Perhaps employment in some capacity is relevant to both male and female life expectancy, but the type of job relevant to male life expectancy differs from the type of job relevant to female life expectancy. The cross-national life expectancy literature has not addressed the potential relationship between life expectancy and the institutional capacity variables identified in the Sherraden et al. (2001) model. Different types of jobs expose workers to different types of risks. Manual laborers do not live as long as non-manual laborers in Sweden (Burstrom, Johannesson, & Diderichsen, 2005). Managers live longer than manual laborers in France (Cambois, Robine, & Hayward, 2001). In Germany, older manual laborers suffer greater rates of mortality than do older salaried workers (Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007). Based on existing individual level research, it was hypothesized that countries with larger service sectors and higher self-employment rates, two institutional capacity characteristics, would have higher life expectancies than would other countries. The results of the present study suggest that, for females, the relationship between employment in the service sector and life expectancy is cubic; as female employment in the service sector

increases, female life expectancy decreases, increases, and then decreases again. The relationship between male employment in the service sector and male life expectancy is not significant in the present study. However, the relationship between the self-employment rate and male life expectancy is positive and linear; as the self-employment rate increases, male life expectancy increases. The relationship is not significant for females. Perhaps working generally in some flexible and low-stress capacity is what really matters, not the sector per se. Males are more likely to be self-employed than are females and females are more likely to work in the service sector than are males (International Labour Organization, 2006a). More research is needed to fully understand the cross-national relationships between work and life expectancy among older adults.

Two socio-demographic characteristics are significant predictors of life expectancy in all OECD countries in the present study. The old-age dependency ratio is a significant direct predictor of older female life expectancy and a significant indirect predictor of older male life expectancy. The Education Index score is a significant direct predictor of older male and female life expectancy.

The old-age dependency ratio has received virtually no attention in the cross-national mortality literature. It was hypothesized that countries with higher old-age dependency ratios would have higher life expectancies. The present study suggests that the relationship between the old-age dependency ratio and female life expectancy is linear; as the old-age dependency ratio increases, life expectancy increases. Countries with proportionately larger older adult populations may be more supportive of older

adults, such that older females have the resources they need to live longer. The old-age dependency ratio is not a significant direct predictor of male life expectancy in the presence of other predictors in the present study; however, there is a significant indirect quadratic relationship between the old-age dependency ratio and male life expectancy in the present study. The old-age dependency ratio influences male life expectancy by virtue of impacting the male labor force participation rate. As discussed in the previous section, the relationship between the old-age dependency ratio and the male labor force participation rate is quadratic; as the old-age dependency ratio increases, the labor force participation rate decreases and then increases. It was conjectured that job availability might contribute to this quadratic relationship. Initial increases in the old-age dependency ratio are associated with lower male life expectancies because initial increases in the old-age dependency ratio are associated with lower male labor force participation rates. Further increases in the old-age dependency ratio are associated with higher male life expectancies because later increases in the old-age dependency ratio are associated with higher male labor force participation rates.

Previous cross-national and individual level studies illustrate that higher educational attainment is associated with lower rates of infant mortality and higher life expectancies (Bronnum-Hansen & Baadsgaard, 2007; Frey & Field, 2000; Shandra, Nobles, London, & Williamson, 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006). The Education Index score is significantly associated with life expectancy in every model of life expectancy in all OECD countries in the present study except for the model of male life expectancy that includes supplementary independent

variables and the labor force participation rate as an independent variable. The results of the present study suggest that the relationship between the Education Index score and life expectancy is linear; as the Education Index score increases, life expectancy increases for both males and females. This finding is consistent with previous research.

One individual capacity characteristic, the gross domestic product per capita, is significantly associated with life expectancy in all OECD countries in the present study. It was hypothesized that countries with higher gross domestic product per capita would have higher life expectancies than would other countries and that the effect would be stronger for females than for males. Previous cross-national studies illustrate that economic development is a strong predictor of mortality (Crepaz & Crepaz, 2004; Kennelly et al., 2003; Munnell, Hatch, & Lee, 2004; Shandra et al., 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006). Individual level research suggests that there is a positive relationship between personal income and longevity among older adults (Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007; von Gaudecker & Scholz, 2007). Since women often leave the workforce to attend to caregiving responsibilities and, thus, have less continuous work histories than do men (Evandrou & Glaser, 2004), they are typically positioned for retirement with fewer financial resources and limited access to private pensions and public social security benefits (Flippen & Tienda, 2000; Price, 2000). Individual level research findings suggest that access to higher levels of financial resources may benefit females more than it does males.

The results of the present study indicate that the relationship between the gross domestic product per capita and female life expectancy is indeed significant; as the gross

domestic product per capita increases, female life expectancy increases. This finding is consistent with previous research. The gross domestic product per capita is not a significant direct predictor of male life expectancy; however, there is a significant indirect relationship between the gross domestic product per capita and male life expectancy. In the primary model, there is a significant indirect cubic relationship between gross domestic product per capita and male life expectancy. In the model with supplementary independent variables, there is a significant indirect linear relationship between gross domestic product per capita and male life expectancy; as the gross domestic product per capita increases, male life expectancy increases by virtue of increasing male labor force participation. More research is needed to more fully understand the shape of the indirect relationship between gross domestic product per capita and male life expectancy. As discussed in the previous section, the relationship between the gross domestic product per capita and the male labor force participation rate is cubic, but generally positive, in both the primary and the supplementary models of male labor force participation; as the gross domestic product per capita increases, the male labor force participation rate generally increases. Such increases in the male labor force participation rate are associated with higher male life expectancies.

One public policy characteristic, public spending, is significantly associated with life expectancy in all OECD countries in the present study. It was hypothesized that higher public spending would be associated with higher life expectancies, but that the effect would be stronger for females than for males. Several recent cross-national studies have focused on the relationship between access to public financial resources and health

outcomes (Crepaz & Crepaz, 2004; Kattler & Williamson, 1988; Ouweneel, 2002; Williamson, 1987; Young, 2001; Yavari & Mehrnoosh, 2006). Results of these studies are mixed. Since women have less continuous work histories than do men (Evandrou & Glaser, 2004), they are typically positioned for retirement with fewer financial resources (Flippen & Tienda, 2000; Price, 2000). Individual level research findings suggest that higher levels of public spending may benefit females more than males. The results of the present study suggest that the relationship between public spending and life expectancy is indeed significant; for both males and females, as public spending increases, life expectancy increases. In addition, public spending significantly indirectly decreases male life expectancy by virtue of lowering male labor force participation. As discussed in the previous section, higher public spending is associated with lower male labor force participation. These lower male labor force participation rates are associated with lower male life expectancies. When the direct and indirect effects of public spending are considered together, the net effect is that higher levels of public spending are associated with higher male life expectancies. As predicted, higher public spending contributes to greater longevity among older males and females. In contrast to what was predicted, however, the effect of public spending is stronger for males than for females when tested in the presence of other variables. Perhaps other variables attenuate the effect of public spending on female life expectancy. Alternatively, what may really matter for women is enhanced access to public benefits. Because of their unique work histories, some women may not be able to access public benefits, even in countries with higher public spending.

Life Expectancy in All OECD Countries When Employment is Considered

Older male and female employment per population ratios were used as supplementary measures of productivity in an attempt to explore whether employment has the same effect on life expectancy as does labor force participation, as well as to facilitate path analyses with models of employment per population ratios. The results of models of life expectancy that include the employment per population ratio as an independent variable (instead of the labor force participation rate) are essentially the same as the results of models of life expectancy that include the labor force participation rate as an independent variable (instead of the employment per population ratio). The models of life expectancy with the labor force participation rate and the employment per population ratio have very similar levels of explanatory power. Only two differences should be noted. First, whereas the Education Index score, a socio-demographic characteristic, is not significantly associated with male life expectancy in the model with the labor force participation rate and supplementary independent variables, the Education Index score is positively and significantly associated with male life expectancy in the supplementary model of life expectancy here. This finding is consistent with previous research (Bronnum-Hansen & Baadsgaard, 2007; Frey & Field, 2000; Shandra, Nobles, London, & Williamson, 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006), as well as with findings from other models of life expectancy tested in the present study.

Second, the indirect relationship between the gross domestic product per capita, an individual capacity characteristic, and male life expectancy is quadratic (not cubic) in

the primary model here. The power of the supplementary employment per population ratio and related life expectancy models may not be strong enough to detect the indirect effect of the cubed gross domestic product per capita term.

Life Expectancy in High-Income OECD Countries

Separate analyses were conducted for all OECD and HI countries to determine whether patterns identified in all OECD countries hold up in HI countries. Significant direct predictors of older male life expectancy in HI countries include: (1) the male labor force participation rate; (2) the Education Index score; (3) the gross domestic product per capita; (4) public spending; and (5) the self-employment rate. Significant indirect predictors of older male life expectancy in HI countries include: (1) the gross domestic product per capita and (2) public spending. Significant direct predictors of older female life expectancy in HI countries include: (1) the Education Index score; (2) the old-age dependency ratio; (3) the gross domestic product per capita; (4) public spending; (5) employment in the service sector; (6) support for secular-rational authority over tradition (only in the supplementary model); and (7) the prevalence of health risks among females (only in the supplementary model).

A few clear differences between results in all OECD and HI countries should be noted. The models of male life expectancy in HI countries have more explanatory power than do the models of male life expectancy in all OECD countries, as well as the models of female life expectancy in HI countries. The models of female life expectancy in HI countries have less explanatory power than do the models of female life expectancy in all

OECD countries, but supplementary independent variables do dramatically enhance the explanatory power of the female models in HI countries.

Some of the independent variables affect life expectancy differently in HI countries than they do in all OECD countries. First, the Education Index score, a socio-demographic characteristic, is positively and directly associated with male life expectancy in both the primary and supplementary models in HI countries (not just the primary model as in all OECD countries). This finding is consistent with previous research (Bronnum-Hansen & Baadsgaard, 2007; Frey & Field, 2000; Shandra, Nobles, London, & Williamson, 2004; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006), as well as with findings from other models of life expectancy tested in the present study.

Second, whereas the old-age dependency ratio, a socio-demographic characteristic, indirectly affects male life expectancy and directly affects female life expectancy in all OECD countries, it is relevant only to female life expectancy in HI countries. The old-age dependency ratio is not relevant to male life expectancy in HI countries because it is not significantly associated with male labor force participation in HI countries. As discussed in the previous section, the old-age dependency ratio is significantly associated with male life expectancy in all OECD countries, but not in HI countries. The insignificant relationship between the old-age dependency ratio and male life expectancy in HI countries may be due to the fact that HI countries have similar old-age dependency ratios.

Third, the relationship between the gross domestic product per capita, an individual capacity characteristic, and male life expectancy is significant in HI countries. The relationship between the gross domestic product per capita and male life expectancy is cubic, but generally, as the gross domestic product per capita increases, male life expectancy increases. This finding is consistent with previous research, as well as with findings from models of female life expectancy tested in the present study. The relationship between the gross domestic product per capita and male life expectancy is not significant in all OECD countries.

Fourth, the indirect relationship between gross domestic product per capita and male life expectancy is quadratic in the supplementary model of male life expectancy in HI countries, whereas it is linear in the same model in all OECD countries.

Fifth, two variables that were significantly associated with female life expectancy in all OECD countries are not important in HI countries when supplementary independent variables are considered: (1) the Education Index score and (2) employment in service sector. The relationships between the Education Index score, a socio-demographic characteristic, and employment in the service sector, an institutional capacity characteristic, and female life expectancy in HI countries may be attenuated when the effects of supplementary independent variables are considered. Alternatively, the power of the supplementary models of female life expectancy in HI countries may not be strong enough to detect these relationships.

Finally, female life expectancy is sensitive to two additional variables in HI countries: (1) support for secular-rational authority over tradition, a socio-demographic

characteristic; and (2) the prevalence of health risks among females, an individual capacity characteristic. The present study tested the relationship between longevity and societal values while controlling for economic development. Inglehart & Welzel (2005) find that economic development is associated with particular societal value changes. That is, highly developed countries are more likely to have populations that exhibit secular-rational and self-expression values, as opposed to traditional and survival values, than are other countries. It was hypothesized that the effect of economic development would be attenuated when the effects of societal values were considered; societal values would account for part of the effect of economic development on longevity. The results of the present study suggest that the relationship between the valuing secular-rational authority and female life expectancy is cubic, but generally positive, in HI countries; as support for secular-rational authority increases, female life expectancy generally increases. The relationship is significant only when the supplementary independent variables are included in the model. Secular-rational societies may be more supportive of older females, and perhaps women in general, than are traditional societies. The relationship between valuing secular-rational authority and male life expectancy is not significant. Males are less sensitive to the influence of cultural values than are females. Other variables strongly predict male life expectancy in HI countries.

Previous studies illustrate the importance of diet and positive health behaviors in promoting individual longevity (Diehr et al., 2008; Hasegawa & Hoshi, 2007; Heyden & Fodor, 1988; Kaplan, Anderson, & Kaplan, 2007; Merrill, 2004; Munnell, Hatch, & Lee, 2004; Phillips, Wannamethee, Walker, Thomson, & Smith., 1996; Prescott et al., 1998;

Reynolds, Saito, & Crimmins, 2005; Tafaro et al., 2004; Trichopoulou, 2004; Wong et al., 2006; Yavari & Mehrnoosh, 2006). It was hypothesized that countries with better health records would have higher life expectancies than would other countries. The present study suggests that the relationship between the prevalence of health risks and female life expectancy is negative and linear in HI countries; as the prevalence of health risks increases, female life expectancy decreases. The relationship is significant only when the supplementary independent variables are included in the model. This finding is consistent with findings from previous research. The power of the primary models of female life expectancy in HI countries may not be strong enough to detect the effect of the prevalence of health risks on female life expectancy. The relationship between the prevalence of health risks and male life expectancy is not significant. Apparently, female life expectancy is more sensitive to cross-national differences in health than is male life expectancy in HI countries; other factors influence male longevity in HI countries.

Life Expectancy in High-Income OECD Countries When Employment is Considered

The results of models of life expectancy in HI countries when the employment per population ratio is considered are the same as the results of models of life expectancy in HI countries when the labor force participation rate is considered.

Insignificant Independent Variables

Several independent variables were unexpectedly not identified as important predictors in the models of life expectancy that were tested. They include: percent urban,

support for self-expression over survival, prevalence of tuberculosis, perceived health, the percent at or below 50% of median income, the percent living alone, the existence of policies that allow for access to old-age pensions while working, and long-term unemployment. The power of the models tested may not be strong enough to detect the cross-national relationships between these variables and life expectancy. Alternatively, these insignificant variables may not be important predictors of life expectancy in the presence of other variables considered. Then again, many of the hypothesized relationships were based on individual level research findings and individual level relationships may not hold up at the cross-national level. More research is needed to fully understand these relationships (or lack thereof).

The present study assessed the influence of urbanicity, a socio-demographic variable that has received virtually no attention in the cross-national mortality literature. It was hypothesized that countries with greater percentages of people living in urban areas would have higher life expectancies than other countries. On the country level, urbanicity might be considered a measure of level of development, and so, older adults might live longer, on average, in countries with higher rates of urbanicity. Alternatively, if the urban populations are very poor, then life expectancy among older adults might be lower in countries with high rates of urbanicity than in other countries. Urbanicity was not a significant predictor of life expectancy in the present study.

The present study tested the relationship between longevity and support for self-expression over survival while controlling for economic development. Inglehart & Welzel (2005) find that economic development is associated with particular societal

value changes. That is, highly developed countries are more likely to have populations that value self-expression over survival, than are other countries. It was hypothesized that the effect of economic development would be attenuated when the effect of support for self-expression over survival was considered; support for self-expression over survival would account for part of the effect of economic development on longevity. Support for self-expression over survival was not a significant predictor of life expectancy in the present study.

The literature suggests that a number of problematic health conditions are likely to affect variation in longevity among older adults (Bittles et al., 2002; Dorling, Shaw, & Smith, 2006; Ewbank, 2004). Tuberculosis prevalence was included as a measure of the prevalence of problematic health conditions in the present study, but it was not a significant predictor of life expectancy. The influence of perceived health on longevity was also assessed, but it was not a significant predictor of life expectancy in the present study.

Existing research suggests that country level longevity among older adults is likely to be sensitive to several economic and financial factors (Arendt, 2005; Crepaz & Crepaz, 2004; Kennelly et al., 2003; Munnell, Hatch, & Lee, 2004; Shandra et al., 2004; Shkolnikov et al., 2007; von Gaudecker & Scholz, 2007; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006). It was hypothesized that countries with smaller low-income older adult populations would have higher life expectancies than would other countries. The percent at or below 50% of the median income was not a significant predictor of country level life expectancy in the present study.

The relationship between access to social support and health among older adults on the individual level is well established; supportive social ties promote good physical and mental health in later life (Lubben et al., 2006). The results of country level research on this topic are mixed (Eriksson, Hessler, Sundh, & Steen, 1999; Kennelly et al., 2003). The present study assessed the influence of living alone on longevity. The percent living alone was not a significant predictor of life expectancy in the present study.

The literature suggests that having access to additional financial resources can only help promote longevity among older adults (Arendt, 2005; Crepaz & Crepaz, 2004; Kennelly et al., 2003; Munnell, Hatch, & Lee, 2004; Shandra et al., 2004; Shkolnikov, Scholz, Jdanov, Stegmann, & von Gaudecker, 2007; von Gaudecker, 2007; von Gaudecker & Scholz, 2007; Williamson & Boehmer, 1997; Yavari & Mehrnoosh, 2006). It was hypothesized that the existence of policies that allow for access to old-age pensions while working would be associated with higher life expectancies. The existence of policies that allow for access to old-age pensions while working was not a significant predictor of life expectancy in the present study.

Individual level research suggests that unemployment contributes to poor physical and mental health (Ouweneel, 2002; Potter, 1991). It was hypothesized that countries with higher long-term unemployment rates would have lower life expectancies than would other countries. Long-term unemployment was not a significant predictor of life expectancy in the present study.

Summary of Findings Related to Life Expectancy

The results of the life expectancy models tested in the present study provide support for the relevance of the Sherraden et al. (2001) model of productivity in later life at the country level. Several socio-demographic, individual capacity, public policy, and institutional capacity characteristics are significant predictors in the different models tested. Characteristics that are not significant predictors of life expectancy are likely to be important control variables.

In all OECD countries, significant direct predictors of older male life expectancy include one socio-demographic characteristic (i.e., the Education Index), one public policy characteristic (i.e., public spending), one institutional capacity characteristic (i.e., the male self-employment rate), and the labor force participation rate among older males. Significant indirect predictors of male life expectancy in all OECD countries include one socio-demographic characteristic (i.e., the old-age dependency ratio), one individual capacity characteristic (i.e., the gross domestic product per capita), and one public policy characteristic (i.e., public spending). Significant direct predictors of female life expectancy in all OECD countries include two socio-demographic characteristics (i.e., the old-age dependency ratio and the Education Index score), one individual capacity characteristic (i.e., the gross domestic product per capita), one public policy characteristic (i.e., public spending), and one institutional capacity characteristic (i.e., female employment in the service sector).

There are some important differences between the results of life expectancy models in all OECD countries and HI countries. Some of the independent variables

affect life expectancy differently in HI countries than they do in all OECD countries.

For example, whereas the old-age dependency ratio indirectly affects male life expectancy and directly affects female life expectancy in all OECD countries, it is relevant only to female life expectancy in HI countries. The differences between the results of life expectancy models in all OECD countries and HI countries suggest that cross-national analyses should consider all OECD and HI countries separately.

The models of life expectancy that include the employment per population ratio as an independent variable (instead of the labor force participation rate) generally confirm the models of life expectancy that include the labor force participation rate as an independent variable in the present study. Therefore, the labor force participation rate and the employment per population ratio can essentially be used in an interchangeable manner in cross-national models of life expectancy among older males and females.

One of the most interesting findings related to life expectancy in the present study is that public policy appears to play a very important role in country level life expectancy. Higher levels of public spending on social issues are associated with higher male and female life expectancies. Policy makers, social advocates, and older adults will be interested in this finding.

Another interesting finding from the present study's life expectancy models is that work in later life strongly influences life expectancy among older adults. However, some important gender differences should be noted. Higher rates of labor force participation are associated with higher life expectancies for older males, but not for older females. While it is possible that females do not benefit from work as much as males do, it is more

likely that labor force participation and life expectancy among older females are not significantly associated in the present study's time period, but that they will be significantly associated in a later time period. Alternatively work in some capacity may be relevant to both male and female life expectancy, but the type of job relevant to male life expectancy may differ from the type of job relevant to female life expectancy.

Overall Implications of the Study

Research Implications

The present study is not a complete test of the Sherraden et al. (2001) model of productivity in later life, but it does employ an adapted version of the Sherraden et al. (2001) model to identify the cross-national predictors of and relationship between one form of productivity (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults. Therefore, the results of the present study shed some light on: (1) the relevance of the Sherraden et al. (2001) model to cross-national analyses; (2) the importance of analyzing male and female behavior and outcomes separately when employing the principles of the Sherraden et al. (2001) model; (3) the benefit of incorporating measures of cultural values into the Sherraden et al. (2001) model; and (4) the value of allowing for direct effects of socio-demographic and public policy characteristics on productive behavior in the Sherraden et al. (2001) model.

The results of the present study suggest that the principles of the Sherraden et al. (2001) model of productivity in later life are relevant at the country level and that the Sherraden et al. (2001) model of productivity provides a solid foundation for cross-

national analyses of labor force participation and life expectancy. Theoretically, the Sherraden et al. (2001) model covers constructs of great importance to productivity and longevity among older adults. Versions of the predictors identified in the Sherraden et al. (2001) model adapted to the country level prove to be important and statistically significant predictors in the models of cross-national labor force participation and life expectancy among older adults in the present study. Future researchers of country level labor force participation and life expectancy can feel comfortable employing the Sherraden et al. (2001) model or an adapted version of it in their analyses.

Furthermore, the present study underscores the need to consider the impact of macro-level forces on productivity and longevity among older adults. The Sherraden et al. (2001) model currently considers only one macro-level construct: public policy. Because the Sherraden et al. (2001) model was developed as a “guide to action,” the authors intentionally limit the model’s consideration of macro-level forces to only those factors that can be manipulated (Sherraden et al, 2001, p. 278). However, the results of the present study support the recent call for a greater understanding of societal level forces that impact productivity among older adults (Estes & Mahakian, 2001; Peel et al., 2005; Sherraden et al., 2001; Taylor & Bengtson, 2001).

The present study highlights the importance of analyzing the cross-national predictors of and relationship between labor force participation and life expectancy among older males and females separately. While the results of male and female models in the present study are similar in many ways, enough differences are identified to justify separate male and female analyses. This is not a surprise; it is clear in the existing

literature that older males and females have very different sets of productive behavior incentives and options (Evandrou & Glaser, 2004; Flippen & Tienda, 2000; O'Reilly & Caro, 1994; Price, 2000; Taylor & Bengtson, 2001). Males and females are, therefore, likely to make different decisions about whether to engage in productive activities. In addition, productive behavior is likely to affect males and females very differently.

The results of the present study suggest that some measure of cultural values should be incorporated into the Sherraden et al. (2001) model. Cultural values influence how individuals and societies view old age and aging (Takamura, 2001; World Health Organization, 2002), as well as opinions about the extent to which governments, families, and individuals are responsible for caring for older adults (Cox, 2001). Such values are likely to influence opinions about and actual patterns of productive behavior and its outcomes. In the present study, support for self-expression over survival is an important predictor of unpaid work; as support for self-expression increases, the unpaid work rate increases. In addition, support for secular-rational authority over tradition is identified as an important predictor in one model of female life expectancy; as support for secular-rational authority increases, so does female life expectancy in HI countries. The results of the present study indicate that culture does, in fact, affect productivity in later life, as well as the longevity of older adults.

The present study does not assess the first portion of the Sherraden et al. (2001) mediation model (see Figure 1). If the mediation suggested by the Sherraden et al. (2001) model is complete mediation, then the socio-demographic and public policy variables should have no direct effects on productivity in the presence of individual and

institutional capacity variables. The present study, however, allowed for the direct effects of the socio-demographic and public policy variables on country level labor force participation behavior among older adults and the results suggest that several of these variables do indeed directly affect country level labor force participation rates.

Therefore, it is recommended that the Sherraden et al. (2001) model allow for the direct effects of socio-demographic and public policy characteristics on productive behavior.

Researchers interested in studying country level labor force participation and life expectancy should be aware of a few logistical issues identified in the present study.

First, they should know that the country level labor force participation rate and employment per population ratio essentially function in the same manner. Second, researchers should make every attempt to incorporate supplementary variables employed in the present study into future studies. These supplementary variables generally enhanced model fit in the present study and, in some cases, proved to be important predictors and controls, particularly for females. Third, researchers should know that all OECD and HI countries are different in ways that can influence the results of studies similar to the present study. In the present study, results of the life expectancy models are similar in all OECD and HI countries. Results of the labor force participation models are similar for males, but different for females. Limiting the sample to countries that belong to OECD provided some control to the analyses and almost completely eliminated the potential influence of political structure, economic orientation, and level of development on the study results. Members of OECD are similar because they each have a democratic government and a market economy. However, because results of all OECD

and HI models are different in some cases, future researchers should consider tightly controlling for level of development.

The present study makes one particularly important and new contribution to the cross-national literature on productivity and longevity. The present study highlights the importance of incorporating measures of employment availability and job type trends into studies of country level productivity and measures of employment availability, job type trends, and labor force participation into studies of country level longevity. While the employment measures are not significant predictors of country level labor force participation, the long-term unemployment rate is significantly associated with country level male employment in the present study. This finding suggests that measures of employment are likely to be important to future similar studies. Similarly, the results of the present study suggest that work-related measures should be incorporated into future cross-national analyses of longevity. The percent of the female employed population working in the service sector is an important predictor of older female life expectancy. Two work-related measures are associated with older male life expectancy: (1) the male self-employment rate and (2) the male labor force participation rate. In addition, the male labor force participation rate mediates the impact of other independent variables on life expectancy among older males.

Policy Implications

In light of the global trend toward longevity and the related potential pressure on countries to adequately provide for their burgeoning older adult populations, the results

of the study can have major implications for international and national policy-makers.

The results of the study are of significance to policy analysts and leaders at international and national institutions interested in knowing more about the societal level, institutional, and policy-related factors that promote labor force participation among older adults, as well as the implications of labor force participation among older adults. Despite the ongoing debate over the will of productive aging, it has drawn great international interest from analysts and policy makers. The International Labour Organization, the United Nations, and the World Health Organization are calling for more opportunities for older adults to actively participate in and contribute to their societies. While aware that longer work lives will alleviate pressure on vulnerable social security systems in the developed countries (International Labour Organization, 2003), these organizations are also committed to the rights of older adults and view employment as a right for those who want to work (United Nations, 1999; United Nations, 2002; World Health Organization, 2002).

The most obvious finding relevant to international and national policy-makers is that public policy plays a very important role in country level labor force participation and life expectancy. More specifically, higher levels of public spending on social issues are associated with lower rates of labor force participation, particularly among males. In addition, for females, higher levels of public spending are associated with longer life expectancies. For males, there are direct and indirect relationships between public spending and life expectancy. Higher spending directly facilitates longer life expectancies, but indirectly contributes to lower life expectancies by virtue of lowering

the male labor force participation rate. In net, however, higher public spending is associated with longer male life expectancies. International leaders and national governments armed with the results of the present study can manipulate public policy to influence country level labor force participation and life expectancy as desired. For males, governments may be able to target public spending to optimally meet labor force participation and life expectancy needs as they see fit.

The present study identifies several country level socio-demographic, individual capacity, and institutional capacity characteristics that may be of interest to international and national policy-makers. Leaders interested in impacting country level labor force participation rates and life expectancies with knowledge about the results of the present study can act in supportive ways to enhance the influence of beneficial characteristics and minimize the influence of detrimental characteristics. Leaders will also know that males and females are likely to be sensitive to different factors and that some impacts will vary in size by gender. For example, in general, males are more sensitive to changes in gross domestic product per capita and public spending than are females. Females, on the other hand, are sensitive to a greater breadth of country level characteristics in some cases, including the prevalence of health risks and cultural values.

Social Work Practice Implications

The results of the present study are likely to be of significance to older adults and their advocates. Drawing conclusions about relationships at the individual level based on the results of the cross-national study would constitute an ecological fallacy (Luke,

2004). However, the present study remains very pertinent to individuals and their families. First, the study helps identify macro-level factors that facilitate labor force participation among older adults interested in working. Second, the present study identifies macro-level factors that facilitate longevity among older adults. Longevity among older adults is clearly an important measure of a population's well-being and a desirable goal for all populations and individuals.

Older adults living in OECD countries and their advocates will now have access to information about country level socio-demographic, individual capacity, public policy and institutional capacity characteristics that influence country level labor force participation rates. Country level educational attainment, age demographics, health, wealth, public policy, and long-term unemployment rates are important factors to consider. Older adults will also be aware of gender differences in factors that affect country level labor force participation.

Older adults living in OECD countries and their advocates will also have access to information about country level socio-demographic, individual capacity, public policy and institutional capacity characteristics that influence country level life expectancy. Country level educational attainment, age demographics, values, health, wealth, public policy, employment behavior, and labor force participation rates are important factors to consider. Older adults will also be aware of gender differences in factors that affect country level life expectancy.

The results of the study equip geriatric social workers and other advocates with important knowledge about the influence of societal level characteristics and resources on

labor force participation and longevity among older adults, as well as the relationship between labor force participation and longevity among older adults. Armed with such information, geriatric social workers will more thoroughly understand the impact of work among older adults. In addition, geriatric social workers will be prepared to advocate for the types of public and workplace policies and individual and institutional resources that promote labor force participation and longevity among older adults.

Limitations and Further Research

The present study provides a new understanding of the cross-national predictors of and relationship between labor force participation and longevity among older adults. It also assesses an adapted conceptual model of the new and evolving notion of productive aging. Some limitations are important to note, however.

Cross-national data available through international public agencies have some weaknesses. First, there are potential definitional differences across countries. For example, in the past, the United Nations Development Programme's measure of education included adult education trends for some countries, but not for others (United Nations Development Programme, 2006).¹⁸ Next, international agencies often harmonize national data and fill in missing data using estimation techniques. In order to facilitate harmonization, the most recent national data are not always used. Therefore, nationally reported data can differ from the data reported by international agencies (United Nations Development Programme, 2006). In a similar vein, international agencies may use

¹⁸ The present study used historical Education Index Scores that the United Nations Development Programme updated to ensure definitional consistency.

statistical techniques to improve nationally reported data if it is known that there are national reporting problems. The underlying problem is also worth highlighting; the accuracy and reliability of nationally reported data can vary from country to country due to differences in data collection strategies, reporting lapses, and other country level obstacles. Another problem with data available through international agencies is that data reporting dates can differ dramatically from data collection dates. Moreover, collection dates for each country reported in the same document can vary, even though all values are reported as from the same year (N. Brown, personal communication, April 11, 2008). Finally, statistics from different years of annual reports may not be comparable because collection and reporting methods are periodically revised (United Nations Development Programme, 2006).

A few additional general study limitations should be noted. First, the measures employed in the present study are, in some cases, proxies. Second, because the study has a correlational design, readers should be careful about interpreting findings as causal relationships. Future researchers could examine causal predictors of labor force participation and life expectancy among older adults. Third, the present study is limited to country-level analyses, and therefore, conclusions at the individual-level cannot be drawn. Multi-level research would be advantageous in the future.

In addition to those general weaknesses, there are weaknesses specific to the measures used in the present study. Appendix D contains a list of these specific weaknesses, as well as some suggestions for future cross-national studies of labor force participation and life expectancy.

Conclusions

Productive aging is a new and evolving conceptual model that emphasizes the antecedents and consequences of productivity in later life. In the context of an adapted version of the Sherraden et al. (2001) model of productivity, the present study analyzes the cross-national predictors of and relationship between one form of productivity (viz., labor force participation) and one aspect of well-being (viz., longevity) among older adults. Random effects models with pooled cross-sections and path analysis were used to analyze potential relationships with data from several international data sources. The complete cross-national longitudinal dataset consists of variables measured at five time points or during intervals centered at these time points (i.e., 1980, 1985, 1990, 1995, and 2000) for each of the thirty countries that belong to the Organisation for Economic Co-operation and Development.

In spite of its limitations, the present study makes some important contributions to the literature on productivity and longevity. First, the present study suggests that work in later life impacts life expectancy among older adults, but that some important gender differences should be noted. Higher rates of labor force participation are associated with higher life expectancies for older males, but not for older females. Labor force participation and life expectancy among older females may not be significantly related in the present study's time period, but may be sometime in the future. Alternatively, work in some capacity may be relevant to both male and female life expectancy, but the relevant type of job may differ by gender.

Second, the present study also suggests that public policy strongly influences country level labor force participation rates and life expectancy. Higher levels of public spending on social issues are associated with lower rates of labor force participation and higher life expectancies. In light of the global trend toward longevity and the related potential pressure on countries to consider efforts to promote longer work lives, these findings can have important policy implications. In addition, older adults and their families, as well as social workers interested in advocating for policy and programmatic changes that could enhance the well-being of older adults, will be interested in these findings.

Third, the results of the present study provide support for the relevance of the Sherraden et al. (2001) model of productivity in later life at the country level. Several socio-demographic, individual capacity, public policy, and institutional capacity characteristics are significant predictors of country level labor force participation and life expectancy. Characteristics that do not significantly predict labor force participation or life expectancy are likely to be important control variables. Future researchers of country level labor force participation and life expectancy can feel comfortable employing the Sherraden et al. (2001) model or an adapted version of it in their analyses.

Finally, the present study indicates that there are some important differences between all OECD countries and HI countries. All OECD and HI countries look descriptively different and different predictors are important in the random effects models tested in all OECD and HI countries. Therefore, cross-national analyses should consider all OECD and HI countries separately.

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Appendix A – Figures

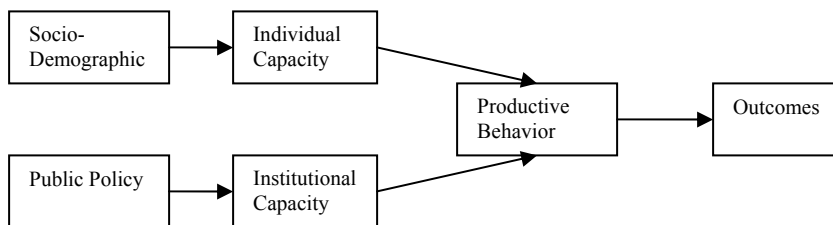


Figure 1. The Sherraden et al. (2001) model of productivity in later life

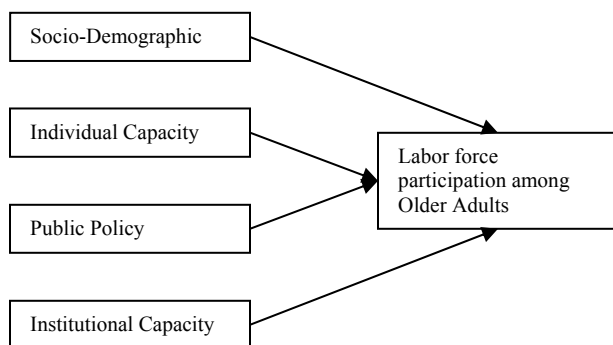


Figure 2. Labor force participation among older adults

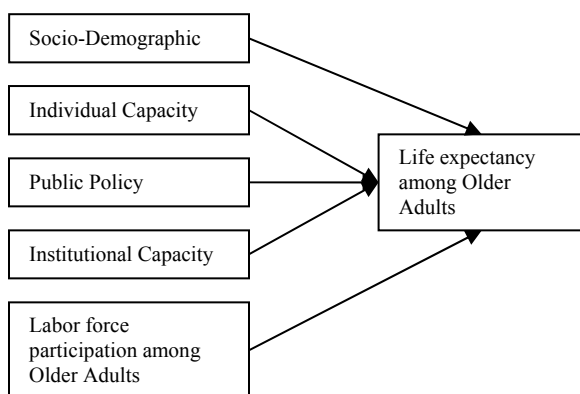


Figure 3. Life Expectancy among older adults

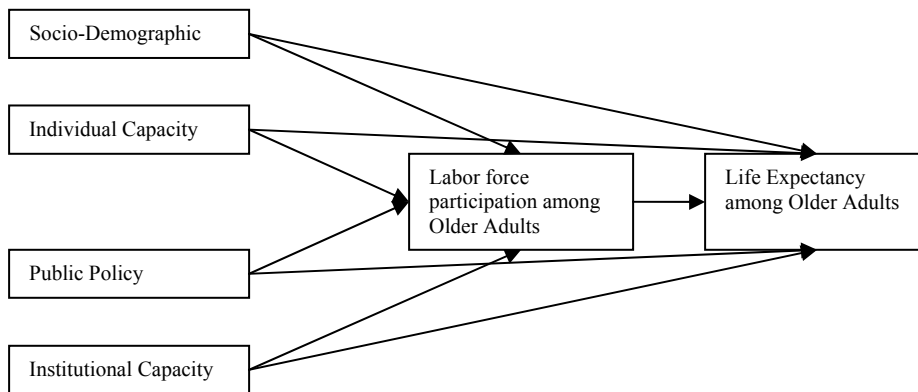


Figure 4. Combined mediating model

Appendix B – Tables

Table 1. Descriptive Characteristics of All OECD Countries

	<u>Unimputed N</u>	<u>Mean</u>	<u>Standard Deviation</u>
<u>Dependent Variables</u>			
Labor force participation rate among older females (female; age 55-64)	120	33.0612	14.5439
Labor force participation rate among older males (male; age 55-64)	120	27.4579	17.0523
Employment per population ratio among older females (female; age 55-64)	120	32.0356	14.7960
Employment per population ratio among older males (male; age 55-64)	120	24.3861	16.5902
Unpaid work rate among older adults (age 55+)	58	0.2729	0.1237
Life expectancy among older females (female; at age 65)	141	18.0291	1.6286
Life expectancy among older males (male; at age 65)	141	14.4901	1.4689
<u>Sociodemographics</u>			
Education index score (mean-centered)	137	0.0000	0.3432
Education index score squared	137	0.1177	0.1279
Education index score cubed	137	0.0179	0.0976
Old-age dependency ratio (mean-centered)	150	0.0000	4.9095
Old-age dependency ratio squared	150	24.0869	39.5136
Percent urban	150	72.0793	12.1512
Survival / self-expression score	82	0.5370	0.8040
Traditional / secular-rational score (mean-centered)	82	-0.0072	0.7941
Traditional / secular-rational score squared	82	0.6303	0.6686
Traditional / secular-rational score cubed	82	-0.0818	1.1878
<u>Individual capacities</u>			
Prevalence of health risks (female)	115	-0.0407	1.7227
Prevalence of health risks (male)	115	-0.0123	2.0144
Prevalence of health risks (female and male)	114	0.0057	1.9858
Prevalence of tuberculosis (mean-centered)	90	0.0017	0.9609
Prevalence of tuberculosis squared	90	0.9227	0.9596
Perceived health status (female)	67	54.8729	20.8384
Perceived health status (male)	67	59.2434	18.1859
Gross domestic product per capita (mean-centered)	145	-0.0010	0.7451
Gross domestic product per capita squared	145	0.5548	0.7325
Gross domestic product per capita cubed	145	-0.3614	1.3548
Percent of older adults at or below 50% of median income	88	2.5035	0.6485
Percent of older adults living alone (age 65+)	82	27.8344	9.4929
<u>Public policies</u>			
Public spending	141	1.3755	0.3193
Access to old-age pensions while working	41	0.5813	0.4935
<u>Institutional capacities</u>			
Long-term unemployment rate	112	30.7402	19.0123
Employment in service sector (female; mean-centered)	122	0.0000	1.2139
Employment in service sector squared (female)	122	1.4727	2.0469
Employment in service sector cubed (female)	122	-1.7375	6.0960
Employment in service sector (male; mean-centered)	122	0.0000	6.5276
Employment in service sector (female and male; mean-centered)	136	0.0000	9.7654
Self-employment rate (female)	113	2.2709	0.4949
Self-employment rate (male)	113	2.9245	0.4201

Table 2. Descriptive Characteristics of the 1980 and 2000 Panels

	<u>1980 Panel</u>		<u>2000 Panel</u>		<i>t</i>	<i>p</i>
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>		
<u>Dependent variables</u>						
Labor force participation rate among older females (female; age 55-64)	33.8346	13.7254	34.6938	14.9903	0.18	0.855
Labor force participation rate among older males (male; age 55-64)	38.6571	14.2718	24.0637	16.6232	-2.92	0.004
Employment per population ratio among older females (female; age 55-64)	32.8731	13.5347	33.7067	15.4427	0.18	0.860
Employment per population ratio among older males (male; age 55-64)	34.7612	13.0811	21.4217	16.2219	-2.84	0.005
Unpaid work rate among older adults (age 55+)	0.2252	0.0807	0.3198	0.1396	2.50	0.013
Life expectancy among older females (female; at age 65)	16.9741	1.3857	19.0467	1.6005	5.16	0.000
Life expectancy among older males (male; at age 65)	13.4407	1.2155	15.6333	1.3830	6.27	0.000
<u>Sociodemographics</u>						
Education index score (mean-centered)	-0.2445	0.1608	0.2867	0.3334	7.50	0.000
Education index score squared	0.0855	0.0808	0.1930	0.1577	3.14	0.002
Education index score cubed	-0.0332	0.0398	0.0907	0.1221	5.05	0.000
Old-age dependency ratio (mean-centered)	-0.9533	4.8557	1.5800	4.9462	1.97	0.049
Old-age dependency ratio squared	24.4077	41.1407	26.8797	32.6736	0.25	0.800
Percent urban	69.5367	12.5396	74.2333	11.9502	1.46	0.144
Survival / self-expression score	0.3040	0.7039	0.7383	0.8376	1.95	0.053
Traditional / secular-rational score (mean-centered)	-0.0571	0.8027	0.0339	0.8133	0.39	0.700
Traditional / secular-rational score squared	0.6454	0.6533	0.6604	0.7427	0.07	0.941
Traditional / secular-rational score cubed	-0.1651	1.1479	-0.0155	1.3487	0.42	0.677
<u>Individual capacities</u>						
Prevalence of health risks (female)	1.5453	1.4158	-1.2807	1.1467	-7.91	0.000
Prevalence of health risks (male)	1.7078	1.7231	-1.4945	1.4717	-7.24	0.000
Prevalence of health risks (female and male)	1.9503	1.6476	-1.5733	1.2325	-9.06	0.000
Prevalence of tuberculosis (mean-centered)	0.4714	0.8224	-0.4547	0.9368	-3.52	0.001
Prevalence of tuberculosis squared	0.8962	1.0738	1.0814	1.0353	0.53	0.600
Perceived health status (female)	43.7000	16.5214	57.8723	22.5970	2.60	0.009
Perceived health status (male)	47.5000	14.7795	61.5903	19.5151	2.96	0.003
Gross domestic product per capita (mean-centered)	-0.1743	0.7423	0.1931	0.7437	1.74	0.082
Gross domestic product per capita squared	0.5795	1.0019	0.5886	0.5206	0.04	0.968
Gross domestic product per capita cubed	-0.7185	1.9409	-0.0513	0.9320	1.46	0.146
Percent of older adults at or below 50% of median income	2.6288	0.7268	2.4111	0.7335	-1.05	0.296
Percent of older adults living alone (age 65+)	25.9570	9.0497	29.8543	10.1340	1.49	0.136
<u>Public policies</u>						
Public spending	1.1087	0.1632	1.6490	0.3056	8.35	0.000
Access to old-age pensions while working	0.4500	0.4983	0.6400	0.4808	1.22	0.225
<u>Institutional capacities</u>						
Long-term unemployment rate	18.1220	11.6769	31.1767	17.2477	3.35	0.001
Employment in service sector (female; mean-centered)	-0.3904	1.2766	0.4069	0.9965	2.52	0.012
Employment in service sector squared (female)	1.7766	2.5670	1.1553	1.4351	-1.08	0.280
Employment in service sector cubed (female)	-3.5523	7.4709	0.0859	4.2529	2.14	0.033
Employment in service sector (male; mean-centered)	-3.8961	4.9403	3.3376	6.6280	4.57	0.000
Employment in service sector (female and male; mean-centered)	-6.3811	8.8096	5.2495	8.5340	5.00	0.000
Self-employment rate (female)	2.2503	0.5801	2.2371	0.4592	-0.10	0.924
Self-employment rate (male)	2.87165	0.4529	2.8935	0.4048	0.19	0.847

Table 3. Labor Force Participation Random Effects Models for Older Males and Females in All OECD Countries

	Primary Models		Supplementary Models	
	EQ-3a Males	EQ-3b Females	EQ-3c Males	EQ-3d Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	1.1937 0.0240 (2.8879)	3.9185 0.0925 (2.5304)	-9.3600 -0.1884 (5.9971)	3.8653 0.0912 (2.4346)
Education index score squared			-6.8037 -0.0005 (11.3718)	
Education index score cubed			41.1559* 0.0002 (22.2088)	
Old-age dependency ratio (mean-centered)	0.2171 0.0625 (0.4174)	0.0376 0.0127 (0.3102)	0.0246 0.0071 (0.4466)	0.3459 0.1167 (0.3630)
Old-age dependency ratio squared	0.1350*** 0.3129 (0.0401)	0.0583* 0.1584 (0.0302)	0.1375*** 0.3186 (0.0420)	0.0640** 0.1738 (0.0319)
Percent urban	-0.0182 -0.0129 (0.1899)	0.0098 0.0082 (0.1416)	-0.0363 -0.0259 (0.1919)	-0.0303 -0.0254 (0.1458)
Survival / self-expression score	0.4012 0.0189 (1.1216)	0.2880 0.0159 (0.8950)	0.6882 0.0324 (1.1608)	-0.0335 -0.0019 (0.8489)
Traditional / secular-rational score (mean-centered)	0.1657 0.0077 (1.0975)	0.1228 0.0067 (0.8982)	0.3325 0.0155 (1.1566)	0.0911 0.0050 (1.0047)
<u>Individual capacities</u>				
Prevalence of health risks	-0.3427 -0.0405 (0.7772)	-0.7190 -0.0852 (0.5339)	-0.3396 -0.0401 (0.7863)	-0.6597 -0.0781 (0.5874)
Prevalence of tuberculosis (mean-centered)			-0.5257 -0.0296 (1.9659)	-1.6974 -0.1121 (1.2049)
Prevalence of tuberculosis squared				1.6293** 0.1075 (0.7656)
Perceived health status			-0.0173 -0.0185 (0.0576)	0.0178 0.0255 (0.0303)
Gross domestic product per capita (mean-centered)	11.5292** 0.5038 (5.3344)	8.9453*** 0.4583 (2.5672)	12.5345** 0.5477 (4.8337)	9.5731*** 0.4905 (2.4419)
Gross domestic product per capita squared	11.8848*** 0.5105 (3.5325)		10.1267** 0.4350 (4.2655)	
Gross domestic product per capita cubed	8.3045*** 0.6598 (3.0151)		7.7046** 0.6121 (3.1231)	
Percent of older adults at or below 50% of median income	0.0534 0.0020 (1.6906)	0.0815 0.0036 (0.9591)	0.1424 0.0054 (1.7176)	-0.1057 -0.0047 (1.0319)
Percent of older adults living alone (age 65+)	-0.1113 -0.0619 (0.1429)	-0.0021 -0.0014 (0.0978)	-0.1180 -0.0657 (0.1448)	-0.0100 -0.0065 (0.0993)
<u>Public policies</u>				
Public spending	-39.3027**** -0.7360 (8.1066)	-4.9021 -0.1076 (4.8620)	-35.7357**** -0.6692 (8.8427)	-11.2561* -0.2471 (6.0784)
Access to old-age pensions while working			0.3727 0.0108 (1.5109)	0.8874 0.0301 (1.1320)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0373 -0.0416 (0.0744)	-0.0790 -0.1033 (0.0494)	-0.0311 -0.0347 (0.0687)	-0.0926 -0.1210 (0.0608)
Employment in service sector (mean-centered)	-0.1353 -0.0518 (0.2352)	-0.6796 -0.0567 (1.0420)	-0.1815 -0.0695 (0.2279)	-0.7448 -0.0622 (0.9726)
Self-employment rate	-2.6316 -0.0648 (3.1741)	2.0508 0.0698 (1.6226)	-2.9152 -0.0718 (3.1582)	1.5005 0.0511 (1.6002)
Constant	88.2669	33.9120	86.5850	45.2119
Overall R ²	0.63	0.50	0.63	0.60

*p<.10, **p<.05, ***p<.01, ****p<.001

Note: The top number is the unstandardized regression coefficient. The middle number is the standardized regression coefficient. The number in parentheses is the standard error.

Table 4. Employment Random Effects Models for Older Males and Females in All OECD Countries

	Primary Models		Supplementary Models	
	<u>EQ-4a</u> Males	<u>EQ-4b</u> Females	<u>EQ-4c</u> Males	<u>EQ-4d</u> Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	-0.3370 -0.0068 (2.8022)	3.2938 0.0777 (2.7031)	-11.3626* -0.2287 (5.8687)	3.3182 0.0783 (2.5795)
Education index score squared			-5.8785 -0.0441 (11.1399)	
Education index score cubed			41.1619** 0.2355 (20.7507)	
Old-age dependency ratio (mean-centered)	-0.0940 -0.0271 (0.3884)	-0.1211 -0.0409 (0.3184)	-0.2844 -0.0819 (0.4042)	0.2664 0.0899 (0.3820)
Old-age dependency ratio squared	0.1240*** 0.2874 (0.0383)	0.0591* 0.1605 (0.0308)	0.1260*** 0.2920 (0.0412)	0.0675** 0.1835 (0.0322)
Percent urban	0.0299 0.0213 (0.1797)	0.0176 0.0147 (0.1415)	0.0049 0.0035 (0.1865)	-0.0272 -0.0227 (0.1440)
Survival / self-expression score	0.2572 0.0121 (1.0742)	0.4543 0.0251 (0.9558)	0.6012 0.0283 (1.1095)	0.0811 0.0045 (0.9174)
Traditional / secular-rational score (mean-centered)	0.1740 0.0081 (1.0152)	0.2506 0.0137 (0.9181)	0.3049 0.0142 (1.0891)	0.2025 0.0111 (1.0090)
<u>Individual capacities</u>				
Prevalence of health risks	-0.5342 -0.0631 (0.7527)	-0.7154 -0.0847 (0.5553)	-0.5700 -0.0673 (0.7378)	-0.6402 -0.0758 (0.6306)
Prevalence of tuberculosis (mean-centered)			-0.0397 -0.0022 (1.8293)	-2.0673 -0.1366 (1.2626)
Prevalence of tuberculosis squared				2.0751** 0.1369 (0.8302)
Perceived health status			-0.0137 -0.0146 (0.0544)	0.0104 0.0150 (0.0317)
Gross domestic product per capita (mean-centered)	14.6164*** 0.6387 (4.7641)	9.3000**** 0.4765 (2.5969)	15.5943**** 0.6814 (4.4353)	10.2204**** 0.5236 (2.4255)
Gross domestic product per capita squared	10.4173*** 0.4475 (3.3463)		8.5454** 0.3671 (3.9974)	
Gross domestic product per capita cubed	6.2622** 0.4975 (2.8228)		5.6718* 0.4506 (2.9366)	
Percent of older adults at or below 50% of median income	0.1213 0.0046 (1.5458)	0.3151 0.0140 (1.0032)	0.1841 0.0070 (1.5960)	0.1075 0.0048 (1.1054)
Percent of older adults living alone (age 65+)	-0.1017 -0.0566 (0.1223)	-0.0082 -0.0054 (0.1046)	-0.1079 -0.1079 (0.1246)	-0.0139 -0.0139 (0.1049)
<u>Public policies</u>				
Public spending	-34.5377*** -34.5377 -0.6467 (8.0130)	-3.2116 -3.2116 -0.0705 (5.1025)	-30.2663**** -30.2663 -0.5668 (8.5393)	-11.2141* -11.2141 -0.2462 (6.3320)
Access to old-age pensions while working			0.2901 0.2901 0.0084 (1.4175)	1.2481 1.2481 0.0424 (1.1491)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0540 -0.0540 -0.0602 (0.0698)	-0.0922* -0.0922 -0.1205 (0.0520)	-0.0454 -0.0454 -0.0506 (0.0650)	-0.1086* -0.1086 -0.1420 (0.0624)
Employment in service sector (mean-centered)	-0.2822 -0.2822 -0.1080 (0.2348)	-0.9528 -0.9528 -0.0795 (1.1177)	-0.3234 -0.3234 -0.1238 (0.2325)	-1.0419 -1.0419 -0.0870 (1.0321)
Self-employment rate	-2.4681 -2.4681 -0.0608 (2.7365)	2.2382 2.2382 0.0762 (1.6700)	-2.6727 -2.6727 -0.0658 (2.7401)	1.4725 1.4725 0.0501 (1.6899)
Constant	75.3325	29.4359	72.7212	43.7291
Overall R ²	0.61	0.48	0.60	0.63

*p<.10, **p<.05, ***p<.01, ****p<.001

Note: The top number is the unstandardized regression coefficient. The middle number is the standardized regression coefficient. The number in parentheses is the standard error.

Table 5. Descriptive Characteristics of the High and Upper-Middle Income OECD Countries

	<u>High-Income OECD Countries</u>		<u>Upper Middle-Income OECD Countries</u>		<i>t</i>	<i>p</i>
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>		
<u>Dependent variables</u>						
Labor force participation rate among older females (female; age 55-64)	34.9030	14.5388	21.0894	6.8852	6.06	0.000
Labor force participation rate among older males (male; age 55-64)	28.7121	16.4710	19.3056	18.5145	1.87	0.062
Employment per population ratio among older females (female; age 55-64)	33.8415	14.8651	20.2974	6.8496	5.91	0.000
Employment per population ratio among older males (male; age 55-64)	25.4548	16.1255	17.4400	17.8961	1.64	0.100
Unpaid work rate among older adults (age 55+)	0.2846	0.1220	0.2243	0.1188	1.73	0.089
Life expectancy among older females (female; at age 65)	18.4641	1.2761	15.9083	1.4931	7.69	0.000
Life expectancy among older males (male; at age 65)	14.7496	1.2996	13.2250	1.5879	4.33	0.000
<u>Sociodemographics</u>						
Education index score (mean-centered)	0.0638	0.3305	-0.2552	0.2660	4.85	0.000
Education index score squared	0.1132	0.1335	0.1356	0.1004	-0.82	0.415
Education index score cubed	0.0338	0.0973	-0.0458	0.0686	4.46	0.000
Old-age dependency ratio (mean-centered)	1.1300	4.0777	-4.5200	5.3418	5.34	0.000
Old-age dependency ratio squared	17.8911	29.2687	48.8704	60.1826	-2.70	0.007
Percent urban	74.2167	12.1509	63.5300	7.5168	5.99	0.000
Survival / self-expression score	0.7108	0.7597	-0.1582	0.5657	5.93	0.000
Traditional / secular-rational score (mean-centered)	0.0714	0.7651	-0.3217	0.8306	2.02	0.045
Traditional / secular-rational score squared	0.5901	0.6436	0.7910	0.7401	-1.22	0.225
Traditional / secular-rational score cubed	0.0620	1.1185	-0.6568	1.2812	2.50	0.013
<u>Individual capacities</u>						
Prevalence of health risks (female)	0.0176	1.6326	-0.2741	2.0301	0.66	0.509
Prevalence of health risks (male)	-0.0675	2.0333	0.2087	1.9244	-0.61	0.541
Prevalence of health risks (female and male)	-0.0165	1.9641	0.0943	2.0715	-0.23	0.815
Prevalence of tuberculosis (mean-centered)	-0.2048	0.9044	0.8276	0.7026	-5.54	0.000
Prevalence of tuberculosis squared	0.8591	0.9373	1.1769	1.0059	-1.08	0.289
Perceived health status (female)	57.1081	19.8759	45.9320	22.1937	2.10	0.039
Perceived health status (male)	60.9633	17.4839	52.3637	19.3104	2.01	0.045
Gross domestic product per capita (mean-centered)	0.2878	0.4572	-1.1561	0.5214	9.60	0.000
Gross domestic product per capita squared	0.2916	0.3237	1.6076	0.9378	-6.55	0.000
Gross domestic product per capita cubed	0.1150	0.4188	-2.2670	1.9862	5.44	0.000
Percent of older adults at or below 50% of median income	2.4974	0.6342	2.5281	0.7035	-0.17	0.867
Percent of older adults living alone (age 65+)	28.4894	9.2602	25.2143	9.9656	1.34	0.186
<u>Public policies</u>						
Public spending	1.4549	0.2920	1.0582	0.2075	7.89	0.000
Access to old-age pensions while working	0.5125	0.5001	0.8567	0.3510	-2.72	0.012
<u>Institutional capacities</u>						
Long-term unemployment rate	30.4684	19.1210	31.8273	18.5623	-0.31	0.759
Employment in service sector (female; mean-centered)	0.1761	1.1253	-0.7046	1.2991	2.92	0.004
Employment in service sector squared (female)	1.2962	1.7286	2.1785	2.8979	-1.32	0.190
Employment in service sector cubed (female)	-0.9865	5.0809	-4.7417	8.4538	1.98	0.050
Employment in service sector (male; mean-centered)	1.2124	6.2806	-4.8494	5.0931	5.10	0.000
Employment in service sector (female and male; mean-centered)	2.1526	8.5612	-8.6105	9.5495	4.92	0.000
Self-employment rate (female)	2.2544	0.4929	2.3368	0.4985	-0.70	0.483
Self-employment rate (male)	2.9011	0.4151	3.0181	0.4276	-1.07	0.287

Table 6. Labor Force Participation Random Effects Models for Older Males and Females in High-Income OECD Countries

	Primary Models		Supplementary Models	
	<u>EQ-6a</u> Males	<u>EQ-6b</u> Females	<u>EQ-6c</u> Males	<u>EQ-6d</u> Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	1.1809 0.0237 (3.4364)	3.7299 0.0848 (2.5611)	1.5183 0.0305 (3.4993)	3.9675 0.0902 (2.6377)
Old-age dependency ratio (mean-centered)	0.6693 0.1657 (0.4532)	0.1111 0.0312 (0.3393)	0.6704 0.1660 (0.4424)	0.2581 0.0724 (0.3742)
Percent urban	0.0150 0.0111 (0.1924)	0.0078 0.0065 (0.1515)	0.0420 0.0310 (0.1895)	-0.0004 -0.0004 (0.1495)
Survival / self-expression score	0.0850 0.0039 (1.1044)	0.1141 0.0060 (0.9014)	0.0424 0.0020 (1.226)	-0.1328 -0.0069 (0.9578)
Traditional / secular-rational score (mean-centered)	-0.0931 -0.0043 (1.0877)	0.1197 0.0063 (0.8954)	-0.1328 -0.0062 (1.1569)	0.2920 0.0154 (1.0489)
<u>Individual capacities</u>				
Prevalence of health risks	-1.3374 -0.1651 (1.05881)	-1.13708** -0.1277 (0.563401)	-1.3358 -0.1649 (1.10943)	-1.37957** -0.1549 (0.661541)
Prevalence of tuberculosis (mean-centered)			-0.6444 -0.0354 (2.1967)	-1.7348 -0.1079 (1.3000)
Perceived health status			-0.0505 -0.0536 (0.0581)	0.0120 0.0165 (0.0332)
Gross domestic product per capita (mean-centered)	2.9831 0.0828 (6.1802)	4.7310 0.1488 (4.2399)	3.6092 0.1002 (6.2630)	5.5528 0.1746 (4.3003)
Gross domestic product per capita squared	13.8614**** 0.2724 (3.8241)		15.1804*** 0.2983 (4.4284)	
Gross domestic product per capita cubed	6.6181* 0.1683 (3.6452)		7.1348* 0.1814 (3.7657)	
Percent of older adults at or below 50% of median income	0.6007 0.0231 (1.9968)	0.3117 0.0136 (1.0394)	0.6251 0.0241 (2.0265)	0.3319 0.0145 (1.1580)
Percent of older adults living alone (age 65+)	-0.1527 -0.0858 (0.1733)	-0.0020 -0.0013 (0.0961)	-0.1560 -0.0877 (0.1668)	-0.0026 -0.0017 (0.1061)
<u>Public policies</u>				
Public spending	-39.9441**** -0.7081 (8.7847)	-1.4283 -0.0287 (5.2847)	-41.1414**** -0.7293 (9.0893)	-7.4971 -0.1506 (6.8435)
Access to old-age pensions while working			-0.1866 -0.0057 (1.6492)	0.8873 0.0305 (1.2881)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.1425 -0.1655 (0.0935)	-0.0835 -0.1098 (0.0605)	-0.1405 -0.1631 (0.0998)	-0.1156 -0.1521 (0.0819)
Employment in service sector (mean-centered)	-0.0456 -0.0174 (0.2714)	-1.3909 -0.1077 (1.3536)	-0.0681 -0.0260 (0.3154)	-1.4437 -0.1117 (1.3269)
Self-employment rate	-1.8824 -0.0474 (3.1113)	1.8867 0.0640 (1.7035)	-1.5308 -0.0386 (3.0908)	1.5013 0.0509 (1.8200)
Constant	93.1494	31.9419	94.3076	41.4826
Overall R ²	0.63	0.42	0.62	0.52

* $p < .10$, ** $p < .05$, *** $p < .01$, **** $p < .001$

Note: The top number is the unstandardized regression coefficient. The middle number is the standardized regression coefficient. The number in parentheses is the standard error.

Table 7. Employment Random Effects Models for Older Males and Females in High-Income OECD Countries

	Primary Models		Supplementary Models	
	<u>EQ-7a</u> Males	<u>EQ-7b</u> Females	<u>EQ-7c</u> Males	<u>EQ-7d</u> Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	-1.3189 -0.0265 (3.3157)	2.9600 0.0673 (2.8309)	-1.0223 -0.0205 (3.4337)	3.2973 0.0750 (2.9660)
Old-age dependency ratio (mean-centered)	0.2642 0.0654 (0.4261)	-0.0673 -0.0189 (0.3438)	0.2642 0.0654 (0.4277)	0.1263 0.0354 (0.3953)
Percent urban	0.1038 0.0766 (0.1858)	0.0158 0.0132 (0.1526)	0.1215 0.0897 (0.1800)	0.0154 0.0129 (0.1498)
Survival / self-expression score	0.0164 0.0008 (1.0132)	0.3117 0.0163 (0.9710)	-0.0144 -0.0007 (1.1358)	0.0272 0.0014 (1.069)
Traditional / secular-rational score (mean-centered)	-0.0999 -0.0046 (0.9841)	0.2373 0.0125 (0.9261)	-0.1529 -0.0071 (1.0705)	0.4707 0.0248 (1.1119)
<u>Individual capacities</u>				
Prevalence of health risks	-1.2988 -0.1603 (0.9916)	-1.1464* -0.1287 (0.6028)	-1.3646 -0.1685 (1.0376)	-1.4867* -0.1669 (0.7415)
Prevalence of tuberculosis (mean-centered)			-0.0536 -0.0029 (1.9222)	-2.1159 -0.1316 (1.3636)
Perceived health status			-0.0341 -0.0362 (0.0557)	0.0088 0.0120 (0.0346)
Gross domestic product per capita (mean-centered)	12.4252** 0.3449 (5.2260)	5.3817 0.1692 (4.2963)	13.4200** 0.3725 (5.2944)	6.3528 0.1998 (4.3781)
Gross domestic product per capita squared	10.3307*** 0.2030 (3.2731)		11.5836*** 0.2276 (3.7544)	
Percent of older adults at or below 50% of median income	0.4981 0.0192 (1.7747)	0.6117 0.0267 (1.0798)	0.4891 0.0188 (1.8301)	0.6311 0.0275 (1.2404)
Percent of older adults living alone (age 65+)	-0.1532 -0.0861 (0.1590)	-0.0118 -0.0075 (0.1037)	-0.1611 -0.0906 (0.1508)	-0.0099 -0.0063 (0.1178)
<u>Public policies</u>				
Public spending	-33.4833**** -0.5935 (8.1111)	0.3727 0.0075 (5.5015)	-34.5853**** -0.6131 (8.3515)	-7.4157 -0.1489 (7.3789)
Access to old-age pensions while working			-0.2196 -0.0067 (1.5608)	1.2971 0.0446 (1.3334)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.1698* -0.1698 -0.1971 (0.0904)	-0.0979 -0.0979 -0.1287 (0.0643)	-0.1717* -0.1717 -0.1993 (0.0939)	-0.1373 -0.1373 -0.1806 (0.0850)
Employment in service sector (mean-centered)	-0.1940 -0.1940 -0.0740 (0.2760)	-1.7062 -1.7062 -0.1321 (1.5051)	-0.2018 -0.2018 -0.0769 (0.3073)	-1.7946 -1.7946 -0.1389 (1.4977)
Self-employment rate	-1.8862 -1.8862 -0.0475 (2.7761)	2.1655 2.1655 0.0734 (1.7488)	-1.2771 -1.2771 -0.0322 (2.9687)	1.5725 1.5725 0.0533 (1.9742)
Constant	75.0129	26.9684	75.4155	38.9011
Overall R ²	0.57	0.39	0.57	0.53

* $p < .10$, ** $p < .05$, *** $p < .01$, **** $p < .001$

Note: The top number is the unstandardized regression coefficient. The middle number is the standardized regression coefficient. The number in parentheses is the standard error.

Table 8. Descriptive Characteristics of All, High, and Upper-Middle Income OECD Countries for 1980, 1990, and 2000

	Trait Status	All OECD Countries		High-Income OECD Countries		Upper Middle-Income OECD Countries		t	p
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
<u>Dependent variables</u>									
Labor force participation rate among older females (female; age 55-64)	undetermined	33.8404	14.5067	35.8590	14.5112	21.7286	6.2382	5.05	0.000
Labor force participation rate among older males (male; age 55-64)	undetermined	28.5978	17.5948	29.9701	16.8000	20.3637	19.9550	1.38	0.168
Employment per population ratio among older females (female; age 55-64)	undetermined	33.0011	14.9384	35.0154	15.0221	20.9153	6.1729	4.98	0.000
Employment per population ratio among older males (male; age 55-64)	undetermined	25.8123	17.2451	27.0177	16.5049	18.5799	19.7459	1.22	0.221
Unpaid work rate among older adults (age 55+)	undetermined	0.2726	0.1220	0.2812	0.1205	0.2354	0.1221	1.08	0.279
Life expectancy among older females (female; at age 65)	positive	18.0833	1.6919	18.5029	1.3702	15.9857	1.5868	5.37	0.000
Life expectancy among older males (male; at age 65)	positive	14.5702	1.5512	14.8229	1.4089	13.3071	1.6167	3.17	0.002
<u>Sociodemographics</u>									
Education index score (mean-centered)	positive	-0.0089	0.3420	0.0533	0.3291	-0.2576	0.2729	3.79	0.000
Education index score squared	positive	0.1169	0.1286	0.1110	0.1345	0.1404	0.0986	-0.87	0.387
Education index score cubed	positive	0.0170	0.0984	0.0338	0.0981	-0.0500	0.0656	4.05	0.000
Old-age dependency ratio (mean-centered)	undetermined	0.1578	4.9609	1.2467	4.1662	-4.1978	5.4803	3.85	0.000
Old-age dependency ratio squared	undetermined	24.6077	39.1607	18.8875	29.5534	47.4886	59.4620	-1.93	0.054
Percent urban	undetermined	72.0611	12.2071	74.1903	12.2302	63.5444	7.5099	4.58	0.000
Survival / self-expression score	undetermined	0.5135	0.8018	0.6932	0.7441	-0.2055	0.5957	4.64	0.000
Traditional / secular-rational score (mean-centered)	undetermined	0.0039	0.7886	0.0732	0.7576	-0.2735	0.8492	1.33	0.188
Traditional / secular-rational score squared	undetermined	0.6212	0.6645	0.5786	0.6420	0.7919	0.7248	-1.06	0.291
Traditional / secular-rational score cubed	undetermined	-0.0778	1.1666	0.0460	1.1023	-0.5728	1.2832	1.64	0.104
<u>Individual capacities</u>									
Prevalence of health risks (female)	negative	0.0565	1.7959	0.0956	1.7336	-0.1000	2.0238	0.34	0.736
Prevalence of health risks (male)	negative	0.0602	2.0988	0.0134	2.1190	0.2476	2.0106	-0.39	0.699
Prevalence of health risks (female and male)	negative	0.1043	2.0739	0.0678	2.0465	0.2501	2.1798	-0.29	0.772
Prevalence of tuberculosis (mean-centered)	negative	-0.0097	0.9787	-0.2117	0.9314	0.7983	0.7109	-4.43	0.000
Prevalence of tuberculosis squared	negative	0.9569	0.9940	0.9111	0.9791	1.1399	1.0345	-0.68	0.496
Perceived health status (female)	positive	55.1907	20.4996	57.0644	19.7325	47.6956	21.8159	1.37	0.175
Perceived health status (male)	positive	58.6722	18.3187	60.5232	17.8068	51.2683	18.5157	1.76	0.079
Gross domestic product per capita (mean-centered)	positive	0.0044	0.7568	0.3001	0.4652	-1.1783	0.4987	7.89	0.000
Gross domestic product per capita squared	positive	0.5721	0.7565	0.3061	0.3464	1.6357	0.9850	-4.69	0.000
Gross domestic product per capita cubed	positive	-0.3677	1.4374	0.1236	0.4664	-2.3329	2.1562	3.85	0.000
Percent of older adults at or below 50% of median income	negative	2.5274	0.6720	2.5377	0.6424	2.4860	0.7796	0.20	0.842
Percent of older adults living alone (age 65+)	undetermined	27.7333	9.5990	28.5068	9.2954	24.6394	10.1817	1.09	0.281
<u>Public policies</u>									
Public spending	undetermined	1.3793	0.3334	1.4579	0.3111	1.0651	0.2131	5.85	0.000
Access to old-age pensions while working	undetermined	0.5722	0.4950	0.5111	0.5002	0.8167	0.3880	-1.71	0.103
<u>Institutional capacities</u>									
Long-term unemployment rate	negative	26.9987	17.9145	26.3272	17.9165	29.6844	17.7022	-0.67	0.501
Employment in service sector (female; mean-centered)	undetermined	0.0100	1.2153	0.1664	1.1498	-0.6155	1.2713	2.04	0.044
Employment in service sector squared (female)	undetermined	1.4755	2.0375	1.3478	1.7516	1.9861	2.8633	-0.77	0.442
Employment in service sector cubed (female)	undetermined	-1.6942	6.0532	-1.0407	5.1450	-4.3080	8.3131	1.38	0.170
Employment in service sector (male; mean-centered)	undetermined	-0.1976	6.6799	0.9324	6.5389	-4.7177	5.1648	3.36	0.001
Employment in service sector (female and male; mean-centered)	undetermined	-0.3445	10.1427	1.8383	8.9880	-9.0757	9.8158	3.91	0.000
Self-employment rate (female)	undetermined	2.2741	0.5048	2.2473	0.5044	2.3814	0.4932	-0.78	0.438
Self-employment rate (male)	undetermined	2.9265	0.4246	2.8895	0.4203	3.0745	0.4103	-1.41	0.163

Note: The t-test values here refer to a comparison of mean values for high-income and upper middle-income OECD countries.

Table 9. Unpaid Work among Older Adults Random Effects Models

	<u>EQ-9a</u> All OECD countries	<u>EQ-9b</u> High-income OECD countries
<u>Sociodemographics</u>		
Education index score (mean-centered)	0.1124* (0.0600)	0.0729 (0.0517)
Survival / self-expression score	0.0619** (0.0287)	0.0347 (0.0274)
Traditional / secular-rational score (mean-centered)	0.0107 (0.0192)	-0.0042 (0.0185)
<u>Individual capacities</u>		
Prevalence of health risks	-0.0159** (0.0079)	-.0216*** (0.0082)
Gross domestic product per capita (mean-centered)	-0.0396 (0.0317)	-0.0431 (0.0592)
Percent of older adults living alone (age 65+)	0.0009 (0.0020)	0.0008 (0.0020)
<u>Public policies</u>		
Public spending	-0.0713 (0.0616)	-0.0521 (0.0610)
<u>Institutional capacities</u>		
Long-term unemployment rate	-0.0009 (0.0006)	-0.0014** (0.0006)
Employment in service sector (mean-centered)	0.0029 (0.0021)	0.0050 (0.0033)
Constant	0.3287	0.3370
Overall R ²	0.58	0.68

* $p < .10$, ** $p < .05$, *** $p < .01$, **** $p < .001$

Note: The first number reported is the unstandardized regression coefficient. The number in parentheses is the standard error.

Table 10. Life Expectancy Random Effects Models for Older Males and Females in All OECD countries

	Primary Models		Supplementary Models	
	EQ-10a Males	EQ-10b Females	EQ-10c Males	EQ-10d Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	0.7215** (0.3021) 0.0245	0.5010* (0.2690)	0.9175 (0.5770) -0.2087 -0.1226 (0.7040) -0.1517 -0.5275 (1.8490) 0.9178	0.5032* (0.2822)
Education index score squared				
Education index score cubed				
Old-age dependency ratio (mean-centered)	0.0228 (0.0309) 0.0044	0.0752** (0.0346)	0.0221 (0.0319) 0.0005	0.0758** (0.0347)
Old-age dependency ratio squared	-0.0023 (0.0034) 0.0028*		-0.0026 (0.0035) 0.1375*	
Percent urban	0.0207 (0.0152) -0.0004	0.0061 (0.0126)	0.0203 (0.0158) -0.0008	0.0053 (0.0126)
Survival / self-expression score	0.0132 (0.1015) 0.0082	-0.0032 (0.1054)	0.0050 (0.1063) 0.0153	0.0078 (0.1081)
Traditional / secular-rational score (mean-centered)	-0.0447 (0.0876) 0.0034	0.0225 (0.0881)	-0.0410 (0.0943) 0.0074	0.0226 (0.0952)
<u>Individual capacities</u>				
Prevalence of health risks	-0.0541 (0.0578) -0.0070	-0.0766 (0.0518)	-0.0622 (0.0629) -0.0076	-0.0755 (0.0542)
Prevalence of tuberculosis (mean-centered)			0.0811 (0.1721) -0.0117	0.1319 (0.1607)
Perceived health status			0.0018 (0.0057) -0.0004	0.0022 (0.0032)
Gross domestic product per capita (mean-centered)	0.4005 (0.2803) 0.2363	0.8547*** (0.2712)	0.3528 (0.3325) 0.2795*	0.8452*** (0.2758)
Gross domestic product per capita squared				
Gross domestic product per capita cubed	0.2436*		0.2258	
Percent of older adults at or below 50% of median income	0.1702* 0.0398 (0.1180) 0.0011	0.0298 (0.1112)	0.1718 0.0332 (0.1210) 0.0032	0.0184 (0.1119)
Percent of older adults living alone (age 65+)	-0.0076 (0.0096) -0.0023	-0.0094 (0.0091)	-0.0077 (0.0093) -0.0026	-0.0088 (0.0091)
<u>Public policies</u>				
Public spending	2.1945**** (0.5759) -0.8057**	1.5725**** (0.3948)	2.2872**** (0.6102) -0.7969**	1.7312**** (0.4513)
Access to old-age pensions while working			-0.0590 (0.1443) 0.0083	-0.0490 (0.1395)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0036 (0.0060) -0.0008	-0.0002 (0.0042)	-0.0040 (0.0060) -0.0007	0.0002 (0.0044)
Employment in service sector (mean-centered)	0.0326 (0.0225) -0.0028	0.2215 (0.1604)	0.0358 (0.0223) -0.0040	0.2307 (0.1550)
Employment in service sector squared		-0.1736* (0.0951)		-0.1753* (0.0987)
Employment in service sector cubed		-0.0790* (0.0395)		-0.0798** (0.0387)
Self-employment rate	0.5334** (0.2487) -0.0539	0.1060 (0.2031)	0.5413* (0.2718) -0.0650	0.1112 (0.1962)
<u>Labor force participation</u>				
Labor force participation rate among older adults (age 55-64)	0.0205** (0.0085)	0.0041 (0.0096)	0.0223** (0.0095)	0.0053 (0.0101)
Constant	8.0504	15.3265	7.8751	15.0203
Overall R ²	0.58	0.66	0.59	0.67

*p<.10, **p<.05, ***p<.01, ****p<.001

Note: The top number is the unstandardized regression coefficient. The number in parentheses is the standard error. The third number in the male columns is the indirect effect of the independent variable on older male life expectancy by virtue of the older male labor force participation rate. In a couple of cases in the male columns, only the third number is presented because direct paths were not modeled.

Table 11. Life Expectancy Random Effects Models for Older Males and Females in All OECD countries

	Primary Models		Supplementary Models	
	EQ-11a Males	EQ-11b Females	EQ-11c Males	EQ-11d Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	0.7731** (0.3313)	0.5065* (0.2690)	0.7336** (0.3152)	0.5084* (0.2815)
Education index score squared	-0.0073		-0.2625	
Education index square cubed			-0.1358	
Old-age dependency ratio (mean-centered)	0.0224 (0.0330)	0.0761** (0.0347)	0.9508 0.0248 (0.0309)	0.0765** (0.0349)
Old-age dependency ratio squared	-0.0020 -0.0009 (0.0036)		-0.0066 -0.0025 (0.0035)	
Percent urban	0.0027* 0.0137 (0.0137)	0.0061 (0.0127)	0.0029* 0.0177 (0.0149)	0.0052 (0.0126)
Survival / self-expression score	0.0006 0.0253 (0.1024)	-0.0035 (0.1056)	0.0001 0.0148 (0.1068)	0.0070 (0.1081)
Traditional / secular-rational score (mean-centered)	0.0056 -0.0487 (0.0901)	0.0223 (0.0882)	0.0139 -0.0431 (0.0926)	0.0223 (0.0954)
	0.0038		0.0070	
<u>Individual capacities</u>				
Prevalence of health risks	-0.0551 (0.0599)	-0.0777 (0.0516)	-0.0611 (0.0631)	-0.0764 (0.0539)
Prevalence of tuberculosis (mean-centered)	-0.0115		-0.0132 0.0880 (0.1754)	0.1321 (0.1611)
Perceived health status			-0.0009 0.0012 (0.0054)	0.0023 (0.0032)
Gross domestic product per capita (mean-centered)	-0.0658 (0.3866)	0.8618*** (0.2709)	0.3130 (0.3079)	0.8469*** (0.2742)
Gross domestic product per capita squared	0.3157* 0.0261 (0.3042)		0.3602**	
Gross domestic product per capita cubed	0.2250* 0.3157 (0.2792)		0.1974	
Percent of older adults at or below 50% of median income	0.1353 0.0562 (0.1200)	0.0297 (0.1113)	0.1310 0.0327 (0.1256)	0.0175 (0.1120)
Percent of older adults living alone (age 65+)	0.0026 -0.0078 (0.0100)	-0.0094 (0.0091)	0.0043 -0.0085 (0.0093)	-0.0088 (0.0091)
	-0.0022		-0.0025	
<u>Public policies</u>				
Public spending	2.179*** (0.7551)	1.5597*** (0.3903)	2.3139*** (0.5924)	1.7202*** (0.4460)
Access to old-age pensions while working	-0.7460**		-0.6992** -0.0610 (0.1432)	-0.0504 (0.1403)
			0.0067	
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0028 (0.0064)	-0.0003 (0.0042)	-0.0036 (0.0061)	0.0002 (0.0044)
Employment in service sector (mean-centered)	-0.0012 0.0388 (0.0236)	0.2232 (0.1611)	-0.0010 0.0382 (0.0229)	0.2331 (0.1555)
Employment in service sector squared	-0.0061	-0.1731* (0.0959)	-0.0075	-0.1760* (0.0997)
Employment in service sector cubed		-0.0793* (0.0398)		-0.0804** (0.0391)
Self-employment rate	.5385** (0.2421)	0.1071 (0.2017)	0.5581** (0.2573)	0.1125 (0.1943)
	-0.0533		-0.0617	
<u>Labor force participation</u>				
Employment per population ratio among older adults (age 55-64)	0.0216** (0.0090)	0.0032 (0.0091)	0.0231** (0.0093)	0.0048 (0.0096)
Constant	8.5700	15.3745	8.0391	15.0585
Overall R ²	0.62	0.66	0.60	0.67

*p<.10, **p<.05, ***p<.01, ****p<.001

Note: The top number is the unstandardized regression coefficient. The number in parentheses is the standard error. The third number in the male columns is the indirect effect of the independent variable on older male life expectancy by virtue of the older male employment per population ratio. In a couple of cases in EQ-10c, only the third number is presented because direct paths were not modeled.

Table 12. Life Expectancy Random Effects Models for Older Males and Females in High-Income OECD Countries

	Primary Models		Supplementary Models	
	EQ-12a Males	EQ-12b Females	EQ-12c Males	EQ-12d Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	0.6961** (0.3416) 0.0266	0.5770** (0.2834)	0.6829** (0.3383) 0.0352	0.4374 (0.2986)
Old-age dependency ratio (mean-centered)	0.0316 (0.0296) 0.0151	0.0978*** (0.0354)	0.0329 (0.0305) 0.0156	0.0818** (0.0372)
Percent urban	-0.0034 (0.0115) 0.0003	0.0031 (0.0119)	-0.0040 (0.0117) 0.0010	0.0005 (0.0104)
Survival / self-expression score	0.0070 (0.1031) 0.0019	-0.0115 (0.1092)	-0.0111 (0.1047) 0.0010	0.0188 (0.1295)
Traditional / secular-rational score (mean-centered)	-0.0063 (0.0906) -0.0021	0.0385 (0.0892)	-0.0007 (0.0977) -0.0031	-0.2838 (0.2184)
Traditional / secular-rational score squared				0.0337 (0.1221)
Traditional / secular-rational score cubed				.2454* (0.1446)
<u>Individual capacities</u>				
Prevalence of health risks	-0.0244 (0.0655) -0.0301	-0.0650 (0.0673)	-0.0146 (0.0687) -0.0310	-1.228* (0.0621)
Prevalence of tuberculosis (mean-centered)			-0.0402 (0.1541) -0.0150	0.0877 (0.1669)
Perceived health status			0.0016 (0.0056) -0.0012	0.0004 (0.0041)
Gross domestic product per capita (mean-centered)	0.1133 (0.4544) 0.3119	1.0630*** (0.3770)	0.0890 (0.5145) 0.3522**	0.8159** (0.3735)
Gross domestic product per capita squared	-0.2941 (0.3178) 0.3119**		-0.3364 (0.3342) 0.3522**	
Gross domestic product per capita cubed	0.5602** (0.2751) 0.1489		0.5513* (0.2969) 0.1655	
Percent of older adults at or below 50% of median income	0.0152 (0.1085) 0.0135	0.0017 (0.1262)	0.0170 (0.1083) 0.0145	-0.0480 (0.1244)
Percent of older adults living alone (age 65+)	-0.0065 (0.0110) -0.0034	-0.0090 (0.0106)	-0.0074 (0.0109) -0.0036	-0.0115 (0.0119)
<u>Public policies</u>				
Public spending	2.5607*** (0.7349) -0.8987**	1.4654**** (0.4169)	2.5738*** (0.7881) -0.9545**	1.5097*** (0.5129)
Access to old-age pensions while working			-0.0155 (0.1490) -0.0043	-0.1000 (0.1537)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0018 (0.0058) -0.0032	-0.0015 (0.0045)	-0.0024 (0.0056) -0.0033	-0.0033 (0.0051)
Employment in service sector (mean-centered)	0.0303 (0.0255) -0.0010	0.1617 (0.1805)	0.0325 (0.0250) -0.0016	0.0672 (0.1654)
Employment in service sector squared		-0.1633* (0.0962)		
Employment in service sector cubed		-0.0808* (0.0413)		
Self-employment rate	.5145* (0.2744) -0.0424	0.1413 (0.2781)	.5195* (0.3052) -0.0355	0.1747 (0.2431)
<u>Labor force participation</u>				
Labor force participation rate among older adults (age 55-64)	0.0225** (0.0089)	-0.0002 (0.0098)	0.0232** (0.0091)	-0.0018 (0.0098)
Constant	9.1492	15.7381	9.1171	16.1001
Overall R ²	0.69	0.57	0.69	0.65

*p<.10, **p<.05, ***p<.01, ****p<.001

Note: The top number is the unstandardized regression coefficient. The number in parentheses is the standard error. The third number in the male columns is the indirect effect of the independent variable on older male life expectancy by virtue of the older male labor force participation rate.

Table 13. Life Expectancy Random Effects Models for Older Males and Females in High-Income OECD Countries

	Primary Models		Supplementary Models	
	EQ-13a Males	EQ-13b Females	EQ-13c Males	EQ-13d Females
<u>Sociodemographics</u>				
Education index score (mean-centered)	0.7489** (0.3549) -0.0359	0.5752** (0.2624)	0.7276** (0.3453) -0.0280	0.4359 (0.2982)
Old-age dependency ratio (mean-centered)	0.0364 (0.0294) 0.0072	0.0985*** (0.0356)	0.0380 (0.0306) 0.0072	0.0802** (0.0376)
Percent urban	-0.0051 (0.0104) 0.0028	0.0032 (0.0120)	-0.0055 (0.0107) 0.0033	0.0006 (0.0103)
Survival / self-expression score	0.0073 (0.1052) 0.0004	-0.0115 (0.1091)	-0.0095 (0.1078) -0.0004	0.0191 (0.1297)
Traditional / secular-rational score (mean-centered)	-0.0067 (0.0916)	0.0385 (0.0893)	-0.0020 (0.0984)	-0.2943 (0.2222)
Traditional / secular-rational score squared	-0.0027		-0.0042	0.0327 (0.1245)
Traditional / secular-rational score cubed				0.2520* (0.1457)
<u>Individual capacities</u>				
Prevalence of health risks	-0.0071 (0.0672) -0.0353	-0.0645 (0.0677)	0.0042 (0.0737) -0.0374	-1.249* (0.0644)
Prevalence of tuberculosis (mean-centered)			-0.0448 (0.1576) -0.0015	0.0852 (0.1687)
Perceived health status			0.0015 (0.0056) -0.0009	0.0004 (0.0041)
Gross domestic product per capita (mean-centered)	-0.1363 (0.4514) 0.3380*	1.0706*** (0.3802)	-0.1479 (0.5072) 0.3677*	0.8167** (0.3721)
Gross domestic product per capita squared	-0.3330 (0.3076) 0.2810**		-0.3661 (0.3386) 0.3174**	
Gross domestic product per capita cubed	0.6083** (0.2716)		0.5974** (0.2925)	
Percent of older adults at or below 50% of median income	0.0140 (0.1103) 0.0135	0.0017 (0.1262)	0.0125 (0.1055) 0.0134	-0.0509 (0.1251)
Percent of older adults living alone (age 65+)	-0.0072 (0.0110) -0.0042	-0.0089 (0.0108)	-0.0084 (0.0103) -0.0044	-0.0119 (0.0121)
<u>Public policies</u>				
Public spending	2.7211**** (0.6808) -0.9107**	1.4608**** (0.4133)	2.7212**** (0.7571) -0.9476**	1.5088** (0.5100)
Access to old-age pensions while working			-0.0196 (0.1471) -0.0060	-0.1007 (0.1573)
<u>Institutional capacities</u>				
Long-term unemployment rate	-0.0008 (0.0061) -0.0046	-0.0015 (0.0045)	-0.0017 (0.0056) -0.0047	-0.0035 (0.0052)
Employment in service sector (mean-centered)	0.0364 (0.0260) -0.0053	0.1626 (0.1826)	0.0390 (0.0247) -0.0055	0.0686 (0.1663)
Employment in service sector squared		-0.1622* (0.0971)		
Employment in service sector cubed		-0.0805* (0.0415)		
Self-employment rate	.5207* (0.2684) -0.0513	0.1396 (9.2827)	.5175* (0.2839) -0.0350	0.1893 (0.2540)
<u>Labor force participation</u>				
Employment per population ratio among older adults (age 55-64)	0.0272*** (0.0089)	-0.0004 (0.0093)	0.0274*** (0.0095)	-0.0020 (0.0094)
Constant	9.0229	15.7496	9.0594	16.1016
Overall R ²	0.72	0.57	0.71	0.65

* $p < .10$, ** $p < .05$, *** $p < .01$, **** $p < .001$

Note: The top number is the unstandardized regression coefficient. The number in parentheses is the standard error. The third number in the male columns is the indirect effect of the independent variable on older male life expectancy by virtue of the older male employment per population ratio.

Appendix C - Measures and Sources

Constructs and Measures	Sources
Socio-Demographic	
Education Index score ¹⁹	Education Index data (Seck, 2007)
Old-age dependency ratio ^{20a}	The World Population Prospects Database: The 2006 Revision (United Nations, 2007b)
Percent living in urban areas ²¹	The World Population Prospects Database: The 2006 Revision (United Nations, 2007b)
Traditional / secular-rational score ²²	Cultural values data (Inglehart, 2007)
Survival / self-expression score ²³	Cultural values data (Inglehart, 2007)
Individual Capacity	
Prevalence of health risks ²⁴	OECD Health Data 2006 (Organisation for Economic Co-operation and Development, 2006a)
Tuberculosis prevalence ^{25c}	WHO Statistical Information System (World Health Organization, 2007b)
Perceived health status ^{26bc}	OECD Health Data 2006 (Organisation for Economic Co-operation and Development, 2006a)
Gross domestic product per capita ²⁷	The World Development Indicators (World Bank, 2007b)

¹⁹ The Education Index score was calculated using measures of adult literacy and enrolment in school (United Nations Development Programme, 2006).

²⁰ The old-age dependency ratio is the ratio of the population aged 65 years or over to the population aged 15-64.

²¹ The percent living in urban areas is the urban population as a percentage of the total population in each country.

²² The traditional / secular-rational score was calculated based on a factor analysis of ten World Values Survey items using data aggregated to the country level (Inglehart & Welzel, 2005).

²³ The survival / self-expression score was calculated based on a factor analysis of ten World Values Survey items using data aggregated to the country level (Inglehart & Welzel, 2005).

²⁴ The prevalence of health risks is the sum of three standardized variables: (1) the average number of decayed, missing, and filled teeth at age 12; the percent of individuals age 15 and above who smoke daily; and liters of alcohol consumption per capita among individuals age 15 and above.

²⁵ Tuberculosis prevalence is the number of cases of tuberculosis at a given point in time per 100,000 individuals.

²⁶ Perceived health status is the percentage of individuals age 45-64 with perceived good health.

²⁷ Gross domestic product per capita is the gross domestic product per capita in constant 2000 United States dollars.

Individual Capacity	
Percent of older adults at or below 50% of median income ^{28a}	The Luxembourg Income Study Key Figures (Luxembourg Income Study, 2005)
Percent of older adults living alone ^{29a}	Society at a Glance 2005 (Organisation for Economic Co-operation and Development, 2005)
Public Policy	
Public spending ³⁰	Social Expenditure Database (Organisation for Economic Co-operation and Development, 2007c)
Access to old-age pensions while working ^{31a}	Social Security Programs and Mechanisms Database (International Labour Organization, 2006b)
Institutional Capacity	
Long-term unemployment rate ³²	OECD Factbook 2007 (Organisation for Economic Co-operation and Development, 2007a)
Employment in services sector ^{33b}	Key Indicators of the Labour Market (International Labour Organization, 2006a)
Self-employment rate ^{34b}	Key Indicators of the Labour Market (International Labour Organization, 2006a)

²⁸ The percent at or below 50% of the median income is the percent of older adults with disposable incomes at or below 50% of the median income for the total population.

²⁹ The percent living alone is the proportion of individuals age 65 and above living alone.

³⁰ Public spending is a factor representing the following three variables: (1) public spending on old-age (per capita, at current prices, in US dollars); (2) public spending on health (per capita, at current prices, in US dollars); and (3) public social spending (per capita, at current prices, in US dollars) on issues besides old-age and health.

³¹ This measure is an indicator of whether individuals are permitted to accumulate any old-age pensions while also earning incomes for employment.

³² The long-term unemployment rate is the number of persons unemployed for 12 months or more as a percentage of the total number of unemployed persons.

³³ Employment in the services sector is the percentage of the employed population working in the services sector.

³⁴ The self-employment rate is the number of self-employed persons as a percentage of the total number of employed persons.

Productive Behavior	
Labor force participation rate among older adults ^{35ab}	OECD Labour Force Statistics (Organisation for Economic Co-operation and Development, 2006b) and Key Indicators of the Labour Market (International Labour Organization, 2006a)
Employment per population ratio among older adults ^{36ab}	OECD Labour Force Statistics (Organisation for Economic Co-operation and Development, 2006b)
Unpaid work rate among older adults ^{37ac}	The World Values Survey Data Files (World Values Survey, 2006)
Outcomes	
Life expectancy among older adults ^{38ab}	Society at a Glance 2005 (Organisation for Economic Co-operation and Development, 2005)

Table 1. Measures and sources.

^aThis measure is for older adults only.

^bThis measure is available for males and females separately.

^cThis measure is not part of the primary analyses; because either 100% of the data for at least one of the study time points or more than 50% of the data for at least two of the study time points are missing, this measure is part of the exploratory analyses.

³⁵ The labor force participation rate is defined as the ratio of the older adult (i.e., age 55-64) labor force (i.e., the economically active population including those who are employed, unemployed, and seeking work for the first time) to the older adult (i.e., age 55-64) population (OECD, 2007b).

³⁶ The employment per population ratio is defined as the proportion of an economy's older adult (i.e., age 55-64) population that is employed (i.e., in paid employment or self-employment) (OECD, 2007b).

³⁷ The unpaid work rate is the percent of individuals age 55 and above working in some capacity for no pay. Unpaid work includes social welfare service for elderly, handicapped, or deprived people; work for a religious or church organization; educational, artistic, musical, or cultural work; work for labor unions; work for political parties or political action groups; human rights work; work for the environment or animal rights; work for professional organizations; youth work; work for sports or recreation; work for women's groups; work for peace movements; work for health organizations; and work for consumer groups (World Values Survey, 2006).

³⁸ Life expectancy is the average number of years of life remaining at age 65.

Appendix D – Limitations and Further Research

Weaknesses specific to the measures used in the present study

1. *Tuberculosis prevalence* - The accuracy and reliability of the nationally reported data may vary due to potential differences in diagnosis levels and reporting lapses (N. Brown, personal communication, April 11, 2008).
2. *Prevalence of health risks* - International comparability of data related to the percent of individuals age 15 and above who smoke daily is limited because of national differences in the wording of health interview questions and response categories. In addition, there are national differences in the methods used to convert alcoholic drinks to pure alcohol for calculations related to liters of alcohol consumption per capita among individuals age 15 and above (Organisation for Economic Co-operation and Development, 2006a).
3. *Perceived health status* – There are national differences in the measurement of perceived health status. Questions asked and response categories given differ in some countries (Organisation for Economic Co-operation and Development, 2006a).
4. *Percent at or below 50% of the median income* – There are national differences in surveys used to measure this variable and in how this variable is constructed. Also, after the poverty line is calculated, only those households with members over age 64 are included when computing this variable. Only disposable income is considered here (Luxembourg Income Study, 2005).
5. *Long-term unemployment rate* - International comparability of these data is limited because of national differences in survey design and conduct, as well as

operational definitions. In addition, this measure does not account for differences in unemployment benefits. (Organisation for Economic Co-operation and Development, 2007a).

6. *Self-employment rates* – International comparability of these data is limited because of national differences survey methods and coverage (International Labour Organization, 2006a).
7. *Employment in the service sector* – Country level data may vary based on whether contributing family members, armed forces, and self-employed individuals are included in the estimates. International comparability is particularly problematic for countries in Africa and Latin America (International Labour Organization, 2006a).

Suggestions for future cross-national studies of labor force participation

Labor force participation rates can differ widely by region and sub-population within a country. Labor force participation rates in the United States vary dramatically by state, race, age, and age cohort, for example (Cahill, Giandrea, & Quinn, 2008; Flippen & Tienda, 2000; Loi & Schultz, 2007; Munnell, Soto, & Zhivan, 2008). Future researchers should consider the possibility that productive behavior among older adults is likely to differ substantially by region, subgroup, age, and age cohort.

The present study investigated predictors and effects of all forms of labor force participation among older adults, as measured by one comprehensive variable. The results of the study might be different if labor force participation rates were broken down

by employment type. For example, predictors of self-employment may differ drastically from predictors of wage employment, as illustrated in Raymo et al. (2004).

Future researchers should consider the possible influence of several potential cross-national predictors of labor force participation. The study did not consider the potentially important influence of supra-national, national, and local initiatives specifically geared toward increasing work opportunities for older adults. A number of these types of initiatives are in operation in Britain (Collis, Mallier, & Smith-Canham, 1999). OECD and the European Union have also developed several such policies (Cook, 2006).

One potentially relevant institutional factor that was not assessed in the present study is age discrimination policy. Many of the countries included in the present study struggle with age discrimination (Adams, 2004; Bendick, Jackson, & Romero, 1996; Chiu, Chan, Snape, & Redman, 2001; Encel, 1999; Firbank, 2001; Frerichs & Naegele, 1997; Garen, Berger, & Scott, 1996; Gringart, Helmes & Speelman, 2005; Gunderson, 2003; Henkens, 2005; Herz & Rones, 1989; Lahey, 2006; Lahey, 2007; Munnell, Sass, & Soto, 2006; Platman & Tinker, 1998; Sziraczki & Windell, 1992; Taylor, Steinberg, & Walley, 2000; Taylor & Walker, 1998). Future researchers should consider the influence of discrimination and discrimination policy on cross-national differences in labor force participation among older adults.

Individual level research suggests that several spousal characteristics are relevant to later-life employment behavior. Potential characteristics to consider in future research include: spousal eligibility for pension benefits, spousal work levels, spousal health,

spousal incomes, and marital satisfaction (Cahill, Giandrea, & Quinn, 2008; Clark, Johnson & McDermed, 1980; Johnson & Favreault, 2001; Kim & Feldman, 2000; Pienta, 2003; Pienta & Hayward, 2002; Reitzes, Mutran & Fernandez, 1998; Szinovacz & DeViney, 2000).

Individual level research findings point to several job-related factors that future researchers should consider in studies of cross-national variation in employment behavior among older adults. Potential factors to consider in future research are: comfort with technology, voluntariness of retirement, flexible work options, organizational tenure, entrepreneurial orientation, unplanned disability, retirement anxiety, job satisfaction, job complexity, the physical demands of a job, work attachment, managerial status, and mandatory retirement (Christensen, 2005; Davis, 2003; Friedberg, 2003; Lim & Feldman, 2003; Mitchell & Anderson, 1989; Mutran & Reitzes, 1989; Shannon & Grierson, 2004; Singh & Verma, 2003; Weckerle & Shultz, 1999; Williamson & McNamara, 2002).

Suggestions for future cross-national studies of life expectancy

Longevity can differ dramatically by region and sub-population within country (Baigi, Hogstedt, Isacson, Oden, & Herrstrom, 2003; Bronnum-Hansen & Baadsgaard, 2007; Burstrom, Johennesson, & Diderichsen, 2005; Chernichovsky & Anson, 2005; Geronimus, Bound, Waidmann, Colen, & Steffick, 2001; Kochanek, Maurer, & Rosenberg, 1994). Future researchers should consider the possibility that life expectancy among older adults is likely to differ substantially by region and sub-population.

So as not to overlook health problems that older women face, future researchers should not rely on life expectancy as a sole country level measure of health among older adults. Women live longer than men, but older men are healthier than older women (Belanger, Martel, Berthelot, & Wilkins, 2002; Laditka & Laditka, 2002). In Canada, women at age 65 can expect to live with cognitive impairment for approximately four years, while men at age 65 can expect to live with cognitive impairment for approximately three years (Dubois & Hebert, 2006). Using data from the United Kingdom Medical Research Council Cognitive Function and ageing study, Jagger & Matthews (2002) found that at age 85, women and men were expected to spend 11% and 4%, respectively, of their remaining lifetimes impaired.

Individual level research findings point to several variables that future researchers ought to consider in studies of cross-national variation in longevity among older adults. Potential factors to consider are: birth month or season (Doblhammer, 1999; Drefahl, 2005), access to healthcare (Rasmussen, 2007), the age at which older adults become eligible to receive public pensions (Choi, 2000), and historical events (Gjonca, Brockmann, & Maier, 2000; Nolte, Scholz, Shkolnikov, & McKee, 2002).

The present study assumes that the relationships between independent variables and life expectancy among older adults are unidirectional. However, it's possible that a country's average life expectancy may also influence several of the independent variables included in the study. In the case of public social spending, for example, a population with a greater proportion of older adults may be more likely to vote for higher public social spending rates than another population (Borck, 2007). Similarly, the relationship

between education and longevity may be reciprocal; expected longevity might influence educational decisions (Cervellati & Sunde, 2005; Echevarria, 2004; Echevarria & Iza, 2006). Future researchers should consider these possible reciprocal relationships.