

Benefits of formal voluntary work among older people – A review

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ABSTRACT

A narrative review of quantitative population-based longitudinal studies was conducted to examine the association of formal voluntary work and personal well-being among older people doing the voluntary work and those being served. To be included the study had to be published in a peer-reviewed journal, written in English and conducted in the Western countries, participants had to be at least 60 years of age, the study employed a longitudinal or experimental design, the methodology and outcomes explicitly described and voluntary work quantified as visits or hours within a certain timeframe. Sixteen studies out of 2897 met the inclusion criteria for the review reporting on benefits of volunteering for those doing the voluntary work. Outcomes were collapsed into three categories of personal well-being: physical health, mental health, and psychosocial resources. All included studies came from the United States and showed that volunteering in old age predicted better self-rated health, functioning, physical activity and life satisfaction as well as decreased depression and mortality. However, volunteering did not decrease the risk of chronic diseases or nursing home admission in old age. Only one study that met the inclusion criteria on the benefits of volunteering for the older recipients was identified. Studies predominantly utilized data from large datasets with only limited information about volunteering which limits more detailed analyses. Randomized controlled trials are needed for studying the effect of voluntary work for those being served as well as to unmask the health participant –effect among the volunteers.

INTRODUCTION

Volunteering is defined as an activity that involves spending time, unpaid, doing something that aims to benefit the community in general or its individuals or specified subsets of community members who are in need, such as older home bound persons (1, 2). This review focused on formal volunteering and excluded informal volunteering such as helping and caring for close relatives, friends or neighbors. What differentiates formal and informal volunteering is a sense of obligation which is often stronger in informal volunteering than it is in formal volunteering, where volunteering depends more on the ability and opportunity of the helper (1). Volunteering has been quantified according to its intensity (the amount of time spent), diversity (how many organizations), and consistency (how regularly the individual volunteers across the lifespan). Formal volunteering is usually coordinated by public agencies, nonprofit agencies, religious organizations, or through government programs covering a wide range of activities (1, 3). Volunteering typically includes activities such as tutoring or mentoring either instrumental, supportive or nonskilled; skilled or unskilled assistance or technical advice and public safety (4).

The growth in the older population in the 21st century will be a challenge to the public economy and health care service system but it might also offer possibilities. The predicted shortage in the labor force will increase the demand for volunteers in the future. The healthy active older population who are not engaged in paid work constitutes a growing reservoir of human and social capital (5-7), and volunteering is potentially a good venue to contribute to the society (8). The generation born between 1946 and 1960 will enter into old age with a great deal of experience and skills that could be transferred to the non-profit sector. In addition, increasing longevity, health and wealth allows for non-profit activities such as volunteering in later life (9, 10). Volunteering could be a cornerstone of productive aging, as volunteering helps provide services that are of economical and social value (11, 12).

Most studies on volunteering have been done in the United States, which is the most active nation in volunteer work in Western Countries. According to the Current Population Survey, the rate of volunteering in the U.S among people aged 65 years or over was 23.5% in the year 2008 (13). The long-standing tradition in volunteering in the U.S is partly due to their welfare system that e.g. builds on non-profit and religious organizations as well as the fact that the U.S policy makers have actively encouraged volunteering (14). In Europe, the rate of volunteering differs between the countries, depending on the welfare policy (15). In Nordic countries, where the public health care system is responsible for social welfare, older people participate more actively in voluntary work than in the Mediterranean countries. There interfamily exchange is strong and cohabitation among generations more usual than in north Europe (16). Cross-national data from the Survey of Health, Ageing and Retirement in Europe (SHARE) on volunteering showed that the rate of volunteering ranged between 2 and 21%, with an average of 10%, depending strongly on the countries' societal context concerning volunteering (17). In Australia about 20% (18) and in Canada about 18% (19) of the older population had volunteered in the previous year.

In cross-sectional studies, the relationship between volunteering and well-being has been identified (20-22). There is, however, the problem of causal order between well-being and volunteering, which can only be addressed with a prospective study design (23). Good health and adequate social resources tend to increase the probability of doing volunteer work (7, 23-26). It has been argued that persons who are physically and mentally fit are not only able, but also likely to be equipped with personal resources such as high self-esteem or control over life that increase the likelihood of volunteering (1, 23, 26). It is equally plausible that health determines volunteering than the other way around. Furthermore, the curvilinear relationship between

volunteering and well-being (27, 28) also showed that a moderate, but not high, number of hours spent doing voluntary work enhanced late-life health and well-being.

Although a fairly large body of literature exists regarding the various benefits of volunteering for those doing the voluntary work, earlier reviews (9, 20, 29, 30) have not investigated the benefits of volunteering systematically with clearly defined inclusion and exclusion criteria. The aim of this review was to conduct a systematized narrative literature review on quantitative data to examine the association of formal voluntary work and personal well-being among older people doing the voluntary work and those being served.

METHODS

Search strategy

We searched for relevant studies published in English through November 31, 2009, without a start date, using the following databases: PubMed, the Cochrane Central Register of Controlled Trials, Cochrane Database for Systematic Reviews, CINAHL (Cumulative Index to Nursing and Allied Health Literature), ERIC (Education Resources Information Center), PsycINFO, Ovid MEDLINE, ISI Web of Knowledge, and CSA (Sociological Abstracts). Depending on the database, search terms included combinations of *volunteering*; *“voluntary work”*; *aged*; *“older people”*; *volunteerism*; *“benefits of volunteering”*; *“people being served”*; *“quality of life”*; *intervention*; *trial*. In addition, the reference lists of identified papers and reviews were searched through for relevant articles. On the basis of the abstract, it was assessed whether the study had the potential to be included. Based on the full article, it was decided whether the study met the inclusion criteria.

Inclusion criteria

The following inclusion criteria were used: a) the study was published in a peer-reviewed journal b) The paper was written in English and conducted in the Western countries c) participants were at least 60 years of age, d) the study employed a longitudinal or experimental design, e) the study methodology and outcomes were explicitly described and f) voluntary work was quantified as visits or hours within a certain timeframe. The selection was made by the reviewer (M.v.B) and in case of any uncertainty regarding the study inclusion the senior reviewer (T.R) was consulted.

RESULTS

2897 studies on older people volunteering were identified in the literature search of which 16 were accepted to this review (see Figure for review flow). The main reasons for exclusion were that the study was cross-sectional, participants were under 60 years of age, volunteering was defined to include also informal volunteering, or the study had not been published in a peer-reviewed journal. The included studies investigated the associations of volunteering with the well-being of those who did the voluntary work. 13 observational studies analyzed data from population-based large prospective datasets and 3 experimental studies used data from one randomized controlled trial. All studies were conducted in the U.S. Studies that used the same large datasets were reviewed as separate studies when they investigated different outcomes.

Prospective studies included in the review

In the population-based prospective studies the number of participants ranged from 705 to 7.496, except for one that included 71 women from the Baltimore Experience Corps Extended Pilot Study matched with a comparison cohort of 150 women from the Women's Health and Aging Study (31), for description of included studies see Table 1. Age ranged between 60 to 97 years (mean age between 70.1 to 77.0 years). Most of the participants (60-70%) were women and predominantly white. The volunteers were more educated, had better perceived health and fewer functional impairments than the non-volunteers (28). Most of the studies, however, did not present baseline data according to the voluntary status, making it hard to compare the volunteers to the non-volunteers for socio-demographics, health and functional status.

In the prospective datasets, voluntary work was mostly defined as the number of organizations the person volunteered for and the total amount of hours dedicated for doing formal voluntary work during the past 12 months. There was very little information on the nature and duration of

the voluntary work or the setting where volunteering took place. Among persons 65 years and older, the volunteering rate in the past year ranged between 12-34.5% in the population-based studies. The organizations for which participants had volunteered included, e.g., church or other religious organization, school or educational organization, and political group or union. The average number of organizations that the volunteers worked for was 1.7 (32). Number of hours spent doing voluntary work ranged from 0 to 200 hours. Among those who volunteered, the average number of hours spent volunteering was 72-73 during the previous year (28, 32). Some studies (10, 27) reported the average hours spent volunteering among the entire study population, which reflects the number of persons who did volunteer rather than the amount of volunteering among those who actually volunteered.

The large datasets such as ACL and LSOA with several data collection waves during long surveillance periods had relatively high attrition due to non-response, not being able to contact the participants, and death. Even though in longitudinal studies missing data are often considered being ubiquitous, it should be accounted for with current methods to avoid biased results (33). In terms of missing data, it is important to consider whether it is missing at random or not at random, where in the latter, systematic differences exist between the missing values and the observed values even after the observed data are taken into account (34). Different imputation methods, such as multiple imputation, recommended for dealing with data that are missing at random, were used in some of the prospective studies on the ACL data (3, 10, 32) and the LSOA data (35). Attrition in the studies drawing on data from the AHEAD study was stated to have been small throughout the three data waves and weights were used to compensate for it (11, 36).

Randomized controlled trials included in the review

The Experience Corps implemented in Baltimore, Maryland (6) is so far the only randomized controlled trial on volunteering among older people. The RCT was designed to generate social benefits and simultaneously offer a community-based approach to health prevention. The 128 predominantly African American participants were randomized into an intervention group or a control waiting list. The eligibility criteria for the trial were: 60 years or older, ability to read and pass a criminal background check, ability to travel to the schools, a Mini-Mental State Examination (37) score of 24 or above and/or meeting a threshold score on the Trail Making Test (38). The intervention group participants served at least 15 hours per week in elementary schools and assisted the children with e.g. reading achievement, library support, and class room behavior during an academic year (39).

Longitudinal associations of volunteering and personal well-being

Outcomes were pooled together and collapsed into three categories that constituted personal well-being: physical health, mental health, and psychosocial resources (23), see Table 2. Several studies found a nonlinear relationship between volunteering and well-being (32), suggesting that a certain amount of involvement is optimal but that a lower level of volunteering is beneficial for well-being (27). Morrow-Howell et al. demonstrated that about 100 hours per year yielded the greatest benefit of volunteering and that more hours per year did not increase the gains (32). There were only a few studies that investigated volunteering with more than just the number of hours committed to it. Building on ACL data, Morrow-Howell et al. reported that the number and type of organization coordinating the voluntary work was not associated with the well-being outcomes (32). However, in another study using the same data Musick & Wilson showed first that the risk for death was lower for those who volunteered for one organization (27) and later

that religious volunteering and the longer duration of volunteering predicted better well-being in older age (3).

Most prospective studies investigated the relationship between volunteering and physical health. A series of studies found that volunteering predicted better self-rated health. Luoh et al. showed with the AHEAD data that those who had volunteered 100 hours or more during the last year rated their health better than those who had volunteered less than 100 hours (36). Two studies (10, 11), drawing on data from AHEAD and ACL reported, on the other hand, no association between volunteering and the number of physician diagnosed self-reported chronic diseases. In all studies, volunteering at the age of 60 years or later predicted less difficulties or disability in activities of daily living tasks than among the non-volunteers with follow-up ranging from 2 to 8 years (10, 11, 32, 36, 40). Tang used the ACL 1 through 3 data waves for showing that increased hours spent volunteering at the age of 60 years or later predicted lower level of functional dependency (10). Lum & Lightfoot found in the AHEAD data that volunteering was not associated with living in a nursing home at the 7-year follow-up (11). Conversely, volunteering at the age of 60 years or later predicted lower mortality in the prospective studies drawing on data from the ACL, AHEAD, and LSOA studies (11, 27, 36, 41, 42).

Mental health and psychosocial resources are less studied outcomes of volunteering among persons over 60 years of age, with the focus mainly on the association of volunteering and depression (3, 11, 26, 32, 35, 40). Building on the three wave data from the ACL study, Li & Ferrano found a beneficial effect of volunteering on depression during the eight year follow-up (26). However, they further detected evidence of certain self-selection processes in that persons with higher socioeconomic status and active church attendees had a lower incidence of depression and were more actively engaged in volunteering (26). Van Willigen showed, drawing

on data from the ACL wave 1 and 2, that voluntary work increased life-satisfaction among people over 60 years of age (28).

In a prospective study, Tan et al. compared the 71 women from the Experience Corps Pilot study who did high-intensity voluntary work with 150 non-volunteering women controls from the Women's Health and Aging Study with a 3-year follow-up time. The women were aged 65-86 years and had comparable socio-economic status, self-rated health and frailty status. The study showed that women who volunteered in the high-intensity senior service program reported sustained increase in their physical activity level compared to the non-volunteering counterparts during the 3-year follow-up (31).

Effects of volunteering on personal well-being

Three papers investigated in a randomized controlled setting the effect of high-intensity volunteering on physical functioning (39), physical activity (39, 43) and cognition (39, 44). The studies showed a positive trend in the effect of volunteering on cognitive and physical functioning, although the power in the analysis was limited. The intervention increased the overall physical activity level for the intervention group (39). Further, when measuring in kilocalories per week, the short-term increase in physical activity was significant among the Experience Corps volunteers compared to the controls (43).

Benefits of volunteering for those being served

The benefits of volunteering for those being served could not be reviewed, because only one study that met the inclusion criteria was identified in the literature search. In that study, frail home-bound older persons participated in the Strong for Life exercise program delivered by volunteers who had been trained by physical therapists for the task. After the 4-month program,

the frail participants showed significant improvements on the Short Form-20 social functioning scale, however there were no significant differences in physical functioning, mental health or self-rated health (45). The study did not include a control group so the effect of the program could not be evaluated in a controlled setting. The basic idea of the study was to investigate whether an exercise program such as the Strong for Life program could be feasibly, efficiently and safely delivered by specifically trained lay volunteers in voluntary organizations.

DISCUSSION

We identified and critically reviewed 16 studies investigating whether volunteering predicted personal well-being among older people doing voluntary work. These studies used data from three population-based prospective datasets and one randomized controlled trial. Volunteering in old age predicted better self-rated health, functioning, physical activity and life satisfaction, as well as decreased depression and mortality. However, volunteering did not decrease the risk of chronic diseases or nursing home admission in old age.

Possible mechanisms for the effect of volunteering on well-being have not been extensively discussed in the literature. The most commonly used explanation is the beneficial association of social contacts that develop during volunteering or more general social activities. It has been shown that social contacts and support have an effect on health and survival among older people and volunteering fosters such connections (36, 42). Volunteering does involve a certain amount of physical and mental effort and probably these beneficial physiological effects contribute to the decreased risk of adverse health outcomes. Furthermore, volunteering is known to support psychological well-being and sense of control, self-efficacy, which is positively related to health (23). This might also in part explain the curvilinear beneficial effect of volunteering seen in several studies (27, 36) in that reasonable amounts of volunteering are salubrious, but excessive amounts are less likely to enhance health. Little empirical work has been done on specific outcomes of volunteering (4, 32) as well as on the effect of different type of voluntary work on health (27, 42). The findings on the association of the number of organizations one volunteers for and subsequent well-being have been inconsistent (3, 27, 32). Thus, to be able to understand and to investigate the mechanisms underlying the positive association of volunteering, more detailed information on the nature of the voluntary work is needed.

The problem of causal order between well-being and volunteering is a challenging one. Furthermore, we cannot completely control for the “healthy participant effect”. It is a fact that persons who are in good health and possess adequate social and economic resources tend to volunteer more (23, 26, 27). They are also likely to be equipped with personal resources such as high self-esteem or control over life that increase the likelihood of volunteering (23, 26). Moen et al. showed in their prospective study that women who volunteered in 1956 were more likely to occupy multiple roles 30 years later and have better health outcomes than those who did not volunteer earlier in their lives (46). That study differs from other studies that compare volunteering and its benefits across different age groups, like e.g. van Willigen (28), in that the period and cohort effect is controlled for. Volunteering presumably has a different meaning for persons in different age groups born in different time periods and in addition, there are underlying cultural norms and traditions that affect attitudes toward volunteering.

Future implications for practice

Volunteering is collectively seen as a feasible and humane way of helping people who cannot cope on their own and as a potential field of productive activity for older retired fit persons who still have a lot to offer. The basic element underlying voluntary work is that it is a social activity which generates a considerable amount of social capital not only to the receiver, but also to the giver, and consequently also to the society (9, 12). To date, persons who retire have better health than ever before and they are expected to live longer without disabilities. Thus they have extra time on their hands, and in some cases, the retired persons’ children and immediate family live further away and they do not help their own family on a day-to-day basis. However, to what extent can older people be expected to be a productive part of the society? The sheer increase in leisure time after retirement cannot be assumed to result in more voluntary work being done (12). It is potentially harmful for social cohesion to label those who do not, for some reason,

volunteer as unproductive in the society (47). Older age increases the risk for debilitating illnesses and functional decline that hinders such activities even though the person would wish to productively participate in the society.

Some people, who are near retirement age lead hectic lives and are often very committed to their working careers. They are likely to transfer some of their energy and ambitious attitudes that they have adopted during their paid working lives into post retirement volunteering, which will probably result in changes in the current voluntary work policy. Volunteering could serve as a good extension of the active working career by offering mental and physical challenges and social contacts that will otherwise cease when the person is retired (36). However, it remains to be seen whether the baby-boomers will engage more actively in voluntary work than the older retired population today.

Even though volunteering is a charitable activity, we should bear in mind that it opens up the doors of vulnerable older persons who do not necessarily understand the potential dangers and thus might end up as targets for abuse (48). This is why it is crucial that voluntary work is coordinated and monitored by responsible organizations that have unified standards for voluntary work. The people who do ‘hands on’ voluntary work need to be properly trained for the task. Volunteering should be evaluated rigorously and there should be clearly defined quality criteria for its implementation.

Future implications for research

There are only a few large datasets in the world that have been used for studying volunteering among older people. The majority of research data on the associations and effects of volunteering on health and well-being come from the United States and might not apply to the

European countries. Further, the limited information available on the history of volunteer work in earlier life as well as the frequency and duration of volunteering in the large datasets limits more detailed analysis of the activity (3). Selection and social causation poses further challenges to determining the effect of volunteer work on well-being (23). For example, it is challenging to recruit people for volunteering studies who do not usually participate in any studies, e.g. those who come from diverse socio-economic backgrounds and who have few social contacts, but who potentially stand to benefit from social activities such as volunteering. Another potential threat to the analyses is attrition which is considerable in a prospective large dataset such as ACL (32). In longitudinal studies on older people, attrition tends to be missing not at random and those who drop out differ in earlier follow-ups from those who responded. Attrition should be recognized, described and dealt with in a proper way in prospective analyses (26). The effect of volunteering for those being served could be explored among persons who live in similar settings with similar services and needs. For this purpose, randomized controlled trials are needed to determine the effect of volunteering on older people. To investigate more deeply the effect of volunteering for those doing the voluntary work, prospective observational studies preferably starting in young life are needed. In addition, gender and social class effects should be addressed more specifically as well as life time engagement in religious and social activities through social networks should be investigated in relation to voluntary work.

Conclusion

Volunteering has been shown to be positively associated with well-being in old age among those doing the voluntary work. However, it is not clear whether activities such as volunteering contribute to the health of older people as opposed to healthy persons being more likely to be engaged in volunteer activities. Further, the mechanisms underlying the association between volunteering and well-being in old age have been poorly identified. To date, we know little about

the effects of volunteering for those receiving the help. Studies have predominantly utilized data from large datasets with only limited information about volunteering which prohibits more detailed analyses. Randomized controlled trials are needed for studying the effect of voluntary work for those being served as well as to unmask the health participator-effect among the volunteers.

Table 1 Characteristics of prospective studies included in the review

| Reference | Participants | Voluntary work | Confounders | Follow-up | Outcomes | Results |
|---------------------------------|---|---|---|-----------|--|--|
| Harris & Thoreson 2005 (LSOA) | 7496, 15.4% volunteered 70+ y. | Never/rarely/sometime/frequently volunteers during past 12 moths | Socio-demographics Health Physical activity Social support | 8 years | Mortality | Reduced mortality |
| Hong S-I et al. 2009 (LSOA) | 5294, 21.6% volunteered 70+ y. | Yes/no during last 12 months | Socio-demographics Co-morbidities Self-rated health Functional limitation Functional dependency | 6 years | Depression | Decreased depression |
| Li & Ferrano 2005 (ACL) | 1669 60+ y. | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Church attendance Functioning Informal social integration | 8 years | Depression | Decreased depression |
| Li & Ferrano 2006 (ACL) | 1669 60+ y. 875 45-59 y. | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Church attendance Functioning Informal social integration | 8 years | Functional limitations | Decreased depression and reduced pace of functional limitations |
| Lum & Lightfoot 2005 (AHEAD) | 7322, 13% volunteered 70+ y. | 0-99 or 100 hours or more work for charitable/religious organization /past year | Socio-demographics | 7 years | Self-reported health Medical conditions Depression level Functioning level Nursing home entry Mortality | Decreased depression, reduced loss of functioning, not associated with medical conditions or nursing entry |
| Luoh & Herzog 2002 (AHEAD) | 4860, 12% volunteered 100 \geq hrs 70+ y. | 0-99 or 100 hours or more work for charitable/religious organization /past year | Socio-demographics Physical activity Social contact Cognitive functioning Depressive symptoms | 2 years | Self-reported health Functional status Mortality | Volunteering 100 \geq hrs lowered the risk of ill health, daily living limitations and mortality |
| Morrow-Howell et al. 2003 (ACL) | 1669, 34.5% volunteered 60+ y | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Informal social integration | 8 years | Functional dependency Self-rated health Depression | Reduced functional dependency and depression, positively associated with self-rated health |

| | | | | | | |
|----------------------------|--|---|---|-----------|--|---|
| Musick et al. 1999 (ACL) | 1211, 35% volunteered 65+ y. | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Health Physical activity Informal social integration | 7.5 years | Mortality | Volunteering decreased mortality, curvilinear association according to number of hours volunteered |
| Musick & Wilson (2003) ACL | 2348, 24-90 y., (for the number of 65+ y. no data available) | Volunteering for 0-5 organizations, Secular/religious work, periods of volunteering 1-3 | Socio-demographics Social resources Psychological resources Health and functioning Physical activity Church attendance | 8 years | Depression | Decreased depression |
| Sabin 1993 (LSOA) | 7485, 15.6% volunteered 70+ y. | Yes/no during last 12 months | Socio-demographics Self-rated health Functional dependency | 4 years | Mortality | Reduced mortality |
| Tan et al. 2009 (EC, WHAS) | 60+ EC=71 WHAS=150 African American women | 15h \geq / week for an academic year in an elementary school | Socio-demographics Health Mobility disability Frailty category | 3 years | Physical activity | Volunteering increased the level of physical activity compared to the controls |
| Tan 2009 (ACL) | 1669, 34.5% volunteered 60+ y. | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Informal social contact | 8 years | Self-rated health Functional dependency Chronic diseases | Volunteering associated with improved self-rated health, decreased functional dependency, but not with diseases |
| Van Willigen 2000 (ACL) | 705, 39% volunteered 60+ y. | Volunteering for 0-5 organizations, hrs/ past year | Socio-demographics Social integration Social support | 3 years | Life satisfaction Self-rated health | Volunteering was positively associated with both outcomes |

American's Changing Lives (ACL), Asset and Health Dynamics Among the Oldest Old Study (AHEAD), Baltimore Experience Corps (EC), The Longitudinal Study on Aging (LSOA), (WHAS) Women's Health and Aging Studies

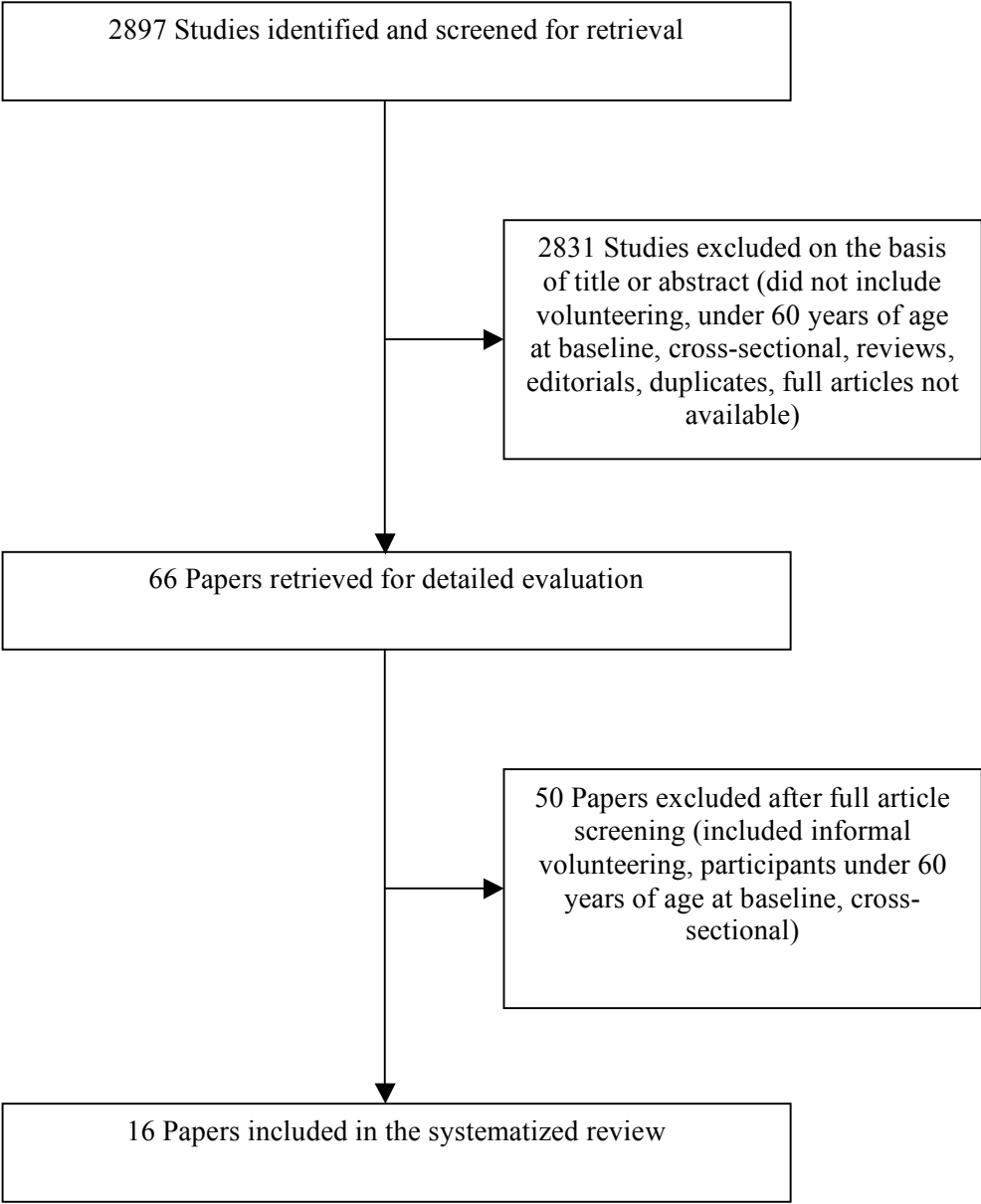
M=mean, SES=socioeconomic status, CES-D=Center for Epidemiologic Studies Depression(49)

Table 2 Personal well-being framework

| Personal well-being | Measure | Reference |
|---------------------|--|--|
| I | Physical health | |
| | Morbidity | Physician diagnosed chronic diseases Lum & Lightfoot 2005 Tan 2009 |
| | Self-rated health | Self-repot, 5 categories Van Willigen 2000 Luoh & Herzog 2002 Morrow-Howell et al. 2003 Lum & Lightfoot 2005 Tan 2009 |
| | Functional status | ADL and IADL disability Luoh & Herzog 2002 Morrow-Howell et al. 2003 Fried et al. 2004 Lum & Lightfoot 2005 Li & Ferrano 2006 Tan 2009 |
| | Physical activity | Minnesota leisure time physical activity questionnaire (MLTPAQ) Self-reported physical activity questions Strength*, endurance*, balance*, physical tasks* Fried et al. 2004* Tan et al. 2006 Tan et al. 2009 |
| | Nursing home admission | Verified at follow-up data collection Lum & Lightfoot 2005 |
| | Mortality | Date of death, National Death Index† Sabin 1993 Musick et al. 1999† Luoh & Herzog 2002 Harris & Thoreson 2005† Lum & Lightfoot 2005 |
| II | Mental health | |
| | Depression | CES-D score Self-reported single question‡ Lum & Lightfoot 2005 Musick & Wilson 2003 Morrow-Howell et al. 2003 Li & Ferrano 2005 Li & Ferrano 2006 Hong et al. 2009‡ |
| | Memory Executive functioning Psychomotor speed | TMT, Rey-Osterrieth CFT Word lists Carlson et al. 2008 |
| | Cognitive activity | Standardized questionnaire, self-report Fried et al. 2004 |
| III | Psychosocial resources | |
| | Life-satisfaction | Self-reported, 5 categories Van Willigen 2000 |

ADL= Activities of Daily Living, IADL=Instrumental Activities of Daily Living, CES-D=Center for Epidemiologic Studies Depression, TMT= Trail Making Test, Rey-Osterrieth CTF= Rey-Osterrieth Complex Figure Test

Figure. Literature review flow diagram.



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