Executive summary:

The European Commission has identified the challenge of population ageing as the most pressing policy issue in the 21st century. As Europeans live longer and disabilities in this population increase, valid and comparable longitudinal data on their health is essential for evidence based policy making. Valid and reliable data requires better measurement instruments and methodologies for longitudinal and cross-population comparative analyses. Previous international studies did not clearly address the mechanisms explaining the linkages between health, disability, quality of life and well-being, as they rely on measures with limited validity as well on a non clear and shared conceptual model of health and disability. COURAGE in Europe project (see http://www.COURAGEineurope.eu online) developed, and validated in
three countries (Spain, Finland and Poland), measures of health and health-related outcomes for an ageing population, creating a valid and reliable scientific evidence base on ageing, that is comparable across countries in Europe and internationally. These measures were grounded in the WHO's International Classification of Functioning, Disability and Health (ICF). The ICF with its biopsychosocial model of health and disability offers the only scientifically valid framework for evidence-based measurement of non-fatal health outcomes. The COURAGE research protocol was validated in the general population of Spain, Finland and Poland, through a population study on a sample of 10,800 persons from Finland (1,976, mean age 59.27) Poland (4,071, mean age 57.62) and Spain (4,753, mean age 60.44) which was completed in March 2012.

Project Context and Objectives:

The increase in the proportion of older people in Europe is the result of unprecedented economic, social, medical and technological changes that have made it possible for Europeans to live a long and active life. In Europe, the percentage of persons older than 60 was 20.3% (3.0 for 80+) in 2000, and will rise to 28.8% (5.2% for 80+) in 2025, and the median age will rise from 37.7 to 45.4: the old age dependency ratio (i.e. the number of persons 65+ per one hundred persons 15-64) will rise from 21.7 to 33.2.

If, on one side, these demographic trends are fairly well understood, the huge political and social changes that they will produce, are less well understood. Should we expect that future populations will live longer and active lives, with severe disability occurring only at the very end of life a phenomenon called ‘compression of morbidity’? Or should we rather expect that the ageing population will experience increasingly high prevalence of mild and moderate disability for a longer period a phenomenon called ‘expansion of morbidity’? Both these ageing scenarios have huge, but very different, political and social consequences. If compression of morbidity is true, then we should expect cost savings (as older populations work longer), reducing pension costs and contributing through income taxation to help pay health and other social expenses. If, instead, expansion of morbidity is true, then the overall health and social costs will be far higher as cross-the-board costs will increase in health, rehabilitation and assistive technology services, in employment, transportation and communication accessibility modifications and in other accommodations designed to decrease the burden of disability. The evidence concerning the different ageing scenarios is conflicting. Certainly the prevalence of most chronic diseases (neurological and psychiatric conditions, arthritis, heart problems, diabetes, hypertension and obesity) and their associated risk factors has increased in developed countries.

Four main objectives were pursued:
- The first objective was to develop valid assessment instruments to measure key health and health-related outcomes in the general population (from age 18 to end of life). Previous and on-going surveys and research projects on ageing in Europe (and internationally) were evaluated for coherence and best practices and linked to the ICF framework. The aim was to build linkages with existing national and cross-national ageing studies in (or including) Europe, such as the Study of Health, Ageing and Retirement in Europe (SHARE), WHO’s Study on Global Ageing and Adult Health (SAGE), Measuring Health and Disability in Europe: supporting policy development (MHADIE), European Community Health Indicators (ECHI), and the Mental Health Disability: An European Assessment Study (MHEDEA). The outcomes of these projects, where available, were used to build the components of the COURAGE in Europe tools and
methodology.
- Validation of the assessment instrument, which was mindful of the need to create a scientific evidence base for health and disability determinants in ageing. Substantive analysis of this survey revealed the relationships between these outcomes and determinants to establish further face and construct validity. This baseline cohort was carefully documented so that possible future follow up may demonstrate predictive validity.
- To produce substantial innovation in ageing survey methodology. We included two additional and innovative environmental elements that, in line with the biopsychosocial model of health, might have substantial bearing on ageing: the Built Environment and Social Networks. The nature of the social network as an indicator of the attitudinal environment has been defined and operationalised in terms of relationships, social support and attitudes. In fact there is considerable evidence that the nature and extent of an individual's social network strongly influences health outcomes. The developed tool enables to create a COURAGE Social Network Index (SNI) which can be used to evaluate the richness of the social network and to assess the contribution of social cohesion towards positive health outcomes. The built environment has a considerable impact on how individual capacities in functioning translate into actual performance in real life environments and two tools were developed and validated. The developed instrument for assessing Environment enables to derive four self-reported scales which measure features of the neighbourhood environment, access to public buildings, and features of the living place and addresses the person-environment interaction. In addition to this, the tool intended to objectively assess the physical features of the neighbourhoods was developed and validated. It shows good capacities in differentiating between rural and urban areas as well as differences between the environments of the three countries. The evaluation of the built environment is an added value to the understanding of the determinants of health, disability, quality of life and well-being.
- To provide cross-population analysis and a baseline for longitudinal data collection. The methodology enabled to produce comparable cross-population analysis of non-fatal mental and physical health outcomes, quality of life, and well-being. The project incorporated the state-of-the-art analytical methods so that self-report responses may be calibrated to adjust for reporting biases. Though a longitudinal study was beyond the scope of this project, the testing was intended to provide a baseline and prepare the ground for potential future longitudinal studies in Europe.

Project Results:
COURAGE in Europe project was organised in six different workpackages (WPs). The first four were directly connected to the development of the protocol, organization of the population study, data analysis and preparation of scientific reports: these WPs were structured in a way that the outcome of each of them was useful to impact on the subsequent one. WP5 was focused on dissemination of project's results.

The overall objectives of the project were the development of a measure of health and health-related outcomes, for an ageing population, that offers objective and evidence-based prevalence trends, and which relates these to both quality of life and well-being outcomes as well as to the role of health determinants such as the built environment and social networks. The project was chronologically divided into three phases.

- The activity in the first phase was intended to develop a protocol to study determinants of ageing, by relying on items from existing assessment instruments and protocols to specifically capture health, quality
of life and well being information. It also aimed to develop a person-centred measure of built environment and social cohesion and social networks. Finally, training materials were produced and training of interviewers held. The project’s activities were mostly referred to WP1-Development of protocol and of ICF-based assessment instrument, and WP2-Training.

- The activities of the second phase were mostly aimed to carry out three national surveys in Finland, Poland and Spain for the validation of the protocol, and to prepare final datasets for analysis. The validation process was carried out in two steps: the first one was the qualitative testing of the instruments to ensure that concepts were conveyed and understood accurately to establish their face and criterion validity; in the second step the three national surveys were carried out. The project's activities were mostly referred to WP3-Validation of ICF-based instrument in Finland, Spain, Poland through a population study, and WP4-Cross-population comparative analysis and interpretation of results of WP3.

- The activities of the third phase were mostly connected to creating a basis for analysis, therefore concluding data cleaning and weighting (WP3-Validation of ICF-based instrument in Finland, Spain, Poland through a population study), preparing an analytical plan and carrying out the analyses (WP4-Cross-population comparative analysis and interpretation of results of WP3).

WP1 Development of protocol and of ICF-based assessment instrument

This aimed to develop ICF-based tools to measure health and health-related outcomes in selected ageing populations, to find good determinants of health and disability in ageing and to assess health and health-related outcomes from both a household and individual perspective. This activity was built over several sub-tasks, each aiming to create the scientific and technical basis for developing and implementing COURAGE in Europe research protocol, and its results impact on the activities to be carried out in the other workpackages.

The first task was the analysis of existing available longitudinal and ageing data sets, the review of state of the art in the measurement of the different components and mapping of existing instrument to ICF framework. Four main activities were carried out for this task: 1) Description of existing European and international ageing studies. 2) Cross-sectional analysis on available datasets as an example of the analytical strategy that could be employed in COURAGE: comparison of SHARE, HRS and ELSA studies. 3) Factor and IRT Analysis on functional limitation variables and the construction of a "health index" that could be used for both cross-sectional and longitudinal analysis. 4) Mapping of WHO SAGE protocol to the ICF Classification.

Results show that the instruments employed in these surveys are able to capture some differences related to self-report health and self-reported difficulties described through functional limitations, ADL and IADL across countries. These measures have however intrinsic limitations, which make it necessary to anchor results obtained through self-report measures to an objective evaluation of health parameters. If in a short or medium term period these elements have good reliability and sensitivity to change, which are related to functioning, on a long-term period their validity and reliability is likely to be undermined.

The cross-sectional evaluation demonstrated that ageing is associated with a decline in functioning and is closely related to the increase in disability prevalence. Therefore, measuring the determinants of ageing should be done during the different stages of life: determinants themselves change significantly during an
individual lifetime (i.e. the assistive devices used at the age of 70 may not be the same used at the age of 85), but also change over time due to technological change. For these reasons, it is important that ageing studies include a cross-sectional and a longitudinal perspective at each wave. To pursue this objective, we propose to analyse both the level of health state of individuals, as well as their difficulty in undertaking daily activities, which are undermined by the increased levels of health problems, in turn strictly connected to their ageing. An index based on disability weights has been developed for this purpose. In this way, both the level of intrinsic health state and the level of individual's difficulties in undertaking daily activities can be evaluated through summary measure that can be employed to measure differences with a cross-sectional design, as well as to describe trajectories of change over time.

Finally, the analysis of SAGE mapping to the ICF showed that coverage is unequal and that there are no specific questions addressing some areas. A very poor coverage of areas related to Environmental Factors is the most outstanding element while, with regard to both Body Functions and Activities and Participation domains, the majority of items are related to few domains. In particular, activities related to communication were completely unexplored in SAGE protocol, and very few items refer to major life areas which include employment and education and to domestic life, which include activities which determine a strong burden on family members. Approximately 20-25% of SAGE items are not compatible with the ICF.

The second task was intended to prepare a draft set of instruments based on existing material. This activity included two main directions: the first was the development of new assessment tools for the Built Environment, the Social Network and Quality of Life; the second was the adaptation of existing instruments to the scope of COURAGE in Europe.

The Built Environment section is composed of two assessment tools: the first one is a self-report questionnaire (CBE-SR) focusing on the judgment of how good was the relationship between the individual and the built environment in which he/she is living. Three areas are under the interest of the tool: the neighbourhood environment, open-to-public buildings, places and facilities and the respondents' living place/home. In addition to this, an outdoor audit (CBE-OUT) filled in by the interviewer was developed to assess the presence of facilitating or hindering elements in the environment. Issues related to social network and social cohesion were developed on the basis of existing tools, but with a completely new organization of items and areas. In fact to serve to COURAGE in Europe scopes, the tool incorporated both structural issues of social network (e.g. who and how many persons are in the respondent's social network) and functional issues. They deal with the possibility of communicating, receiving support, trusting, participating as well as with the sensation of safety in the neighbourhood. Questions about perceptions of quality of life (QoL) were developed on the basis of the WHO-QOL (the QoL tool developed by the WHO). It is composed of 14 items (out of them, one demonstrated limited reliability and was deleted), of which 6 are derived from the WHO-QOL-OLD, a specific adaptation of the instrument for ageing populations.

The remaining part of the protocol was an adaptation of some sections of the SAGE protocol. It included the Day Reconstruction Method (DRM), a full section of objective health measures and performance test which is composed of some self-report measures related to performing activities (e.g. walking, bathing, dressing, dealing with people), mental functions such as memory, sleep and emotional functions, and sensory functions (e.g. pain, vision and hearing). In addition to this, blood pressure, height and weight,
vision test, walking speed, cognitive functions and grip strength were included. Finally, issues about risk factors and preventive health behaviours, chronic conditions, health system coverage and health care utilisation were also taken into account.

The third task was intended to agree on a common research protocol to be followed in all the centres collecting general population samples. This activity required two rounds of "pre-pilot" testing once the first version of the protocol was made available.

Group discussion evidenced the need, before testing the whole protocol, to adjust several items of the newly developed sections. These single sections were then piloted in the sites in charge of their development and implementation, to ensure that items were understandable for respondents. After that, the whole protocol underwent a first pre-pilot testing. The most relevant conclusions of this first round of protocol testing were the need of shortening the whole protocol, and to eliminate some redundancies.

A long revision lead to the second draft version of the protocol, which included a different organisation of each section. The most relevant differences were: an improved response scale for some questions (which allowed to avoid some options when not adequate: for example, if the respondent has never gone to visit family members in the last three months, then possible answers on the last month/week should not be considered) and, most important, a skip pattern that allows to skip some questions on the basis of the responses to other questions (e.g. if the respondent is not working for pay, then you should not pose questions related to the support he/she receive from colleagues, as well as on the difficulties he/she has in performing job duties). Based on the results of this second pre-pilot testing, the protocol was then finalised, and was definitively evaluated through the field work in the three countries.

The fourth task was aimed to develop an analytical strategy for longitudinal data. Although a longitudinal study was beyond the scope of COURAGE in Europe, as it was intended to develop instruments and a methodology able to produce comparable cross-population analysis of non-fatal mental and physical health outcomes, quality of life, and well-being, the testing could provide a baseline and prepare the ground for potential future longitudinal studies.

The most relevant issue related to the way in which these data were analyzed deals with the need of getting an indicator which is reliable both for cross-sectional and for longitudinal analysis. COURAGE protocol is composed of several indicators dealing with health and health-related issues, which can be measured as separate sections but that also need to be evaluated as a whole: an overall health index is a viable way to define the health state as something that can be measured over time and cross-sectionally. In sum, the construction of a health index serves to fulfill one of the requirements of COURAGE project: the description of the functional status of ageing populations according to the ICF model. The health index is therefore needed to provide a measure of the extent to which the health state of individuals predicts, or is associated to, the limitations at the level of activities and participation.

The main aim of this analysis was to construct a 0-to-1 health index, where 0 represents the worst observed health state and 1 represents "perfect health". The basis of the health index is the objective information about health problems: diagnosed physical and mental conditions, mental illnesses, and measurements like grip strength, gait speed, and BMI. The absence of any conditions implies perfect
health, i.e. an index value of 1.

The fifth task was language adaptation. The original protocol was in fact drafted in English, but the three survey sites were Finland, Poland and Spain. A selected sample of core items for back translation, commonly agreed among the partners, was made available: back translation results show that, for the majority of items, translation was satisfactory. A pilot study was finally made with the final version of the protocol in the three languages: again, the decision to shorten the protocol and avoiding redundancies was taken.

The sixth task was the identification of the relationship between functioning profiles in later life with early childhood adversities. Early childhood adversities are likely to be related to late life health and well-being outcomes, but this clinical information is somewhat difficult to be captured in a synthetic way. The aim of this task was therefore to systematically review this kind of literature findings to identify which early childhood adversities are the strongest predictors of late life functioning decrements.

The research revealed a remarkable lack of literature on the specific issue, and pointed to the need for well designed prospective studies extending beyond early adulthood. Moreover the limitation of most studies is the prevalence of medical perspective, linking childhood diagnosis (event) with late life pathology (mostly psychiatric). Most of the functional areas explored were in the component of body functions. Only in few instances the more comprehensive approach inclusive of activities and participation was followed.

The seventh task was the identification of the relationship between social networks and functioning profiles in later life. This task was divided in the following parts: the definition and structure of social network and its relation to health; a systematic review and meta-analysis on social capital and mortality; a comparative analysis between the COURAGE in Europe countries (Finland, Poland, Spain and Italy) based on variables of social capital, values, attitudes, beliefs, well-being and health.

The definition and structure of social network and its relation to health. The results of this analysis accounted for a positive association between the structural characteristics of social relations and the availability of instrumental and emotional support, in terms of better mental health and psychological well-being and reduction of stress: large social networks may reduce the likelihood that stressful circumstances are appraised as much as and may be positively associated with perception of available support or with increasing opportunities for companionship or assistance when needed. Finally, the effect of social networks resulted to be very strong also as protective factors for reducing the impact of Alzheimer's disease on global cognitive functioning.

A systematic review and meta-analysis on social capital and mortality. The main outcome of this review is that social capital includes structural and cognitive components, and is perceived both as an individual and as a collective property. Social participation and social networks may help to increase the length of life, while little is known about the relationships between the cognitive aspects of social capital and mortality. This is due to a lack of cross-national observational cohort studies measuring any aspects of social capital and mortality.
Comparative analyses between the COURAGE in Europe countries (Finland, Italy, Poland and Spain) based on variables of social capital, values, attitudes, beliefs, well-being and health. In this report the variables from three international surveys were examined through a wide-ranging cross-country comparative analysis on social capital indicators including social network characteristics, values, attitudes, beliefs, well-being and self-rated health indicators. This allowed us to conclude that there are differences in social capital and social variables in the four countries involved in the COURAGE in Europe project but not significant differences on the levels of well-being and subjective health status. Furthermore, the "social profile" of each of the four countries, based on the prevalence of most highly rated responses, provided us evidence on the most widespread social norms and variables within each country, as well.

Having identified the highest and the lowest rate within each social variable of the four countries, we observed most frequently that Finland was positioned quite differently from the other three countries. However, similarities between the four countries emerged on issues such as:
- self-rated number of persons belonging to the social network,
- subjective general health,
- trust in family and family members with whom one has most frequent and relevant contact with,
- ethnic diversity,
- work as a duty towards society,
- satisfaction with one’s own life as a whole,
- importance in life of family or friends,
- pride with one’s own nationality,
- perception of government responsibility for providing decent living for the old or childcare,
- importance of having a close friend who is understanding or enjoyable company,
- types of relationship mostly preferred when seeking help when one is ill or depressed.

WP2 Training

The second WP was devoted to develop training material and to train supervisors and interviewers to the use of COURAGE in Europe protocol. The WP was composed of two tasks.

The first task was training of supervisors, that was held in English by different members of COURAGE in Europe project centers. The duration of training was five days and it was divided in an ICF basic course and a training on COURAGE in Europe survey and its protocol. A training manual was prepared to assist training.

ICF Basic Course: a course dealing with a brief history of disability and of classifications, ICF basic principles, ICF structures and background, differences between classifying, measuring, assessing, impact on national legislation and application in different settings.

COURAGE in Europe Survey Training: a course to enable trainers to learn the materials required to conduct the interviews and the procedures to fill in questionnaires in an accurate, clear and complete way. Special attention was paid to the methodology for administering performance tests.

The Survey Manual was intended to provide practical information about the survey instruments, to help in
the implementation of COURAGE in Europe in the countries of the study, and to improve the quality of the interview process. The survey manual was created in English. The first parts of the manual cover background information about the COURAGE in Europe Project, an introduction to the ICF, questionnaire conventions, description of the roles and responsibilities of the different people involved in the survey, and advises for the interviewers.

All training of supervisors was held with PAPI (paper-pencil) method: in fact CAPI (computer-assisted personal interview) programs were not prepared in English since this would not be useful for the scope of the project.

The second task was local training in the three survey sites. This involved training in general interviewing techniques, conventions used in the COURAGE in Europe instruments, section-by-section reviews, role-plays and actual practice interviews with respondents. Training was basically identical to the "central" training: it was five days long and followed the same agenda.

Training in Poland: during the first part of the training the printed version of the questionnaire was used. During the second part, practice on the CAPI and in the field was done. The structure of the training enabled the interviewers to be familiar with the concepts of the COURAGE in Europe study and with the structure of the questionnaire as well as with required procedures.

Training in Spain: the training was done with the printed version of the questionnaire since the CAPI in Spanish was not ready at the time of the training. After the programming of the CAPI all interviewers practiced with the CAPI before doing the actual interviews.

Training in Finland: all the interviewers who participated to the pilot study were trained centrally in the English training. After the training in Madrid and before the pilot they practiced with the CAPI. After the pilot study a training was held in Finland for the rest of the interviewers who participated in the main fieldwork.

WP3 Validation of ICF-based instrument in Finland, Spain, Poland through a population study

The third WP was constituted of four tasks, and was mostly focused on carrying out a population study. The main WP objectives were:
- to develop methodologies for the reliable and valid measurement of health and health-related outcomes;
- to obtain reliable, valid and comparable data on levels of health on a range of key domains for ageing populations;
- to examine patterns of age-related changes in health and well-being;
- to cross-validate self-reported measures of health to improve cross-national and cross-age comparability of data;
- to collect data on health examinations to improve reliability and validity of data on morbidity and risk factors.

The first tasks was aimed to design the protocol and validation study: therefore, this activity was strongly connected to the development of project’s measures. To warrant the quality of data from the field work,
different quality assurance procedures were developed: the first type of quality procedure was to pilot test the whole protocol.

First, a pre-pilot study was conducted in the three countries (Spain, Poland and Finland) with few volunteers to obtain qualitative information. This information was used to fine-tune the questionnaire before the pilot study: recommendations to shorten the protocol, simplify some items and avoid redundancies were made.

The second task was the definition of quality assurance procedures and implementation for field work. A codebook describing key information about the variables of the study was developed: it included the name and label of each variable, a brief description, type (quantitative, categorical, binary, ordinal, date, time) and the codification. Additionally, a SPSS database was created according to the codebook and sent to centres to ensure the comparability of data between countries: on the basis of this dataset, CAPI programmes were implemented.

The third task was the completion of field work.
A template to include information about the field work progress was created: the document was intended to calculate the response rate achieved during the field work and make adjustments, if required. Finally, a template about the information on completed interviews was also created and sent to partners.

The completion of open-ended questions is one of the most relevant concern in large population studies. To limit possible discrepancies, a set of codes to codify open-ended questions about the main income provider’s occupation, the type of business and activity of the main income provider’s occupation, the respondent’s occupation, and the occupation of the respondent’s father and mother was produced.

A common test-retest data set included both questions that are expected not to change (such as age, number of children) and questions that are expected to change over time (such as quality of life). Test-retest was performed via telephone interview, using a specifically developed questionnaire. It was not only aimed to check the consistency of some questions, but also to ensure that the interview was conducted, and to record some information like the duration, how the interviewee felt about the interview. Site visits were performed too to check study procedures.

WP4 Cross-population comparative analysis and interpretation of results of WP3

WP4 was intended to enable the cross-population comparability of COURAGE fieldwork’s results and to interpret these results. Two main activities were carried out.
First, the demonstration of the metric properties of the health outcomes, such as quality of life and subjective well-being measures, as well as of determinants such as the built environment and social network assessment instruments, using both classical test theory (CTT) and item response theory (IRT). These were used to demonstrate the internal consistency and the underlying structure of the measures, and whether it is possible to construct a scale that has measurement properties that are population invariant or can generate a composite score that is cross-population comparable.

Second, preparation of substantive analysis of the COURAGE data from the three countries to examine
the complex relationship between health status, outcome measures, neighbourhood’s built environment and social networks. This task focused on multivariate analysis using state-of-the-art statistical analytical methods including multi-level models.

The metric properties of newly developed instruments have been assessed.
- With regard to the WHOQoL-AGE, a two-factor structure was found, with adequate Cronbach’s alpha values were found for each of the two latent factors (a = 0.88 for Factor 1, a = 0.84 for Factor 2). However, it is recommended to use a Single Summative Scale which shows clear national differences in relation to gender, age, and income across analysis so far carried out.
- With regard to COURAGE Social Network questionnaires, a five factor structure (Parents, Spouse, Other family, Neighbours, Friends/co-workers, with a coefficients varying between 0.61 and 0.84) was identified, and an overall Social Network Index (SNI) was created. Based on SNI, it was possible to show age-related gradients, with worse social networks being associated with older age, and differences also related to contexts of life: in particular, better levels of social networks were associated with living in rural places.
- With regard to COURAGE Built Environment Self-Report questionnaire (CBE-SR), a four factor structure was identified (Usability of the Neighbourhood Environment; Hindrance of Walkable Environment; Easiness of use of public buildings, places and facilities; Risk of accidents and usability of the living place), with a coefficients varying between 0.74 and 0.91. Results shows that there are age-related and health-related trends: those reporting good or very good health reported a better persons-environment interaction (i.e. an environment which is more usable, accessible and friendly) than those with moderate or bad health; those younger than 50 perceived their neighbourhood environment as more usable.

Preliminary descriptive and substantive analyses showed consistent differences across age groups and across countries for almost all variables.

The first task of WP4 was the development of analytical and cross-sectional analysis plan, i.e. the development of statistical models for a comparative analysis for measuring non fatal health outcomes, quality of life and well being of an older adult population.

One of the assumption in comparing self-reported data is that the way in which people self-report their health, quality of life, well-being or disability varies across populations consistently with factors such as education, sex, age, or other cultural factors. This means that different people use different response category cut-points: this 'response shift' implies that self-report categorical data are not directly comparable across individuals. In a project like COURAGE, this is a very critical element: therefore, measured tests need to be used to position self reported responses on a common scale that is comparable across persons. Basically, two methods exist to solve this 'response shift' issue: the Item Response Theory (IRT) and the Hierarchical Ordered Probit models (HOPIT) approach.

The IRT approach requires that multiple items are used to measure a given domain of functioning derived from a clear conceptual framework (i.e. the ICF model). This strategy clearly defines the entity of interest, separates it from other entities and has a set of items of varying difficulty in a given domain. If items are accurately translated in different languages, analysis can be undertaken to assess item equivalence across populations and evaluate if the scale measures the true underlying ability in a comparable manner: items showing differential item functioning (DIF) across populations need to be deleted from the scale. The
HOPIT models is to include exogenous information with regard to the underlying ability using either anchoring vignettes or performance tests in a given domain: since anchoring vignettes have not been implemented in COURAGE, HOPIT models have not been implemented.

Psychometric analyses the validation process
Built Environment Instruments
Two are the instruments newly designed to capture issues related to Built Environment and its role on functioning and disability: the COURAGE Built Environment Self-Report questionnaire (CBE-SR), and the COURAGE Built Environment Outdoor Checklist (CBE-OUT).

CBE-SR basically captures the person-environment interaction. The validation process has been carried out using classical approach, and Factor analysis has been used to assess the latent structure of items. Results showed that a four-scale structure is the most adequate, and four factor scores have been developed.

The four factors identified assess the following constructs:
- Usability of the Neighbourhood Environment, i.e. the possibility to use elements of the environment, such as seating areas, and the possibility to reach different areas such as though use of transportation means and services.
- Hindrance of Walkable Environment, with items referring to elements that limit or hinder the use of walkways, and to the absence of light that limit personal security.
- Easiness of use of public buildings, places and facilities, where the underlying concept refers to the likelihood that people are able to use elements of the environment because they are easy to use.
- Risk of accidents and usability of the living place, which refers to steps and bathrooms, which are the places in which most of accidents happen, and to other elements of the house that facilitate its use and/or indoor mobility.

Results shows that there are age-related and health-related trends: those reporting good or very good health reported a better persons-environment interaction (i.e. an environment which is more usable, accessible and friendly) than those with moderate or bad health; those younger that 50 perceived their neighbourhood environment as more usable. Finally, country-specific differences were found: in general, Polish respondents reported worse person-environment interactions, and Spanish better interactions.

CBE-OUT is intended to assess the degree to which an environment is facilitating or hindering per se. The items selected for the construction of this instrument have been grouped into nine areas: the streetscape, the walkways, the bikeways, the street crossing/intersections, the parking facilities, the public facilities and features of the street, the land-use visible along the street/road, the site decay/urban blight, and the street activity. The CBE-OUT is a 128-items audit, rated by an evaluator that has to tick checklists’ items when these are noticed.

Each item can have an intrinsic positive or negative value, defined by a group of experts: to create total scores, "direct" value when the item was ticked, and the "opposite" value when the item was not ticked were assigned. The adopted scale varies between 1 to 5, where 1 indicates a negative aspect, while 5 a positive one. This means that higher scores represent positive environments, and lower scores refers to
negative environments. Global scores were computed both section by section and in the overall checklist, so we have a score for each of the nine section and a score for the total instrument.

Results show that the best scores (55.62) were reported for Spain, followed by Poland (52.50) and the worst scores correspond to Finland (48.13) meaning that environment was assessed as more facilitating in Spain than in Finland. The analysis of correlation between CBE-OUT and CBE-SR showed that the more barriers in the walkable environment were self-reported by interviewee, the more the aspects of the environment were negatively evaluated by interviewers.

COURAGE Social Network instrument (CSN)
The CNS is composed of different sections aimed to assess ties between the individual and relevant others (e.g. spouses, sons, parents), the general support available from these persons and the frequency of contacts.

Based on these elements, an overall Social Network Index (SNI) was created: it showed good reliability and content validity and seems to be promising tool for the assessment the social network across European countries. Based on the developed SNI some cross-analyses were performed across the different sections of the COURAGE protocol. The general descriptive information regarding social networks was provided. Social networks were examined in the three survey countries, across different age groups, different places of residence and levels of education.

COURAGE Quality of Life instrument (WHOQOL-AGE)
Items from WHOQOL-AGE questionnaire were derived from the EUROHIS-QOL, a brief index, comprising eight items for use in public health research, and from the WHOQOL-OLD, a module of WHOQOL-BREF specific for use with older adults.

Cross-sectional comparative analyses
Demographic issues
The analyses were carried out based on the sample enrolled in the three countries, composed of 10,800 subjects: 1,976 from Finland (unweighted age 59.3) 4,071 from Poland (unweighted age 57.6) and 4,753 from Spain (unweighted age 60.4).

Majority of subjects were married or cohabitating in all the three countries. Prevalence of overweight/obesity showed consistency across countries (from 57.5% to 61.6%), while differences were observed for smoking (daily and non daily), which varied from 21.2% in Finland to 34.2% in Spain, and for alcohol consumption: regular consumers were 52.5% in Finland, 42% in Spain and 38.9% in Poland. High physical activity was performed by more than half of the Polish and Finnish people (58.6% and 50.7% respectively) versus 36.7% of Spanish people.

Stroke and diabetes showed similar prevalence across countries (approximately 2.5% and 7-8%, respectively). For other diseases, country differences were observed: Polish people had higher prevalence of Angina (6.9%) and Hypertension (28.3%); Finnish had higher prevalence of Asthma (9.9%) and Arthritis (29.2%); Spanish had higher prevalence of Chronic Lung Disease (5%) and Depression (16.5%).
Mobility limitations
Analysis to assess the impact of sociodemographic factors, health behaviours and chronic conditions on mobility limitations, intended as difficulties in walking 1 kilometre, was carried out for the three countries. Logistic regression analyses were performed to study the contribution of risk factors on mobility limitations in persons aged 50 years and older. Population attributable fractions (PAF) were estimated to quantify the impact of these risk factors on disability at the population level.

Difficulties in walking 1 kilometre were much more common in Poland (56%) than in Finland (27%) and Spain (32%). The prevalence of the risk factors and their association with mobility limitations varied considerably between the three countries: as a consequence, the relative importance of risk factors was different in Finland, Poland and Spain.

In general, back pain was the most important factor in all three countries: 20-40% of mobility limitations could be attributed to back pain. In Finland and Spain only, low education, obesity (in women), and arthritis were important determinants of mobility limitations. In Poland, the PAF's of the risk factors were lower than in Spain and Finland, largely due to the high overall level of mobility limitations. Arthritis (in women) and education (in men) also played an important role, in addition to back pain.

Cognitive functioning and mental health outcomes
Analysis were undertaken to assess the prevalence of cognitive and mood problems. Cognitive function declines with age.
Finland presents the higher cognitive function, and Finnish women showed in general better cognitive function than men. In Spain, the cognitive decline in women seems also higher than men, but this decline appears early, around 50 years.

Well-Being
Subjective well-being comprises the satisfaction with various domains of life, global judgments of life satisfaction, and the current affective state. We used three instruments to assess these components: experienced well-being was evaluated with an abbreviated version of the DRM; global life evaluation with the Cantril Self-Anchoring Striving Scale; happiness with a question from the General Social Survey.

Finnish respondents reported higher life evaluation and happiness, and they also displayed more positive affect than Spanish and Polish ones. Life evaluation and happiness declined with age, consistently in all the three countries, while there is a trend of improvement in affective state for Finnish respondents only. In the three countries, high income improved life evaluation but not affective experience, people married or living with a partner reported better judgements of one's own life but did not experience better mood. Functional status is an important predictor of well-being after controlling the effects of depression, age, income, and other sociodemographic variables.

In general people from Finland showed the highest well-being, Poland showed the lowest and Spain scored in between. Life evaluation declined along the life span, whereas the affect tended to improve in Finland and Spain, but in Poland negative affect increased with age.

The third task of WP4 was the production of an analytical report which contained the validation study of
the newly developed instruments, as well as of the Day Reconstruction Method.

The reports from these analyses will be published in peer-reviewed journals. Scientific papers from the psychometric analyses are being prepared for a special issue of the journal Clinical Psychology and Psychotherapy.

The fourth task of WP4 was the release of the final COURAGE in Europe Survey protocol. The protocol was extensively presented during the final conference, held in Milan on 27-29 November: in that occasion, the different researchers involved in COURAGE presented different sections of the protocol and the analyses carried out to evaluate its validity, reliability and usefulness.

WP5 Dissemination
Dissemination activities were carried out for the whole duration of COURAGE project: five are the tasks connected to this WP.

The first task is the design of a dissemination plan. COURAGE is intended as an innovative project in the field of ageing, as it developed new assessment instruments for determinants that are expected to have an impact on healthy ageing (i.e. the built environment and the social networks) and that at a population level are also deemed to be more easily modifiable than the intrinsic health state.

Target groups and events included:
- Council of Europe Disability Action Plan Mid-term review conference
- The future of ageing research in Europe A FUTURAGE and WHYWEAGE European Conference
- European Debate On Evidence-based Mental Health Promotion and Prevention of Mental Disorders
- XI Congress of European Federation for Research and Rehabilitation
- Festival of International Conferences on Caregiving, Disability, Aging and Technology (FICCDAT)
- World Planning School Congress 2011
- 10th Conference of the European Sociological Association
- Meetings of WHO-Family of International Classifications Collaborating Centres
- Active and Healthy Ageing Action on Adherence. The European innovation partnership on Active and Healthy Ageing. Focus on adherence, poly-pharmacy and under-prescription of medications in elderly-AIFA (Italian Medicines Agency)
- Expert meeting on measurement and target setting for well-being
- Pontificia Accademia pro Vita
- First National Congress of Positive Psychology
- EU European Innovation Initiative on Active and Healthy Ageing: from plan to action

The third task was the organization of international conferences.
A conference to discuss ethical, political and socio-economic aspects of the data collection was organized on 25-27 January 2010 in Brussels. The meeting has been anticipated by a restricted pre-meeting in which the COURAGE in Europe sampling procedures has been discussed. Some overall decision were taken concerning the need of a pre-pilot test through the questionnaires, incentives for interviewers and interviewees, quality control of the survey work.
In the same day, another pre-meeting only for representatives of INNCB and UJ responsible for developing built environment and social network tools and for External Experts (Shirley Confino-Rehder, Chair of the Norfolk, Virginia Mayor’s Commission for Persons with Disabilities; Julie Byles from University of Newcastle, School of Medicine and Public Health; Fionnuala Rogerson, Director of the International Union of Architects). Participants paid attention to the complexity of built environment evaluation and External experts gave some inputs based on their expertise and research.

The following papers will be published in Clinical Psychology and Psychotherapy Journal, which offered to produce a COURAGE in Europe Special Issue:
- Editorial: COURAGE Protocol for Ageing Surveys
- The validity of the instrument to evaluate social network in the ageing population: the COURAGE Social Network Index
- COURAGE Built Environment Self-Reported Questionnaire
- COURAGE Built Environment Outdoor Checklist
- COURAGE Health Information Index


Other publications are planned and are being prepared (titles are provisional):
- Relationships between health status and well-being
- Mobility functioning and wellbeing and quality of life
- Mobility limitations in Finland, Poland and Spain
- Build environment as a predictor of social network structure and quality in Europe the UE COURAGE in Europe Project.
- The relationship between Built Environment perception and Health in ageing population: a cross-national study in Finland, Poland and Spain.
- Inequalities in health services coverage, socio-demographic status and health-related factors among elderly population: Results from the COURAGE study
- Relationship between socio-demographic inequalities and physical and mental health in elderly people of three European countries.
- Relationship between Socio-economic status, place of residence and life style among the elderly: the COURAGE study.
- Lifestyle as a moderator of the association between socio-demographic status and health among elderly population: results from the COURAGE project.
- Cognitive Functioning in older adults across Spain, Poland and Finland
- COURAGE in EUROPE Project Main Results
- BMI Information in older adults across Spain, Poland and Finland
The fifth task of WP5 was the organization of Final Conference. It took place on 28-29 November 2012 in Milan, in coincidence with the closure of the European Year of Active Ageing (December 2012): it involved all partners, the European Commission and relevant stakeholders. COURAGE Protocol was released in occasion of the conference.

This meeting was preceded on November 27th by the COURAGE in Europe Satellite Symposium on Neurological Disorders and Ageing whose aims were: to present main aims of Active and Healthy Ageing, research and policy implications; to focus on latest news on neurological disorders' impact on ageing population; to provide a comprehensive information about connections between brain and active ageing; and to present Italian contributions to Active and Healthy Ageing Initiative EIP-AHA towards HORIZON 2020. Most of the symposium was on neurological disorders in ageing, dividing those with adult-life onset from those with late-life onset, and also focussing on rare diseases, as well as on ageing issues that are relevant for neuroimaging and neurosurgery.

The first day of COURAGE meeting, November 28th, was mostly on the presentation of the projects' results and of the protocol. The different research groups presented issues related to sampling, methodology for data analysis, demographic characteristics of the sample, psychometric properties of newly developed instruments and some preliminary substantive analyses.

During the second day of COURAGE meeting, November 29th, the principal investigators of other FP7 research projects in the field of ageing (CHANCES project, SHARE project, FUTURAGE project, MENTDIS_ICF65+ project, FRAILOMIC project) presented the results of these initiatives. Finally, a roundtable was organized to evaluate possible future directions for ageing studies in Europe. A total of 230 participants attended the three-day meeting: they were from different fields, mostly health professionals and researchers, and contributed with their comments to the discussion of COURAGE results, allowing to enrich the discussion on ageing and disability in Europe from research, clinical and policy-making points of view. Bringing together representatives of the main European ageing projects, having them share their results and discuss European ageing trends from their perspective, allowed to define needs, produce proposals and outline roadmaps to guide research and policy-making in a Europe that set Ageing as a milestone for the next eight years, within the HORIZON 2020 framework.

Potential Impact:

In 2006 the European Commission identified ageing of population as one of the challenging policy issues of the 21st century. Valid and reliable outcome measures for good statistics and innovative measurement instruments for cross-population comparative analyses were needed. Ageing studies involving persons aged 50+ tended to confuse the relationships between a person's health state, his/her quality of life and well-being, relying on measures with limited validity. This confusion was due to overlapping research questions and a conflation of subjective and objective perspectives and evidence. So there was a need to measure these elements independently and against the background of the clear conceptual framework of
health provided by WHO's International Classification of Functioning, Disability and Health ICF that defines disability as the interaction of a health condition with contextual factors.

COURAGE in Europe Project built, during its three-years duration, linkages with existing national and cross-national ageing studies in (or including) Europe, such as the Study of Health, Ageing and Retirement in Europe (SHARE), WHO's Study on Global Ageing and Adult Health (SAGE), Measuring Health and Disability in Europe: supporting policy development (MHADIE), European Community Health Indicators (ECHI), and the Mental Health Disability: An European Assessment Study (MHEDEA). This linking permitted to critically evaluate how health, disability and health related quality of life have been evaluated in previous ageing research in Europe, and inspired the construction of COURAGE Protocol overcoming the gaps found in these studies.

COURAGE in Europe started the discussion on ageing and disability in Europe from research, clinical and policy-making points of view. Bringing together representatives of the main European ageing projects, having them share their results and discuss European ageing trends from their perspective, allowed, during the International COURAGE in Europe Conference, to define needs, produce proposals and outline roadmaps to guide research and policy-making in a Europe that set Ageing as a milestone for the next eight years, within the Horizon 2020 framework.

COURAGE in Europe project represented an opportunity to collect information in an integrated way, as it allowed the analysis of the interaction between the health conditions (both from subjective and objective points of view) and the environment, facilitating the study of the differences between self-reported information, proxy information and objective information on health conditions. The biopsychosocial model of health and disability of WHO ICF Classification, the framework for COURAGE projects, supported the idea that all the elements of the person and of its environment, are relevant for surveys and data collected within this framework can support also targeted policy actions. This project then represented a challenge concerning the assessment of the interaction between health and the environmental factors and the estimation of the amount of people with disability, taking in account this interaction.

Finally, COURAGE in Europe avoided current pitfalls such as diversity of definition and measures of severe disability and developed a methodology in which data is collected on the basis of fit for purpose assessment tools. To obtain cross populations comparability, strategies to minimize conceptual confusions in the minds of different groups of respondents were used to allow the detection of systematic reporting biases and develop analytical approaches to correct for these biases. In order to evaluate the aspects of built environment that predict healthy ageing, ICF environmental factors domain's elements were explored in accordance to Inclusive Design approaches, that evolved worldwide in response to the explosion of disability prevalence and increase in life expectancy. Understanding how the built environment can facilitate performance means to enhance everyone's experience for a better participation, health, quality of life and well-being. Available measures of social networks were taken into account and their content explored according to ICF environmental factors domains of 'Social support and relationships' and 'Individual attitudes'. Social support affects future health, and its relationships with well-being and quality of life was analysed as well as its role as a mediating variable.

Ageing studies generally focused on the impact of specific diseases, or on genetic markers connected to
ageing, as well as the complex mechanisms that underline the inflammatory pattern. Unfortunately, the majority of these findings are not likely to be immediately transferrable into intervention procedures. Producing innovative instruments for health and disability data collection, COURAGE in Europe responded to the need of clear data for development of rights-based policy, as expressed in the Article 31 of UN Convention on the Rights of Persons with Disability and provided a common protocol, should a European Disability Survey be carried out in the future.

COURAGE in Europe project was presented world-wide in a number of international and scientific meetings. Partners presented COURAGE in Europe Project in national, European and international meetings to audiences composed of general public, scientific community, policy makers, EC officials, health professionals, NGOs etc.. In this sense, COURAGE in Europe project had a wide impact on policy and research in Europe and internationally. Meetings as "Madrid Declaration Conference: searching for a coordinated European-wide effort in mental health research" or "Ageing and health: from evidence to policy" contributed to the start-up of the project in research and policy-making community. First results were presented in meetings such as the "Festival of International Conferences on caregiving, disability, aging and technology" and "Active and Healthy Aging Action on Adherence: the European innovation partnership on Active and Healthy Ageing", giving to International community the preliminary inputs on the first European cross-population comparative analysis of the ageing populations. Ethical issues concerning ageing and disability were also discussed in meetings as "Paradox of Disability: autonomy, capacity and dependence", providing to COURAGE project a pathway in the fields of bioethics, philosophy and social policy, opening the discussion on the need to breakdown the division of the fields of ageing and disability and foreseeing the two phenomena as interrelated and inseparable. Finally, meetings such as the "EUWAP 2012: European consensus workshop on health and disability surveillance in ageing populations" settled definitively the project and its results in the European discussion of disability and ageing, translating them to policy making.

The results of the project were presented during the COURAGE in Europe final conference, held on 27th, 28th and 29th November 2012, that involved all partners, the European Commission and relevant stakeholders. This meeting was preceded by a Satellite Symposium that aimed to present main initiatives of Active and Healthy Ageing, research and policy implications; to focus on latest news on neurological disorders' impact on ageing population; to provide a comprehensive information about connections between brain and active ageing; and to present Italian contributions to Active and Healthy Ageing Initiative towards Horizon 2020. Given the increasing prevalence of brain disorders in the ageing population in Europe, and their high burden and cost, ageing policy development can be improved by the evidence that COURAGE has gathered.

During the COURAGE Satellite Symposium on 27th of November, the discussion focused on innovative ageing policy proposals that could be presented during the European Year of Active and Healthy Ageing. The International COURAGE in Europe Conference aimed to present the key results of COURAGE’s cross-country data collection on ageing, determinants of disability, effect of social network and of built environment on ageing European populations; to release the newly developed COURAGE protocol for ageing studies that will enable cross-population comparisons; to network COURAGE results to those of other European Ageing Projects; to allow for a general discussion and sharing of perspectives among the major contributors in health and social policy, public health, research and practice on ageing across
Europe.

Related documents

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