Competencies in Later Life:
Overview of the First Results
Aims of CiLL

The Competencies in Later Life-Project (CiLL) is a parallel study to the German Programme for the International Assessment of Adult Competencies (PIAAC). It is a joint project delivered by the German Institute for Adult Education (DIE) in cooperation with the Institute of Pedagogy, Education and Socialization Research of the Ludwig-Maximilians-University of Munich (LMU) and the Institute of Education of the Eberhard Karls University of Tuebingen. It is sponsored by the German Federal Ministry of Education and Research (BMBF).

Within the project, we assessed three central basic skills of adults: literacy, numeracy and problem solving in technology-rich environments which are considered by the Organization for Economic Co-operation and Development (OECD) as essential for successful participation in today’s society. PIAAC focuses on people mainly being active in the labour market (16 to 65 years old), whereas CiLL collects data from older adults mainly “beyond” the working age population (66 to 80 years old).

CiLL provides valuable information about the skills of the elderly, gathers insight in the daily use of considered skills, and examines factors associated with the acquisition and maintenance of these skills. It also elucidates effects of these competencies on social participation, e.g. participation in continuing education, labour market or voluntary work. In combination with the PIAAC results, CiLL can outline differences in skills between older and younger age cohorts.
Basic Skills Assessed

CiLL assesses, like PIAAC, three central competence domains: literacy, numeracy, and problem solving in technology-rich environments. The following short definitions are adapted from OECD Skills Outlook (2013). More detailed information about the domains, conceptual frameworks, and examples of tasks can be found in that publication as well.

"Literacy is defined as the ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential. Literacy encompasses a range of skills from the decoding of written words and sentences to the comprehension, interpretation, and evaluation of complex texts. It does not, however, involve the production of text (writing)." (OECD Skills Outlook 2013:59).

"Numeracy is defined as the ability to access, use, interpret, and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life. To this end, numeracy involves managing a situation or solving a problem in a real context, by responding to mathematical content/information/ideas represented in multiple ways." (OECD Skills Outlook 2013:59).

"Problem solving in technology-rich environments is defined as the ability to use digital technology, communication tools and networks to acquire and evaluate information, communicate with others, and perform practical tasks [sending e-mails, filling out digital forms, evaluate the informational content and credibility of different websites]. The assessment focuses on the abilities to solve problems for personal, work and civic purposes by setting up appropriate goals and plans, and accessing and making use of information through computers and computer networks." (OECD Skills Outlook 2013:59).

For each competence domain, a conceptual framework and subsequently assessment items were developed. The quality and adequacy of the items were thoroughly tested before the main data collection of PIAAC in 2011/2012. Data of CiLL was collected during the middle of 2012. For each domain, proficiency scales were created using Item Response Theory models. Furthermore, each scale was divided into proficiency levels with intervals, resulting in six proficiency levels for literacy and numeracy and four proficiency levels for problem solving in technology-rich environments. The literacy and numeracy scale range comprises 500 points. Levels one to four have a range of 50 points. Less than 175 points is below Level I and over 375 points is Level V.
Study Design

CiLL was planned as a parallel study to the German PIAAC survey focusing on the elderly and using the same methods to deliver data in a way that is coherent and consistent to the German PIAAC sample. The interviews and assessments of CiLL were carried out by the survey institute TNS Infratest in Munich. In Germany, 3,600 senior citizens in 111 municipalities were randomly selected from lists held at German registration offices. More than 1,300 interviews and assessments were conducted which equals a response rate of 40%. The data for CiLL was collected by using first an elaborate background questionnaire which covered socio-demographic data and information on educational and qualification processes as well as labour status or previous employment. In the second part, assessments were applied which tested the previously stated three central adult competence domains: literacy, numeracy, and problem solving in technology-rich environments. The skill assessment was independently completed by the respondent in the presence of the interviewer either in a computer- or in a paper-based version. The entire interview (including the skills assessment) took around 90 minutes to conduct. The prepared data was completed by the international coordinator ETS and supplemented by test results and weightings.

CiLL additionally includes qualitative research on competencies of the elderly in the context of their specific life situation. These interviews contain self-assessments of competencies and background information on the person’s social environment and life situation. In a first part of the project, 42 qualitative interviews were completed. In a next step, additional qualitative data was collected and four target groups of the elderly were especially in focus: people still participating in the labour market, migrants, people participating in a voluntary activity, and people who care for a relative at home. For each of these target groups, single case studies, group interviews, and expert interviews were conducted to elucidate the application of the three competencies in the specific focus groups and to find out about competence requirements in daily life.

People participating in CiLL were born between 1932 and 1946, thus, during or shortly after the Second World War period. The childhood and school time of this war or post-war generation is characterized by poverty and shortage – many of them heard of the death of their relatives and endured air raids on German cities. After the war, quick entry into the labour market was often more important than a long school, vocational or academic qualification. Reconstruction required many workers and craftsmen who were often only semi-skilled or qualified with a short training. 56% of the participants in CiLL have a middle education (ISCED 3/4), 18% have a low education (ISCED 1/2), only 12% have a high vocational education (ISCED 5b), and 13% a higher academic education (ISCED 5a/6).

96% of the sample live together with a spouse or a partner, 90% have children (average: 2.3 children/person) and the majority of the sample assesses their own health status as “very good” (29%) or “good” (41%), only 16% as “fair.”
Elderly people in Germany achieve a mean literacy score of 236 points which is a score assigned to the category Level II.

When comparing how many people of the CiLL cohort are assigned to which literacy level, the majority of 45.7 % are in Level II, followed by 29.3 % in Level I, 15.7 % in Level III, and 8.5 % below Level I. No test person of CiLL achieved a test score to be assigned to Level V and only 0.9 % belong to Level IV.

Adults in the PIAAC Germany survey have an average literacy score of 270 points which is also a score assigned to Level II – however, at the higher end of Level II whereas the CiLL average is at the lower end.

People performing at Level II can integrate two or more pieces of information based on criteria, compare and contrast or reason about information, and make low level inferences. Moreover, they can navigate within digital tests to access and identify information from various parts of a document (OEDC Skill Outlook 2013:66).

The CiLL cohort achieves a mean numeracy score of 240 points which is a score assigned to the category Level II.

Most of the people assessed for CiLL perform in numeracy in Level II (41.4 %), 25.3 % perform in Level I, 20.4 % in Level III, and 10.1 % perform below Level I. Only 2.8 % of the people perform at the two highest levels in numeracy.

In the PIAAC Germany survey, adults have an average numeracy score of 272 points which is also a score assigned to Level II – in comparison to the CiLL average at the higher end of Level II whereas the CiLL average is at the lower end of Level II.

People at Level II successfully perform tasks that require identifying and acting upon mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. The tasks may require applying two or more steps or processes involving, for example, calculations with whole numbers and common decimals, percentages and fractions, simple measurement and spatial representations, estimation or interpreting relatively simple data and statistics in texts, tables and graphs (OEDC Skill Outlook 2013:79).

The assessment of this skill domain was by definition exclusively computer-based. Thus, no scores could be assessed for people who did not have adequate computer skills (no experience with the computer or people who failed a pre-test with a computer mouse) or who refused to do the test computer-based at all. As a result, the average score cannot be estimated for the whole population but only for those who were able and willing to do the assessment computer-based.

All in all, scores for problem solving in technology-rich environments were determined for 29.1 % of the CiLL cohort. 49.5 % of the assessed people in CiLL did not have any experience with the computer. 15.6 % refused to make the computer-based test and 5.8 % failed the computer pre-test. In the younger PIAAC cohort, 80.8 % of the people were able and willing to do the computer-based assessment. However, people aged 66 to 80 years did not grow up during the computer age and were often not confronted with the need in their professional and personal life to learn how to use a computer.

48.5 % of the people assessed for CiLL perform below Level I, 41.6 % at Level I, and 9.6 % at Level II. Only 0.3 % perform at the highest level in problem solving in technology-rich environments. The average score is 244 points which is a score at the bottom of Level I. Therefore, an average older person is able to complete tasks in which the goal is explicitly stated and in which the necessary operations are performed in a single or familiar environment. They can solve problems whose solutions involve a relatively small number of steps, the use of a restricted range of operators, and a limited amount of monitoring across a large number of actions (OEDC Skill Outlook 2013:90). Anyhow, it can be assumed that for many older adults it is not so much the problem solving task itself that makes them perform low in this kind of tasks but the necessity to use and to understand the structure of digital environments.

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1 Due to rounding, the percentages do not always add up to exactly 100 percent.

2 All percentages of this and the previous sentence are not weighted; all other percentages and competence scores in the text are weighted.
How Do Basic Skills Differ Within the Population?

There are considerable differences in the performance in the three skill domains between specific population subgroups in CiLL. The largest differences in performance occur between people with different qualification, different age, and between native and non-native speakers. Furthermore, considerable differences occur between people living in different sizes of municipalities. Figure 2 illustrates most of the variables considered concerning literacy and numeracy. The upper bar represents the point differences of the specific groups without control variables and the lower bar the point differences with control variables.

Figure 2: Comparison of the point differences in the mean literacy and numeracy proficiency scores between specific population subgroups without (upper bars) and with (lower bars) control variables in CiLL.

<table>
<thead>
<tr>
<th>Variable</th>
<th>High vs. low-qualified adults</th>
<th>Native vs. non-native speakers</th>
<th>Persons aged 66 to 70 vs. persons aged 76 to 80</th>
<th>Men vs. women</th>
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<tbody>
<tr>
<td>Literacy</td>
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<td>Numeracy</td>
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<td>Participation vs. non-participation in education/training</td>
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<td>Adults using vs. adults never using computers</td>
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<tr>
<td>Municipalities &gt;100.000 vs. municipalities &lt;20.000 citizens</td>
<td></td>
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<tr>
<td>Persons doing vs. persons not doing voluntary activities</td>
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Without control variables
With control variables
* Statistically significant differences (p<0.05)

3 In this and the following chapters the following control variables were always used in the regression model: age, gender, qualification, language (native/non-native), health, voluntary activity, continuing education/training, use of computer, and size of municipalities.
The study reveals that school education is a meaningful predictor for literacy even in later life. In CiLL, the average literacy proficiency of people who have at most a Hauptschule leaving certificate is around 37 points lower than of people who have an Abitur (university entrance diploma) which is the highest possible school education in Germany. The Hauptschule, which is aimed at basic general education, is the lowest tier of lower secondary education where pupils obtain a leaving certificate on completion of grade nine.

Considering the general qualification of people – thus not only school education but also the following vocational and or academic qualification – people with a low and a high qualification differ considerably with 61 points in their mean literacy score. People with a low qualification (ISCED 1/2) have a mean literacy score of 208 points, those with middle qualification (ISCED 3/4) 235 points, those people with a high vocational qualification (ISCED 5b) 245 points, and those with high academically qualifications (ISCED 5a, 6) have a mean literacy score of 269 points. Even when considering other control variables, the difference in the average literacy score between those with a low and those with a high academically qualification only decreases minimally to 47 points. The result is highly significant and is equal to almost an entire competence level in CiLL. In numeracy, even a stronger effect can be recognized with a difference of 57 points in the average score between those with a low and those with a high (academically) qualification which is equal to more than a whole competence level.

Figure 3: Percentage of people in CiLL in four levels of qualification at each proficiency level in literacy; white box: mean literacy proficiency of different qualification levels in CiLL.

The level of education of the older adults’ parents is still a significant predictor for their own proficiency concerning literacy and numeracy. Between those people not having a parent who attained upper secondary education and people of whom both parents have attained upper secondary education is a considerable difference of 30 points in literacy and 38 points in numeracy. Those adults whose parents have not attained upper secondary education have an average score of 222 points in literacy and 240 points in numeracy, those with at least one parent having attained upper secondary education have an average score of 240 points in literacy and 245 points in numeracy, those with both parents having attained upper secondary education have an average score of 252 points in literacy and 260 points in numeracy.
How Do Basic Skills Differ Within the Population?

...between people with and without immigrant background

In CILL, the mother tongue is used to operationalize the migration background of a person. 3% of the CILL sample are people, whose mother tongue is not German. However, migration background is not only registered by mother tongue but also by the country of birth. 16% of the CILL cohort are not born in Germany (82% of them use German as their mother tongue) and 7% of the cohort have parents from abroad (all speaking German as a mother tongue). An explanation for the high percentage of people born abroad but speaking German as a mother tongue is the country of birth. About 2/3 of the migrants came from Poland (44%), Czechoslovakia (12%), and Russia (12%) – mainly as so called “late repatriate” from German speaking minorities in these countries. The majority (51%) of the migrants in CILL came as children to Germany in the late years of the war and shortly after the war (1944 to 1946).

Considering the average competence score in literacy, people with German as a mother tongue have a 32 points higher score in literacy and numeracy than people with another mother tongue. The difference is still significant when other variables are considered. The same effect can be found for numeracy. When comparing people with migration experience, with parental migration experience, and without migration experience, people with migration experience have slightly but significant lower scores in literacy than the two other groups which have no difference.

...between birth cohorts

People of older cohorts have lower proficiency scores in literacy and numeracy than younger cohorts. Especially the oldest cohort in CILL has considerably lower literacy and numeracy scores than of those aged 66 to 70 years and 71 to 75 years. More than half of the people in the age group 76 to 80 years are located on Level I or below in the two competence domains. In literacy this means that, at best, they are able to read short text with simple vocabulary and simple structure. The age difference is still significant when controlling other variables.

The phenomenon that older cohorts have lower skills scores than younger ones can be similarly found in PIAAC. Reasons for the competence differences between CILL cohorts can vary between biological aging processes, different socialisation processes, and different educational opportunities mainly caused by the post-Second World War period.

Figure 4: Percentage of people in CILL in three age groups scoring at each proficiency level in literacy; white box: mean literacy proficiency of different birth cohorts in CILL; comment: statistically significant differences between birth cohort ‘Age 76-80’ and younger birth cohorts.
How Do Basic Skills Differ Within the Population?

Men and women do not differ significantly in their mean literacy proficiency. However, there is a gender difference in numeracy. Men outperform women with a 20 points higher average numeracy score. Considering three different age sub-groups, men and women differ in every group significantly. The difference between men and women is still significant when considering other variables. However, it is reduced to 8 points.

In problem solving in technology-rich environments, men and women who were able and willing to do the assessment have also a significant difference in their score. As in numeracy, men outperform women slightly.

Figure 5:
Mean numeracy proficiency between women and men in different birth cohorts in CiLL; comment: statistically significant differences in CiLL in every of the three birth cohorts between women and men, between women ‘Age 71-75’ and younger cohorts, and between women ‘Age 76-80’ and younger cohorts.
How Important are Skills to Be Active in Old Age?

The three basic skills assessed in CILL and PIAAC have originally been designed referring to general affordances in modern societies' labour markets. In CILL, most of the participating adults already ended their working life. However, the assessed skills seem to have also relevance for activities in the retirement.

...in terms of voluntary work

In CILL, around 24% of the people are participating in a voluntary work. There is a relation between basic skills and participation in voluntary work. People participating in a voluntary work regularly perform 17 score points better in literacy and 22 score points better in numeracy than people not participating in a voluntary activity which is a significant difference. When other variables are considered, the difference is still significant in literacy but decreased to 6 points. In numeracy the difference is not anymore significant. This is mainly due to the fact that the qualification of a person has a higher influence on the competence score.

...in terms of labour market participation

In CILL, 155 people are still active in the labour market. They show a slightly higher score in literacy with 242 points than people who are out of the labour force with 235 points. However, the difference is not significant. In numeracy, the difference between those still in the labour force and those out of the labour force is 14 score points – a small but significant difference. Considering the duration of the period since when a person is not anymore active in the labour force, people being out of the labour force for more than 20 years have a significantly lower score in literacy than people who are not out of the labour force or less than 10 years out of the labour force. However, when other variables are considered, the difference is not significant anymore.

...in terms of continuing education/training

Only 10% of the people, which were assessed in CILL, had participated in adult education and training during the twelve months prior to the survey. Other surveys (AES, EdAge) show higher participation rates of the elderly. This result in CILL can be partly explained by the fact that mainly vocational or job-related education and training was captured by the background questionnaire and that most of the participants in CILL are no longer active in the labour market. Additionally, informal education occurs especially at an old age and was not captured either.

Comparing literacy and numeracy scores of those who participated in education and training to those who did not, a significant difference of 18 points can be found in the literacy and 24 points in the numeracy performance. However, when other variables are considered, the difference in literacy and numeracy is no longer significant. This is mainly due to a high influence of a persons' qualification on the competence score.

Moreover, CILL confirms for the elderly a trend of PIAAC that older cohorts do not participate as often in education/training as younger cohorts.
How do People Apply Competencies in Daily Life?

The competence assessment in CiLL was supplemented by qualitative case studies which aimed at

- Supporting interpretations of the assessment results,
- Showing how competencies are applied in daily life of the elderly,
- Referring to other competencies at old age.

The first 42 interviews of elderly were conducted following the rule of maximal contrast which considered socio-demographic and educational characteristics in order to develop a typology of people having different educational habits and biographies, life circumstances, and therefore different competence profiles.

For the most recent case studies, individuals, groups, and experts of four focus groups were interviewed: elderly people still working in the labour market, people participating in a voluntary activity, people who care for a relative at home, and migrants. People belonging to the first three groups have in common that they conduct an activity with a growing importance in today’s society. Those activities can also mean educational challenges for the elderly, give them opportunities to contribute competencies developed during their lifespan, and to develop new ones. Elderly migrants are a group which is under-represented in participation in adult education and training. They also have a high risk of unemployment and a risk of low educational qualification. Thus, there is a necessity to find out about the daily use of competencies, the life situation, and the educational needs for this group.

The qualitative interview data of CiLL in a whole reveals the importance of challenges in different areas of everyday life for learning and competence development. This is true for the tasks directly related to the organization of everyday life but also for different activities in later life like hobbies, voluntary activities, care for a relative etc. The case studies show that especially literacy is an essential competence needed in everyday life, for example to read newspaper, letters, advertisement, manuals, guides, and books. However, numeracy is also needed in the everyday life, even though people are more unconscious of it. Numeracy is used for daily challenges, such as knowing the right dosage of medicine, the use of cooking recipes, doing the tax return or planning the budget for a shopping tour. In the case studies, people were also asked if they use a computer. A few agreed to use it to write documents, e-mails, use the internet to find information or read online newspapers. For some of them, problem solving in technology-rich environments does not seem to have such importance like the first two competence domains. Nevertheless, others pointed out own deficits concerning digital media and seemed to be aware of possibilities and options which can be opened by computer competencies.

In all four focus groups, the people in the case studies, the group interviews as well as the experts stated that there are more competencies than the three assessed which are relevant for the elderly to meet challenges in their daily life. This is especially the case when people participate in some kind of activity. The interviewed elderly people who are still in the labour market show a high ability of self-organization. Those people interviewed performing a voluntary activity show organizational skills, empathy, and the ability and willingness to learn new things. Knowledge and skills concerning organizational, practical, and legal aspects about care is shown by the people interviewed who care for a relative at home. Migrants show an especially high sensibility of intercultural aspects of everyday life. These are of course only exemplary but deep insights into the focus groups.
Résumé and Outlook

First of all, a great success of CiLL was to prove that the PIAAC survey and competence assessment design can be used for elderly people as well. CiLL can show differences in the distribution of competencies between subgroups of elderly which points to inequalities and structural disadvantages within educational systems. We can also compare older cohorts of CiLL with younger cohorts in PIAAC Germany due to the similar used survey design. Nevertheless, account must be taken that there are methodological limitations because of the cross-sectional research design and limitations regarding the focus of research which was adjusted to OECD policies and (labour market related) interests. Furthermore, cross-sectional research design never allows for conclusions on causalities (Nagengast 2009). CiLL provides – as well as PIAAC – a very solid base for further research as those two studies point out highly relevant questions.

As shown before, basic skills like the ones assessed in CiLL are highly influenced by initial education, vocational and academically qualification, age, language (native/non-native), and size of municipality.

CiLL also shows that older cohorts participate less often in adult education than younger cohorts. However, the participation in educational offers often goes hand in hand with other (civic, cultural, social) activities, provides new impetus and motivation. Thus, new forms of education for elderly should be considered.

The next rounds of PIAAC are already planned in set time intervals. It would be a great success to assess the competencies of the elderly also in other countries in order to have the possibility of international comparison. Before such an international data collection on elderly starts, a revision of the surveys instrument for the elderly has to be taken into consideration. The three assessed skills are important for participation in modern societies. At the same time, we must remember that considerably more skills and competencies exist and that only three of them are part of CiLL and PIAAC. The everyday life of elderly is different to younger people – especially when they are out of the labour force. Elderly need new competencies to meet new requirements of the changed everyday life and those skills need to be assessed: Which competencies do elderly need to remain healthy and independent in their everyday life? Which resources and competencies do elderly have behind the background of their experience of life?

Literature


The presented results are only a first impression of the findings of CiLL. A more detailed analysis of the study’s findings will be published in December 2014: