ISSUE BRIEF

Issue Brief: Occupation, Cognitive Decline and Retirement

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Introduction

Physical health problems are a major reason for early exits from the labor force (e.g., Aaron and Callan, 2011). Given the well-documented socioeconomic patterning of health, this means that low-wage workers are more likely to be in poor health (Gueorguieva et al., 2009) and to leave the workforce earlier because of poor health (Bound, Stinebrickner and Waidmann, 2010). Less is known about the potential role that cognitive decline may play in workforce departure and the extent to which it may be similarly socioeconomically patterned along occupational lines.

This Issue Brief addresses how occupation may interact with age-related cognitive decline to influence work decisions such as job changes or retirement. In exploring this topic, we use rich data on occupations and cognitive functioning to describe differences in rates of age-related cognitive decline across broad occupational categories representative of a hierarchy of cognitive demands and to relate these differences to a set of work transitions at common retirement ages.

Data

Data come from the Health and Retirement Study (HRS), a longitudinal biennial survey that is representative of Americans older than 50. We used the RAND version N data, a cleaned and ready-to-use resource that includes 11 waves of HRS data from 1992 through 2012 (Chien et al., 2014).

A commonly used measure of cognition, word recall (WR), has been available in the HRS since 1992. However, the number of items changed from wave one to wave three. For consistency, we used scores from waves three through 11. We used the total number of words recalled in both the immediate and delayed word list questions, and standardized the total WR scores over the full HRS sample (mean=0, SD=1). Word recall measures working memory, a dimension of fluid cognitive ability that could have bearing on ability to complete required tasks at work. Declining memory is an important marker of age-related cognitive decline.

The HRS core interview also gathers data about the occupations in which HRS respondents work. Masked occupation data with 16 to 24 categories are publicly available for all years. We categorized the masked occupational categories for HRS respondents' current occupations into five groups: (1) professional and managerial, (2) sales, (3) clerical, (4) service, and (5) manual occupations and operators. These categories were designed to represent a hierarchy of cognitive demands, with professional and managerial positions likely requiring the most cognitive engagement and manual occupations and operators the least. The professional and managerial categories are combined because it was not clear that one was higher than the other in terms of cognitive demands of the job. The sales category is fairly small and the professional/managerial category is relatively large.

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We consider four potential work transitions: movement into a higher cognitive demand occupational group, movement into a lower cognitive demands occupational group, retention in the same occupational group, and movement into retirement.

Our retirement status indicator is based on a RAND variable, sayret, together with occupation data. Specifically, respondents are considered to be retired if they report that they are "completely retired," or if they report that they are "partly retired," but no occupation code is available.

Method

We selected two analytic samples. The "age 62 sample" included HRS respondents who were observed at the survey wave at which they had reached the age of 62 but were less than 64 years old. The "age 65 sample" included HRS respondents who were observed at the HRS survey wave at which they had reached the age of 65 but were less than 67 years old. We used reported occupation and labor force status from respondents at this wave, the "target wave," occupation from three waves prior to the target wave, and WR scores from one and three waves prior to the target wave. To be included in the analysis, HRS respondents must have completed the survey in the target wave, but also have been working (and reported an occupation) at three waves prior the target wave, and have completed the WR batteries at one and three waves prior to the target wave. Note that our sample does not include HRS respondents who had died or attrited prior to the target wave, as well as those who did not complete an interview at the target wave or the interviews one or three waves prior.

Results

Table 1 displays the sample sizes and percentages across the five occupational

categories and retirement status in our selected samples. The top panel of Table 1 shows the composition of the "age 62 sample" with respect to occupation and retirement status, both at the target wave for this sample, at which respondents were between 62 and 64 (last two columns), and three waves prior, at which respondents were around the ages of 56 to 58 (first two columns). The same respondents are represented in both sets of columns. About one-third of workers who were working around age 56 are retired by the survey wave after which they reached age 62. Thus, we see reductions in the number of observations in all five occupation groups between the first and second observations, as individuals shift into retirement. Specifically, over the four waves leading up to and including the target wave, the professional/managerial category shrinks by 33 percent, sales by 18 percent, clerical by 32 percent, service by 21 percent, and manual occupations and operators by 45 percent.

The bottom panel of Table 1 shows the composition of the "age 65 sample" with respect to occupation and/or retirement status, both at the target wave for this sample, at which respondents were between 65 and 67 (last two columns), and three waves prior, at which respondents were around the ages of 59 to 61 (first two columns). As in the top panel, the same respondents are represented in both sets of columns. More than 40 percent of workers who were working around age 59 retired by the survey wave after which they reached age 65. Again, we see reductions in the number of observations in all five occupation groups between the first and second observations, as individuals shift into retirement. Specifically, over the four waves leading up to and including the target wave, the professional/managerial category shrinks by 45 percent, sales by 27 percent, clerical by 45 percent, service by 39 percent, and manual occupations and operators

by 53 percent. Thus we see an overall trend toward retirement over time in all occupational categories.

Table 2 begins to shed light on the relationship between occupation and cognitive ability by providing summary statistics about measures of cognitive ability and cognitive change, and how these differ by occupation and over time. The top three rows of Table 2 use the age 62 sample and show the WR scores at three and one waves prior to the target wave. It should be noted that a large proportion of the sample had perfect or near-perfect WR scores, though that proportion declines as respondents age. Over the four years spanned by these waves, the whole distribution of the WR scores shifted downward. The average scores in each major occupation category also declined as respondents aged. On average, the "change" row shows that scores in this sample declined by 0.07 standard deviations over the four year period spanned by these waves. However, at least a quarter of the sample experienced declines in WR of half a standard deviation or more. Interestingly, the largest average decline we see is within sales occupations.

The bottom three rows of Table 2 tell a similar story, with a downward distributional shift between three and one waves prior to the age-65 sample's target wave. The average decline over four years was about 0.09 standard deviations, and one quarter of the sample experienced a drop in WR of at least 2/3 of a standard deviation. Again, average WR scores in each occupation group drop as respondents age. By occupation group, the largest average decline we see is within the manual occupations and operators category, followed by sales.

In Table 3 we characterize the transitions we see over time within and between occupation groups and into retirement, before examining the relationship between cognitive decline and

these same occupation/work transitions (Tables 4 and 5). It is important to note that it is impossible to move up if in the "top" occupational category (professional/managerial), or down if in the "bottom" category (manual/operators), so these cells are necessarily not applicable (n/a).

The top panel of Table 3 shows occupation around age 56 (rows) and whether respondents were in "higher," "the same," or "lower"-category occupations or retired, by the age-62 sample's target wave, when respondents were between 62 and 64 (columns). For all of these occupation groupings, the modal outcome is that respondents were still in the same occupational category around the age of 62. For all but manual occupations and operators, this was the case for more than half of respondents. The next most common transition, for all occupation groups and overall, is into retirement. The probability of transitioning into retirement decreases as occupations' cognitive demands increase. There is no clear movement into lower cognitive demand occupation groups as respondents age.

The bottom panel of Table 3 shows occupation around age 59 (rows) and whether respondents were in "higher," "the same," or "lower"-category occupations, or retired, by the age-65 sample's target wave, when respondents were between 65 and 67 (columns). Here, the modal outcome is no longer that respondents were still in the same occupational category around the age of 62. The modal outcome for professional/managerial occupations and the sales occupations is the same level of occupation, while it is retirement for the other occupations. Again, there is no clear movement into lower cognitive demand occupation groups as respondents age.

Table 4 presents tables analogous to those in the top panel of Table 3. However, they are

broken into two groups: those for whom WR scores declined by at least half a standard deviation (top) and those for whom they did not (bottom). Within the age-62 sample, we see higher rates of retirement overall and in all but one occupation group (manual/operators) for those with large declines in their WR score relative to those without large declines. Additionally, in the top three occupational categories we see more movement to lower occupation levels for those with large declines in WR relative to those without large declines.

Table 5 presents tables analogous to those in the bottom panel of Table 3, broken into two groups: those for whom WR scores declined by at least half a standard deviation (top) and those for whom they did not (bottom). Within the age-65 sample, we see higher rates of retirement overall and similar or higher rates of retirement for each occupation group for those with large declines in their WR score relative to those without large declines. The largest differences between those with large WR declines and those without are in the professional/managerial and clerical occupations, perhaps because memory is most important in these occupation groups.

Conclusions

In this Issue Brief, we use HRS data from 1996-2012 to study differences in rates of age-related decline in fluid cognitive abilities—indicated in this study by a measure of working memory—across broad occupation groups. We relate these changes to occupational changes and work transitions at common retirement ages. We group masked occupational categories into larger categories, from higher skill/cognitive demand occupations to lower. This categorization seems to work well, in that WR scores generally line up with this schema.

We then examine transitions between occupational categories and retirement from approximately age 56 to 62 and age 59 to 65. Over the younger age range, the modal respondent in each occupational category remains in the same occupational category. Over the older age range, the modal respondent in each category moves into retirement. Neither age range displays much movement between occupational categories.

Last, we brought together the transition matrices and changes in WR scores, showing that those with large declines in their WR scores over the period of observation were more likely to move into lower occupational groups or into retirement than respondents with less or no decline.

Researchers have begun to explore potential effects of occupation on cognitive changes, finding, for example, that working in an occupation characterized by higher levels of mental demands was associated with higher levels of cognitive functioning before retirement, and a slower rate of cognitive decline after retirement (Fisher et al., 2014) and that the blue collar-white collar difference is not fully accounted for by different educational levels across occupations (Li, Wu, and Sung, 2002).

There has been less research on how the interaction between cognitive decline and occupation affects occupational changes and retirement. However, a recent paper by Belbase, Khan, Munnell, and Webb (2015) does just this. Belbase et al. (2015) uses more detailed occupation data from the HRS, linked to the O*NET database, to examine the relationship between cognitive decline and workplace outcomes or workforce exit. The results of our brief seem to concur with the Belbase et al. (2015) findings, which suggest that workers may shift to less cognitively demanding jobs as a

result of cognitive decline, and that cognitive decline may also cause earlier than planned retirement.

This Issue Brief has shed light on some areas of work that might prove fruitful in the future for better understanding Social Security claiming behavior and occupational transitions. A logical next step is to use mental status and other cognitive measures to create analogous analyses. Number Series score, a measure of fluid intelligence, will be a particularly useful variable when enough waves of this new measure have been fielded. A next step that may be useful to the Social Security Administration is to examine cognitive changes in the period leading up to full retirement age (FRA) and how these relate to claiming behavior.

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Table 1. Frequencies in large occupation categories

Age 62 sample	Wave at which age ~56		Wave at which age ~62	
	Frequency	Percent	Frequency	Percent
Prof/managerial	925	37%	619	25%
Sales	231	9%	190	8%
Clerical	464	19%	314	13%
Service	347	14%	275	11%
Manual/Operators	527	21%	290	12%
Retired	n/a	n/a	806	32%
Total	2,494	100%	2,494	100%

Age 65 sample	Wave at which age ~59		Wave at which age ~65	
	Frequency	Percent	Frequency	Percent
Prof/managerial	835	33%	457	18%
Sales	265	11%	193	8%
Clerical	439	18%	240	10%
Service	370	15%	227	9%
Manual/Operators	561	22%	262	11%
Retired	n/a	n/a	1,091	44%
Total	2,470	100%	2,470	100%

Table 2. Levels of word recall scores, overall and by large occupation

	Overall						Means by occupation				
	Mean	25th%	Median	75th%	SD	n	Prof/ manage	Sales	Clerical	Service	Manual/ operators
Age 62 sample											
WR score ~ age 56	0.51	0.02	0.48	1.00	0.83	2619	0.74	0.61	0.61	0.30	0.16
WR score ~ age 60	0.45	-0.18	0.40	0.96	0.87	2619	0.68	0.50	0.53	0.24	0.09
Change	-0.07	-0.57	-0.02	0.56	0.85	2619	-0.06	-0.10	-0.07	-0.06	-0.06
Age 65 sample											
WR score ~ age 59	0.47	-0.04	0.48	1.00	0.86	2596	0.75	0.57	0.56	0.22	0.11
WR score ~ age 63	0.38	-0.21	0.37	0.96	0.89	2596	0.68	0.48	0.49	0.16	-0.04
Change	-0.09	-0.68	-0.11	0.46	0.90	2596	-0.07	-0.09	-0.07	-0.06	-0.15

Table 3. Occupational retirement transition probabilities

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Occupation ~ age 56	Outcome ~ age 62 (n=2,742)				
	Higher occ	Same occ	Lower occ	Retired	Total
Prof/managerial	n/a	58.18	10.38	31.45	100%
Sales	6.2	55.79	11.16	26.86	100%
Clerical	8.16	53.06	3.88	34.9	100%
Service	5.65	52.42	1.34	40.59	100%
Manual/Operators	11.23	45.28	n/a	43.49	100%
Overall	5.31	53.42	5.73	35.55	100%

Occupation ~ age 59	Outcome ~ age 65 (n=2,877)				
	Higher occ	Same occ	Lower occ	Retired	Total
Prof/managerial	n/a	46.83	10.61	42.56	100%
Sales	6.12	48.2	9.35	36.33	100%
Clerical	5.41	41.13	4.55	48.92	100%
Service	3.31	44.27	2.54	49.87	100%
Manual/Operators	9.73	35.74	n/a	54.53	100%
Overall	4.35	43.03	5.74	46.88	100%

Table 4. Transition probabilities from age ~56 to ~62, by level of word recall change

WR score declined by >0.5 SD (n=775)

Occupation at age ~ 56	Occupation at age ~62				
	Higher	Same	Lower	Retired	Total
Prof/managerial	n/a	56.73	9.82	33.45	100
Sales	5.41	50	8.11	36.49	100
Clerical	6.04	48.99	3.36	41.61	100
Service	5.71	47.62	2.86	43.81	100
Manual/Operators	9.88	48.84	n/a	41.28	100
Overall	4.65	51.61	5.29	38.45	100

WR score did not decline by >0.5 SD (n=1,844)

Occupation at age ~ 56	Occupation at age ~62				
	Higher	Same	Lower	Retired	Total
Prof/managerial	n/a	58.76	10.6	30.63	100
Sales	6.55	58.33	12.5	22.62	100
Clerical	9.09	54.84	4.11	31.96	100
Service	5.62	54.31	0.75	39.33	100
Manual/Operators	11.83	43.7	n/a	44.47	100
Overall	5.59	54.18	5.91	34.33	100

Table 5. Transition probabilities from age ~59 to ~65, by level of word recall change

WR score declined by >0.5 SD (n=800)

Occupation at age ~ 59	Occupation at age ~65				
	Higher	Same	Lower	Retired	Total
Prof/managerial	n/a	42.08	10.04	47.88	100
Sales	3.45	49.43	10.34	36.78	100
Clerical	6.02	35.34	1.5	57.14	100
Service	1.6	47.2	1.6	49.6	100
Manual/Operators	10.2	35.71	n/a	54.08	100
Overall	4.13	41	4.88	50	100

WR score did not decline by >0.5 SD (n=1,796)

Occupation at age ~ 59	Occupation at age ~65				
	Higher	Same	Lower	Retired	Total
Prof/managerial	n/a	48.85	10.86	40.3	100
Sales	7.33	47.64	8.9	36.13	100
Clerical	5.17	43.47	5.78	45.59	100
Service	4.1	42.91	2.99	50	100
Manual/Operators	9.5	35.75	n/a	54.75	100
Overall	4.45	43.93	6.12	45.49	100