National Institute on Aging | Division of Behavioral and Social Research

WORK, THE WORKPLACE, AND AGING PRE-TELECONFERENCE CONCEPT PAPERS

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WORKPLACE PRACTICES AND POLICIES THAT PROMOTE HEALTH AND SUPPORT WORK INTO OLDER AGES

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This concept note outlines two lines of research:

1. Longitudinal observational studies both in existence as well as potentially new cohort studies.
2. Intervention studies using fully randomized designs and quasi-experimental designs.

The substantive focus in both instances is oriented towards understanding workplace conditions and practices as well as social and economic policies at workplace, local, state and national levels that will improve worker health and enable older men and women to remain actively and productively employed in the work force longer. The second common theme is a focus on low and middle wage earners and others who are disadvantaged in the labor force. Much of the work on older workers is still oriented towards high income professionals whose economic security is well-anchored and whose health is better than most other Americans. The challenges are real but not as pressing as those workers who are in lower and middle wage occupations and who may face physical challenges to working long as they are in more demanding jobs. Work conditions and the challenge of balancing work and family life may be among the most important set of conditions producing health inequalities in our country. They also contribute to our overall low health rankings at a population level vis-a-vis other industrialized countries.

WHAT CAN WE LEARN FROM OBSERVATIONAL STUDIES?

Based on existing longitudinal observational studies, a number of issues can be identified.

1. **Working longer:** There is a call for working longer both in terms of health promotion of workers as well as for sound policy (extending retirement age, etc.). Some evidence suggests working longer promotes cognitive function and social engagement. Furthermore, the needs of Social Security and other retirement plans are challenged by increases in life expectancy. Yet, some evidence suggests the next generation of "older workers" may not be as healthy or as socially able to work longer. In all cases, there is likely to be great heterogeneity around the capacity of older Americans to work longer. We need more work to clarify the prospect that cohort differences and heterogeneity within cohorts may shape patterns of employment in old age.

2. **Work and family:** Balancing work and home obligations is challenging in the US where few national and state policies provide paid leave or flexible work. We know little about the long run impacts of work and family balance. Furthermore, new types of work (contract work within the workplace, new

work arrangements in the "gig" economy and new family forms and recent trends in migration may impact needs of employees for more protected and flexible time to balance workplace productivity with caregiving needs related to family health conditions.

Ongoing longitudinal studies such as the Health and Retirement Study (HRS), Panel Study of Income Dynamics (PSID), Current Population Survey (CPS), Midlife in the United States (MIDUS), and now even The National Longitudinal Study of Adolescent to Adult Health (Add Health) may be further exploited to yield important information related to these research goals. As we think about the ideal approach to understanding the links between new working conditions and population dynamics, it may be worth considering launching a new cohort study. The US is lacking in important occupational cohorts that might inform us about company level policies and practices, work unit interactions (managers and employees) and HR benefits that may impact employee health. Existing studies are very limited in the contextual information available that would enable us to understand environmental conditions that shape the health of workers at older ages. It is worth seriously considering the establishment of broad multi occupational cohort studies to answer the above questions.

WHAT CAN WE LEARN FROM QUASI-EXPERIMENTAL AND EXPERIMENTAL STUDIES?

The Work, Family and Health Network (WFHN) was a decade long project in which investigators from 6 institutions and the National Institutes of Health (NIH) conducted a randomized field experiment in two industries. It was an expensive undertaking yielding many valuable findings with publications appearing long after the end of the trial. The WFHN identified a number of workplace practices that influence turnover, life satisfaction, stress, sleep disruption, and cardiometabolic disease based on a strong randomized control trial (RCT) design. It is a landmark study for the National Institute on Aging (NIA) and the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) to have conducted. Continuing to use RCTs to investigate the impact of workplace redesign is important along a number of dimensions. First, all explorations using RCTs, from pharmaceutical interventions on, are based on multiple interventions with continued improvement and refinement of the "causally important agent." Rarely do we get it right the first time. Continued refinement and retesting make a final intervention most likely to be successful and sustainable. My experience with the WFHN as well as ENRICHD Enhancing Recovery in Coronary Heart Disease; a large RCT aimed at post myocardial infarction patients who were socially isolated or depressed) is that these very large trials are important but equally important is to conduct a number of smaller RCTs to test interventions on mid-range outcomes and across a more diverse and heterogeneous set of participants. RCTs offer a critical method to assess whether changing a situation can change an outcome. It needs to be tailored to an

etiologically important moment both when change in exposure can be made as well as when it can biologically influence outcomes. It is important to integrate RCTs into work and workplace redesign.

Secondly, as many states and cities launch paid leave policies, change retirement and disability policies, we have a unique opportunity to conduct quasi-experimental studies on the impacts of these policy changes on health and wellbeing. States such as California, New Jersey, Rhode Island, Washington and New York have implemented paid leave. Evaluations may still be possible. The next states likely to implement such leave policies are considered major contenders for evaluation. We should be interested in outcomes among both the people most likely to be impacted by the policy change as well as the impact these policies have on broad general population health. NIA would be well-served to take advantage of policy changes likely to occur over the next few years to identify states where pre- and post-policy data could be collected. The example of the Oregon Health Experiment is a prime example of the kind of study that could be implemented related to paid leave, or on workplace practices related to flexibility, workplace schedule control, etc.

Finally, it is important to understand that no one approach will answer all our questions. Multiple study designs will be optimal to assess the conditions that impact the long run capacity of men and women to work longer, remain healthy and take care of their families.

THOUGHTS ABOUT RESEARCH PRIORITIES RELATED TO WORK, WORKPLACE, AND HEALTH:

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I. ARTICULATE THE COGNITIVE AND PHYSICAL CORRELATES OF LONGER WORKING LIVES

Physical and cognitive health have been associated reliably with longer working lives. Though most of this research has been correlational, country comparisons by Rohwedder, Willis, and others have offered intriguing evidence that working may actively protect against age-related cognitive decline. Because cognitive decline is among the greatest fears of aging people, such evidence may inspire people to work longer. Many questions remain, however, about the specific characteristics of work that serve protective functions, the dose response (e.g., whether part-time work is protective), and whether only certain types of work offer cognitive and physical benefits.

II. KEY NON-FINANCIAL FACTORS IN DECISIONS TO RETIRE OR TO CONTINUE WORKING.

A 2014 article by Olshansky et al. finds that the majority of older Americans (even a near majority of those over 85) say that they are healthy enough to work; and findings from SHARE suggest that two thirds of Germans over age 70 are healthy enough to work (Jürges, Thiel, & Axel Börsch-Supan, 2017). Yet retirement age in the US remains even below the age at which workers would receive full Social Security benefits.

Given Americans' poor financial preparedness, we can assume that decisions to retire reflect factors that remain poorly understood. Family considerations, such as caregiving demands and spousal retirement, may play a role. Rigid schedules and policies that discourage part-time work also may contribute. It is important to understand these non-financial reasons for retirement. There is a need to understand the role that expectations and social norms contribute as well.

III. OVERT AGEISM VERSUS WORKPLACE PRACTICES

In surveys, Boomers report that they expect to work past traditional retirement ages. Employers, however, are less enthusiastic about the prospect. To the extent that management views older workers as less productive than younger workers, employment of older workers will remain limited. Many American employers remain focused on moving older workers out of the workforce (viz., graceful exists). Some employers are contributing to retirement plans in order to encourage older workers to

retire. Others are including fellowships in benefit packages that workers can use to retrain in other areas after they retire.

In part, the disinterest in recruiting and retaining older workers may reflect workplace practices that fail to highlight their contributions. Criteria by which workers are evaluated evolve around young workforces, for example, criteria that accentuate speed, accuracy, flexibility, willingness to work overtime, etc., and are thus weighted heavily in manager evaluations of employees. In contrast, contributions such as emotional stability, knowledge, expertise, and loyalty – which may be comparably valuable – are often not incorporated into reviews. In other words, review practices may fail to capture the contributions that older workers make.

In addition, there is some evidence that older workers generate spill-over effects that affect the production unit as a whole, but for which they are not credited. Older workers appear to reduce turn-over and increase social cohesion, for example, and there is intriguing evidence that the presence of older workers may increase the productivity of younger workers (although the processes through which such outcomes come about remain poorly articulated).

IV. MIXED AGE WORKFORCES

Though we hear mostly about aging workforces, workforces in the future will be more age diversified than ever in history and will remain diversified for the foreseeable future. From a societal perspective, it is essential that we better understand factors that contribute to well-being and productivity in mixed-aged workforces. From an employer perspective, identifying optimal practices will be welcomed.

Although mostly anecdotal, there is some evidence that mixed-aged teams are more productive than teams that are all young or exclusively old. Thus, the potential of optimizing outputs in mixed age teams is promising. Just as important is understanding of risks of age diversity in workplaces. In studies of gender and racial integration, Richard Hackman observed poorer performance in some settings when integration was initiated.

V. FUTURE TRENDS: ARE BOOMERS RECONCEPTUALIZING RETIREMENT?

Historically, retirement has been conceived of as a permanent and abrupt cessation of work, a reward at the end of working lives. Conceptualized as a reward, the earlier people retire, the greater the reward. Times have changed. Taking the long view, functional health in the 60s and 70s has improved greatly over historical time, and, for most, work is less physically demanding. Relatedly, retirement age, though remaining relatively young, has begun to tick upward. A small but significant number of people are retiring from core careers to transition to “encore careers,” (i.e., ones that focus less on earnings and more on social contributions). Others are seeking part-time work either with their existing employers or new employers. Self-employment is increasing among older adults. Research is needed to understand

the economics and subjective benefits of these emerging glide paths. How widespread is the tendency to retire differently? Are there differences by social class? Are people motivated by a search for emotionally meaningful work or a sense of duty?

VI. INFORMAL OBSERVATIONS FROM CONVENINGS OF LARGE EMPLOYERS

At the Stanford Center on Longevity, we regularly convene large employers to discuss aging workforces. It is clear to us that employers hold the same stereotypes about older people that are widely held in the general population: older workers are viewed as unlikely to change, slow learners, and uninterested in new experiences. Employers come to the table believing that older workers are less productive, even when acknowledging the circularity in their beliefs. For example, they often stop training workers once they reach 50 years of age.

At the same time, we have been struck by the responsiveness of employers to empirical evidence. To the degree that industry-specific data speak to beliefs, I expect that employer views are modifiable. Thus, understanding the ways that institutional practices contribute to worker effectiveness and employer perceptions of older workers is very important. Field studies and workplace interventions may be essential.

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RECOMMENDATIONS FOR NIA RESEARCH PRIORITIES: HEALTH AND WORK AT OLDER AGES

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Economists typically model retirement as a decision made by a rational, forward-looking consumer. This individual considers the benefits from work (including wages, changes in the entitlement to future Social Security and private pension benefits, and other benefits like health insurance) as well as the cost (the value of lost leisure time, or disutility of work) and retires when the cost of work exceed the benefits.

Health interacts with the retirement decision in a variety of ways. Poor health raises the disutility of work, though workplace policies that accommodate declining health may be able to partially offset this. Poor health may also increase the value of having health insurance, raise expectations of future medical costs, change the value of non-medical consumption (e.g., travel), and alter projected life expectancy, all of which can alter the retirement calculus. Further, whether the individual is working may affect their physical health, mental health, and cognition.

Several findings from the existing economics literature on retirement are germane. First, poor health increases the probability of retirement. This is seen most clearly in papers that address the thorny issue of causality by exploring how an unexpected negative health shock affects the probability of retirement. Second, health is by no means the only driver of retirement. This is evident from the fact that average population health declines only slowly with age throughout the window in which most people retire (ages 60-70), while employment declines far more rapidly. In addition, there are a large number of studies showing that financial incentives from Social Security and private pensions as well as access to health insurance have important effects on retirement decisions, consistent with the model discussed above. A third key finding is that less-educated groups are in poorer health, are more likely to receive Disability Insurance (DI) benefits, and have lower labor force participation rates. Finally, discussions of work and retirement often gloss over the important complexity of the retirement transition, which may include a period of "phased retirement" (reduced hours at the same job), a "bridge job" (a transitional job between the career job and labor force withdrawal), self-employment, or labor force re-entry after initial withdrawal.

The first two findings would seem to imply that if the health of the population is improving over time, we might reasonably expect to see some trend towards later retirement, though for many people the retirement decision will continue to be dominated by non-health factors. Of course, health trends themselves are quite complicated – while mortality at older ages has declined consistently for many decades, there is increasing awareness that longevity gains are concentrated among those of higher socioeconomic status as well as considerable debate about whether individuals are healthier at older

ages than in the past and about whether recent health declines in middle age will soon be reflected in health declines at older ages. Thus, projecting how changes in health translate into changes in work is not simple, either for the population as a whole or for vulnerable groups.

With this as a backdrop, more research by economists and other social scientists in the following areas would enhance our understanding of workplace qualities and policies that promote health and support work in older ages, particularly among vulnerable subgroups.

VALUING WORKPLACE ATTRIBUTES

A job is defined not only by the set of tasks a worker performs in exchange for a wage and benefits package, but also by many other non-monetary attributes. A partial list of job attributes might include, for example, whether the worker is able to set his or her own hours, to shift to a part-time schedule, to work remotely, to receive training and opportunities for professional growth, and to enjoy paid time off. Job attributes such as these (or the lack thereof) may influence the worker's decision to remain on the job at older ages; those attributes that contribute to a worker's ability to manage health problems could be even more important for workers in poor health.

Estimating the value that workers place on job attributes by estimating wage regressions can generate biased (even wrong-signed) effects because of the tendency of highly-paid workers to have jobs with desirable attributes and the difficulty of controlling adequately for worker quality. Maestas et al. (2017) sidestep this problem by using experimental data to estimate workers' valuations of these attributes. But much more work is needed to understand how non-monetary job attributes are valued and affect labor supply decisions, and whether firms are adapting jobs to meet older workers' preferences.

A new data source that may facilitate work on this subject is the 2015 American Working Conditions Survey, which provides data on a broad range of working conditions for a representative sample and is also harmonized with similar European data; existing data sources like O*NET also hold promise, especially when linked to other survey data. A challenging yet promising avenue for future work would be to promote partnerships between researchers and companies on experimental studies in which workers' access to job attributes is varied and researchers study the effect on retention and health. This work could be modeled on similar collaborations that examine how pension plan characteristics (e.g., whether workers participate in the plan automatically or must opt in) affect savings.

LABOR DEMAND

The economic literature on retirement has focused largely on supply-side factors that may affect retirement decisions, including public and private pensions, health and health insurance, wealth and savings, and family factors. Labor demand factors merit greater attention. One important topic is the relationship between age, wages, and productivity. While there is solid past work on this topic (see

Skirbekk, 2004 for a review), it is important to explore whether trends such as sector shifts, technological change, automation, and the rise of alternative work arrangements (e.g., use of temporary and contract workers) may change the relationship between age and productivity and also whether these trends pose new challenges or opportunities for older workers. An update of Hirsch et al. (2000) is one example of the kind of work that could be useful.

Age discrimination remains an important topic, as older workers will be challenged to extend their working lives if employers are reluctant to hire them or treat them differently in pay and promotion decisions. The existing literature on this topic (e.g., Neumark et al., 2015) provides compelling evidence on one piece of this question, using a field experiment to ascertain that older workers – particularly older women – are less likely to receive a call back for a job interview. It has proven more difficult to examine how this translates into differences in actual hires and wage offers, and also to see if older workers on the job are treated differently than younger workers. It would be useful to put out a call for new research strategies to address this topic, such as the possibility of using big data (e.g., longitudinal data on job titles scraped from LinkedIn).

SUPPORTING WORKERS AT DISABILITY ONSET

US workers who experience a disability must choose whether to leave their job in order to meet the requirement of being out of work for five months before applying for Disability Insurance (DI) benefits or to try to figure out how to continue doing their job despite the decline in their health. As Autor (2011) notes, the DI program does not feature employer experience rating of premiums (as does unemployment insurance) that would give employers a financial incentive to accommodate a recently disabled worker on the job in order to encourage him or her to continue to work. It would be useful to promote research that would help us understand how a worker who has recently experienced a health shock approaches the decision of whether to exit work and apply for DI and how the employer may be able to influence this decision. Research that offered real financial incentives to firms to encourage accommodations could be especially compelling (if more expensive).

THE EFFECT OF WORK ON HEALTH

As referenced above, studying the relationship between health and work is complicated by the likelihood that health affects work, work affects health, and that observed correlations between work and health may reflect a causal effect of other (perhaps unobserved) factors. Even so, it seems clear from the existing literature that poor health increases the probability of retirement. The evidence regarding the effect of work on health is more mixed, with evidence pointing to improvements in physical health but also cognitive decline after retirement and inconclusive evidence regarding mortality effects. Given the focus of this project on designing interventions that will extend work life and

promote health, having a clearer understanding of the effect of work on health, including for vulnerable groups, would appear to be a desirable goal.

LABOR FORCE TRENDS: SOME WORKING LONGER, OTHERS WORKING LESS

The two most important labor force trends affecting older and late middle-aged workers are the rise in labor market participation at older ages for both men and women and the declining participation of prime age men. Although these trends may seem somewhat distinct from the question of workplace qualities and policies that would promote health and support work into older ages, it is nonetheless critical to understand these trends, which can represent either a wind at one's back or a headwind thwarting any attempt to promote longer work lives.

With respect to working longer, it is easy to cite some of the factors that may play a role, including: changing financial incentives from social security and private pensions, changes in education and occupation, improving health (as measured by mortality risk), the rise of women in the workforce (which may encourage men to work longer), and population aging (which may strengthen demand for older workers). What is more difficult is to ascertain the relative contribution of these factors to longer work lives. Additional research on this point would be useful. With respect to decline in participation by prime age men, this trend is much stronger for those with less education, making it critical to understand its causes in order to determine how to promote work at older ages among this group.

Finally, as noted above, there is considerable uncertainty about whether individuals are healthier at any given age relative to in the past and also about whether a recent uptick in mortality represents the end of the long-term trend of continual mortality improvements or is merely a temporary phenomenon. Obtaining greater clarity on these important health trends, including how they vary across demographic groups, will enhance our ability to design workplace qualities and policies that promote health and support work at older ages.

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THE CURRENT AND FUTURE WORK ENVIRONMENT: STRATEGIES TO MAXIMIZE OPPORTUNITIES FOR OLDER WORKERS

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THE CHANGING LANDSCAPE OF WORK

To provide some context for the remainder of the discussion, I will begin by briefly reviewing significant demographic and social changes that are shaping todays and tomorrow's workplace. One is that the workforce is aging. According to recent data from the US Census, by 2050 about 19% of the workforce will be aged 65 or older – a 75%growth of the number of workers in this age group as compared to a 2% growth in individuals aged 25 -54 years (Toossi, 2012). As the diversity of the US population increases, the entire workforce, including older workers, is also becoming more diverse. Further, patterns of work and retirement are changing. It is no longer a "lock step process" - most workers making many more transitions throughout their working life and moving in and out of different work experiences (AARP, 2010).

At the same time, there are also dramatic changes in work structures and organizations, which include decentralized management structures, collaborative work arrangements and teamwork, and a greater emphasis on knowledge-based work and jobs that require advanced degrees or training (Czaja and Sharit, 2012). Technology is also becoming ubiquitous within work environments and reshaping work processes, the content of jobs, where work is performed, and training strategies. Most workers use some form of technology and this trend will continue into the future. Technology is dynamic and will continue to change and in many cases become more sophisticated (US Bureau of Labor Statistics, 2013). These changes in the workplace have tremendous implications for workers, employers and organizations. On the worker side, these changes imply that workers of all ages will have to learn new skills continually and adapt to changes in job demands. Organizations and employers will need to develop strategies to accommodate older workers and to ensure that workers of all ages are provided with opportunities to update their skills to keep pace with changes in work technologies and job demands.

MYTHS AND REALITIES ABOUT OLDER WORKERS

Unfortunately, numerous negative stereotypes about older workers still exist that often prevent or have a negative impact on employment opportunities for older people. These stereotypes can also prevent

organizations from realizing the wealth of positive assets, such as wisdom, experience, and reliability that older workers can bring to the table.

Common myths about older workers include the belief that all older people are alike, tend to be sick, have higher rates of absenteeism be less productive than younger workers and less flexible or willing to adapt to changes in the workplace. In addition, older people are thought to be technophobic and unwilling or unable to learn to use new technologies. Further, it is often thought that they are less willing to participate in training programs and costlier to train.

These myths are largely unsubstantiated by findings from our research and that of others. Below, I summarize what we know and don't know surrounding these myths:

- We know that as a group, for a variety of factors, older people are extremely heterogeneous on a host of dimensions such as educational attainment, race/ethnicity/culture, living arrangements, health and physical and cognitive abilities. Thus, we cannot assume that everyone 55+ (a common definition of the "older worker") is the same.
- Many age-related changes in function, such as declines in vision or working memory may be compensated for by experience or external/environmental supports (i.e. eye glasses, procedural cues or reminders).
- Older people can learn and experience gains in function and skills if they are provided with opportunities for training and sufficient practice and feedback during the learning process.
- There is no substantial literature that indicates that job performance is lower among older adults and in fact there is literature demonstrating that in fact aspects of performance such as accuracy improves with age. Further, older workers do not have higher rates of absenteeism or turnover. In contrast, they tend to be more reliable than younger workers.
- Although technology uptake tends to be lower among today's cohort of older adults, **older adults are not technophobic** and are willing to use technology systems and applications. However, they often have less confidence and less self-efficacy using technology than younger adults. We believe that this lower uptake and sometime lack of confidence regarding ability to learn new technologies, is often the result of poor design of technology systems and applications and lack of available and appropriate training.
- Within our CREATE Center, our research has shown, for example, that even people in the later decades including the 70s, 80s, and 90s with no prior technology experience can learn to use computers and software applications. We have also shown that older adults experience great gains in technology proficiency and in technology self-efficacy with continued experience.
- Unemployed older people who wish to return to work often confront lack of technology skills as a barrier (Lee, Czaja and Sharit, 2009). Unfortunately, within the workplace older workers are often bypassed in terms of training and retraining opportunities. Further, there are often limited

opportunities in community settings that provide older adults with the training to gain the skills that they need, especially for older adults of lower SES status.

INTEGRATING OLDER ADULTS INTO TODAY'S WORK ENVIRONMENT

Maximizing the potential of older workers and their contribution to the workforce will require strategies to accommodate the skills, abilities and preferences. One important issue is, of course, recognizing the value of older workers and striving to match their skills and abilities with the demands of jobs and work environments. This requires both a workforce and workplace assessment to understand needs in worker skills and potential changes in jobs or the work environment to accommodate older people. These changes might include:

- Reducing the physical demands of jobs and making sure that workplace and environments adhere to existing ergonomic standards and available guidelines for older people. The CREATE team has handbooks available on these topics.
- Designing more flexible work schedules such as alternative work hours, shorter work-weeks, or providing the ability to work from home for some portion of time.
- Accommodating competing family demands. Many middle-aged and older workers are involved in caregiving and need support for their caregiving activities.
- Ensuring that technology systems and applications are properly designed to ensure effective use by older workers whose perceptual, cognitive and psychomotor capabilities are likely to be undergoing normative age-related changes. There are numerous design guidelines available.
- Ensuring the availability of training and technical support. In today's work environment with the continual diffusion of new technologies training and retraining of older workers is critical to organizational effectiveness. There are also guidelines available (authored in fact by members of the CREATE team) regarding design of training programs for older adults. This may involve partnering with community agencies to provide venues for job related training. It should also involve partnerships between industry and the government to support worker-training programs.

There are also areas of needed research that must be addressed to fully maximize employment opportunities for older adults and the productivity, quality of working life and work satisfaction for older people including research directed at:

- Identification and consistent operationalization of work performance metrics.
- Updating existing databases on age and work performance for today's jobs in real work settings and how this varies according to worker characteristics.
- Examining the impact of family caregiving on work performance.

- The development and evaluation of strategies, including technology-based strategies, to accommodate working caregivers. There is an absence of a solid evidence-base on caregiving and work.
- The identification of strategies to foster the re-entry of older adults into the work force.
- Development of strategies to best train older workers and strategies to implement training of older adults (especially lower SES older adults) in community settings.
- Understanding the implications of online learning and training formats for older people and how to best optimize these formats.
- Understanding the implications of teamwork for older adults and how to best structure teams.
- Maximizing the experience and skills of older people in terms of intergenerational mentoring.

ADDING A EUROPEAN PERSPECTIVE FOR FUTURE RESEARCH AGENDA TO WORK, PLACE, AND HEALTH

Joachim E. Fischer, M.D. | Heidelberg University

I. UNDERSTANDING WORK ECONOMICS & CONTEXT.

Work hinges on the availability of work-places. Research into work and health often fails to acknowledge that businesses will only offer work-places if full costs of labor (direct plus indirect) minus revenue leaves a profit. Exceptions are the jobs paid from re-distribution of funds (i.e., taxes, insurance contributions). The contribution by Coile in this collection emphasized studying labor demand factors with respect to sector shifts, alternative work arrangements and the ensuing challenges for older workers. However, also the supply side on a community level may be a driving force for work participation.

We suggest considering that workers during the last third of their working age (e.g., above 50) may be less willing to move to other communities as they have established material bonds (e.g., house and mortgage), social bonds (friends & neighborhoods) or family related ties (children and school). Hence, older workers may be more susceptible to changes in the supply side (i.e., closure of a local plant and transfer of operations or business to outside the US, or in Europe from high wage countries like Germany to low wage European countries like Rumania). In German communities, this is often accompanied by a relative change in work sector contribution, i.e. a shift to a higher proportion of work demand in locally bound jobs such as nursing.

A completely different picture emerges in another remote region in Bavaria, Germany: Dingolfing is the site of the largest BMW production plant (larger than Spartanburg, US). The site has attracted multiple other business that are related to supplying BMW. The net result is an extreme shortage of available work-force in the region; even semi-skilled workers are transferred daily from up to 100 miles away by a network of company hired bus services. No wonder, the plant is a leader in exploring new work ergonomics that foster the productivity of 50+ workers.

Thus, we see a need to integrate descriptors or indicators of community level work supply and demand determinants into studies on aging work, productivity and health. Combining research in the US with research in Europe (e.g., with countries with statutory health services for every citizen) with companies that employ aging workers in both countries (i.e., IBM for white collar workers, BMW site at Spartanburg vs. Dingolfing or BOEING vs. AIRBUS for blue collar workers) may offer opportunities to disentangle the effects of work organization, individual health, and macro-economic context.

II. MERGING LONGITUDINAL OBSERVATION AND EXPERIMENTAL DESIGNS.

Global technological trends and an ever-increasing agility in changes of work conditions hamper the application of the traditional cohort-study approach of longitudinal observation leading to hypotheses that may be tested in randomized controlled trials. There is a need for more agile research designs that embed interventions at the contextual level. The past decade has seen the practical implementation of design innovations that extend beyond the cluster-randomized controlled trial or the factorial design approach. We need to acknowledge that we must increasingly draw causal inferences from observing complex interventions (e.g., at the community level) together with a need for modeling external effects too.

New design approaches, such as interrupted time series and regression discontinuity, lend more credibility to quasi-experimental designs. The method of synthetic control groups of time series opens new avenues beyond the sphere of, for example, propensity score matching. New statistical models such as longitudinal multilevel or multilevel structural equation are no longer highly innovative but are increasingly applied. The research on work, aging, and health is no longer comparable to the fruit fly experiment in the laboratory, particularly once meso-context and complex interventions are integrated. The research methodology must redefine the appropriate balance between adherence to traditional scientific rigor (i.e., the highest valued evidence is the systematic review based on high quality RCTs) vs. practicability of research in the industry. Linkage data from countries with more established tradition in the use of linkage data (e.g. the Scandinavian countries) may be helpful.

III. HETEROGENEITY IN AGING OF WORK RELATED FUNCTIONS.

As individuals age, the heterogeneity of cognitive functions and sensory abilities increases. This is due to the differential aging of various functions. This well-known and researched phenomenon relates to muscular force, coordination, audio-visual processing, memory, and fluid intelligence. These processes occur for longer periods at the subclinical level (i.e., without impairing work performance), like the chronic progression of atherosclerosis, diabetes, or joint cartilage degradation. Like chronic non-communicable diseases these impairments are at least amenable in part by training or their effects in part by ergonomic designs (i.e., increased illumination at work places for aging visual systems). Often some of these impairments do not become apparent in simple medical testing (i.e., the impaired audio-signal separation in aging people is a different phenomenon than simple hearing loss). Adding to the complexity is that increasing levels of functional loss may – like in clinical conditions – have non-linear relationships to functioning or symptomatic thresholds.

In our data, we often see ensuing two-hump camel back-like distributions across larger work groups. Statistical methods relying on the normal distribution or methods to achieve normal distribution with transformations no longer apply. Key performance indicators are needed that have the possibility to account for these multiple small changes in different systems, their complex interaction with productivity, and that model the observed threshold phenomena observed in real life. Such methods are needed to inform research that addresses the heterogeneity in work-related function when evaluating new avenues for work-site related prevention or environmental measures.

IV. ORGRANISATIONAL RESOURCES, WORKPLACE ATTRIBUTES AND AGING

In our own Mannheim Industrial Open Cohort Study (> 45,000 employees) as well as in a more representative longitudinal cohort study on work conditions and economic success of companies initiated by the federal ministry of work, we have seen the important role of organizational resources (such as perceived supervisor support, co-worker support, enjoyment of one´s work, personal engagement) in relationship to mental health as compared to the traditional psychosocial risk factors such as high demands and low control. The effect sizes are as high or higher than those of other psychological constructs, such as the reciprocity (effort-reward-imbalance) or organizational justice. We need short and practical instruments that address these factors at a work-group level. This can be achieved by computer-adaptive testing or intelligent use of item response theory. Currently available validated instruments are too long to be combined into a single survey that addresses all relevant constructs.

Failure to appropriately address these distinct but often correlated constructs leads to attribution bias when analyzing and discussing the data. This also holds true for personal, non-work-related stressors, or resources. For example, we achieved an almost well-fitting structural equation model when using the traditional psychosocial measures, subjective health and a new measure of productivity, which combined absenteeism, presenteeism, and work-ability into a single digit. Once we added personal psychosocial factors such as worries, financial burden, care-giving needs the model improved. Yet, still this model concealed a fundamental construct that appeared as mediator between work-related resources and health once included: the perception of joy and purpose at work. Moreover, the relationship between work conditions and perceived health was mediated in an age dependent fashion by the perception of joy and purpose at work. This hitherto unpublished finding let us hypothesize that studies investigating the relationship between retention at work, retirement, health and ageing should include non-classical work attributes such as perception of purpose, belonging, social value, enjoyment.

V. MODELLING MESO-CONTEXTUAL EFFECTS ON HEALTH

Few longitudinal cohort studies maintain the organization structure. Thus, the results link psychosocial resources at work directly to the individual. However, personality factors may influence both the perception of work conditions (e.g., unfair) as well as one´s own health (e.g., poorer). Thus, the traditional cohort design cannot disentangle this possible underlying confounder. Maintaining the organizational level and achieving large enough recruitment per work-group (e.g., a minimum of 10 participants) allows for multilevel modeling or simpler pseudo-multilevel modeling where the averaged responses of the other individuals from the same work-group are entered as predictor at the individual level together with the individual´s deviation from the work-group average. Such design is not only informative in longitudinal observational studies but also allows for the investigation of quasi-experimental real-life interventions (e.g., a change in leadership). Such research design facilitates, for example, estimates of illustrative effect sizes for interventions (e.g., a leadership improvement program achieving a similar effect as the change from manager X to Y).

VI. NUDGING AND INCENTIVES AT THE ORGANIZATIONAL LEVEL

Most of the incentive literature focuses on individual nudging or individualized incentives. A recent example observed at BMW, hitherto not published, shows the importance of also considering incentives at higher organizational level.

Given the threat from rising prevalence of diabetes in their aging work-force and given the low availability of younger work-force in many regions in Germany, BMW decided to promote low-glycemic nutrition in their company canteens, hoping for carry-over effects into real life. Thus, seven years ago, BMW started a massive campaign towards healthier eating, first educating all canteen chefs in their German sites to cook attractive low-glycemic load meals. By early 2014, this campaign had led to balance in consumption of “good,” “average,” and “poor” nutritional value meals. In early 2014, BMW introduced a simple key performance indicator, first internally to monitor the efforts: A sold “good” meal scored +1, an “average” meal scored 0, a “poor” meal scored -1 and the key performance indicator (KPI)was the monthly average of sold meals. Starting with a KPI of 0.05, BMW introduced food labeling (green, yellow, red) together with an attractive internal advertising campaign. Consistent with the published literature on food labelling, the KPI changed by about 10% to 0.15. BMW considered an individualized incentive program, only to realize that sufficient incentive value would result in a multimillion scheme with high administrative burden.

By late 2015, BMW introduced the incentivizing at the canteen chef level: every month, the KPI and the percent achievement per canteen towards the overall goal of 0.35 was published openly and the

canteens business performance evaluation included the KPI review. Within five months, the KPI soared to 0.35 and has hovered between 0.3 and 0.45 ever since. When 1,400 individuals who had their HbA1c level measured in 2014 were reinvestigated in the first six months of 2017, their HbA1c showed a small but significant decrease, particularly in the group of prediabetes according to the ADA definition (HbA1c 5.7 – 6.5%). This example calls for innovative designs investigating nudging and incentive approaches at the organizational level.

VII. SMALL BUSINESSES, COMMUNITIES AND HEALTH

Small businesses with fewer than 50 employees rarely partake in research studies. Yet, in some communities, small businesses of this size are the backbone of the local economy. Unlike large companies, small businesses rarely have the resources to systematically develop programs accommodating the needs of aging workers. We need community based research endeavors that build upon or leverage the locally existing ties and social bonds within communities and we need to identify effective ways of creating sustainable business support networks within communities that address the special needs and requirements of an aging workforce. Further, the community level provides new opportunities for aligning the work sector with the health care or preventive sector beyond individual case management or individual arrangements. Currently, we are testing the feasibility of such formal networks and alliances within one mid-size German city (Gaggenau), learning that the required knowledge goes beyond just that pertaining to work & health and includes health policies making, local policies, social media, communication, micro-economics, macro-economics. To address such endeavors, we need multidisciplinary (within science) and transdisciplinary (scientists working with managers or local politicians) approaches.

IDENTIFYING THE ROLE OF THE WORKPLACE ENVIRONMENT IN THE HEALTH AND LONGEVITY OF OLDER WORKERS

Jim Harter, Ph.D. | Gallup, Inc.

As the majority of the baby boomer generation approaches traditional retirement age, and as the nature of work changes with increased digitization, it is important to consider the wide range of variables that impact the health, longevity, and engagement in work for the older segment of the workforce. For example, in what ways can work itself improve health and vitality as we age? In what ways does work serve as a compounding factor, among other life variables, in likelihood of disease and mortality? Movement toward science-based answers to these questions is essential to inform business leaders and policy-makers.

Understanding work, health, and longevity requires consideration of a multitude of variables, including broad macro-level economic context and micro-level work and life experiences. For example, nations with higher unemployment rates have higher percentages of disengaged workers, likely because workers have less choice to switch from miserable working conditions or poor management to a job with more optimum conditions (http://news.gallup.com/reports/220313/state-global-workplace-2017.aspx?g_source=link_newsv9&g_campaign=item_220472&g_medium=copy). Lower unemployment can increase the competitiveness of organizations to build environments with good working conditions so that they attract star employees. At the micro-level, organizations that hire and develop great managers, give workers roles in which they can succeed and progress, recognize them when they do good work, invite their opinions, and give them ongoing opportunities to develop achieve higher performance and retention of workers (http://news.gallup.com/reports/191489/q12-meta-analysis-report-2016.aspx?utm_source=gbj&utm_medium=copy&utm_campaign=20160531-gbj). Businesses that achieve high performance tend to grow and create jobs, and so the micro and macro-economic variables go hand in hand (http://news.gallup.com/poll/148883/Engaged-Workers-Report-Twice-Job-Creation.aspx).

Some of the "current state" challenges:

- Case & Deaton (2015, 2017) found increases in all-cause mortality and morbidity among white non-Hispanic Americans in midlife (45-54) since the turn of the century. More specifically, they found increases in drug overdoses, suicides, and alcohol-related liver mortality among those with a high school degree or less education.
- Krueger (2017) found participation in the labor force has been declining for prime-age (25-54) men. About half of those who are not in the labor force have a serious health condition and half take pain medication on a daily basis—nearly two-thirds take prescription pain medication.

Labor force participation is lower in areas of the country where more opioid pain medications are prescribed.

- Gallup-Sharecare Well-Being data show that 14% of Baby Boomers report being currently treated for depression and 21% report a depression diagnosis at some point in their life. These figures are higher than in other generations (http://news.gallup.com/poll/181364/reports-depression-treatment-highest-among-baby-boomers.aspx).
- The average expected retirement age and average actual retirement age are gradually increasing. 40% of non-retirees age 50-64 expect to retire after age 65—this group includes both those who want to continue working and those who are actively disengaged in their work or workplace and have to continue working for financial reasons. Traditionalists who continue to work are the most highly engaged generation (http://news.gallup.com/poll/166952/baby-boomers-reluctant-retire.aspx?utm_source=link_newsv9&utm_campaign=item_181298&utm_medium=copy).
- Younger baby boomers (50-59) are less engaged in their work and workplace than older baby boomers. There appear to be two segments within the baby boomer generation:50-59 and 60+ (http://news.gallup.com/poll/181298/older-baby-boomers-engaged-work-younger-boomers.aspx?utm_source=Employee%20Engagement&utm_medium=newsfeed&utm_campaign=tiles).
- Organizations vary considerably in their success in engaging workers. Some organizations have as many disengaged as engaged workers, whereas others have developed workplaces with a ratio of 15 or more engaged workers for every disengaged worker. There is substantial evidence that the quality of the workplace environment, in addition to impacting performance and retention, is associated with the overall health and well-being of workers. Creating an engaging workplace doesn't happen by chance. Organizations that achieve high levels of workplace engagement have a very clear strategy, communication systems, accountability, and development programs (http://news.gallup.com/poll/187865/engaged-employees-less-likely-health-problems.aspx).
- Policy and organizational offerings to employees also need to be considered within the context of the work environment. For example, while 85% of US organizations with 1,000 or more employees offer wellness programs to employees, only 24% of employees participate. Engaged workers are 28% more likely to get involved in wellness programs that are offered by their organization in comparison to employees who are not engaged (http://news.gallup.com/businessjournal/168995/why-workplace-wellness-program-isn-working.aspx). Workers who are expected to use mobile technology to work outside normal working hours report higher stress than other workers. But, among those that are engaged in their work, there is no difference in stress between those who are and aren't expected to use

mobile technology to work outside normal working hours (http://news.gallup.com/businessjournal/175670/employers-ban-email-work-hours.aspx).

- An over-arching problem is that most organizations haven't put in place the foundational elements necessary to engage workers, young and old. Approximately 1/3 of US workers, and approximately 15% globally, have a high level of engagement in their work and workplace. While these figures have improved in recent years, most workers are either indifferent or actively disengaged in their work and workplace (http://news.gallup.com/reports/220313/state-global-workplace-2017.aspx?g_source=link_newsv9&g_campaign=item_220472&g_medium=copy).
- Robots are projected to take over automatable jobs in the services sector the next 10-20 years (https://www.marketwatch.com/story/this-chart-spells-out-in-black-and-white-just-how-many-jobs-will-be-lost-to-robots-2017-05-31). As particular job segments become extinct, retraining workers to build new capabilities will be necessary. The capacity to continually learn new skills will be of increased importance. Gallup workplace data indicate that older workers report, at a much lower rate than younger workers, development and learning opportunities-- a pattern that could produce inefficiencies in finding meaningful work as jobs are reformulated due to digitization.

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RESEARCH DIRECTIONS ON WORK, THE WORKPLACE, AND HEALTH, WITH A FOCUS ON OLDER WORKERS

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The interplay of work, workplace policies and practices, and older workers' health has clear relevance to population health, health disparities, and economic development. I approach this topic as an organizational sociologist interested in both worker health and wellbeing and the experiences of employers, managers, coworkers and customers or clients. This perspective leads me to identify a need for research that investigates workplace policies, practices, and interventions from the perspective of multiple stakeholders: workers (especially older workers), families, communities and firms or other employing organizations. There is important work to be done to understand how workplace policies and practices affect 1) the labor supply of older workers (i.e., the likelihood of being in the labor market and the hours devoted to paid work), 2) the health and wellbeing of older workers with a focus on the psychosocial work environment and work-life conflicts, and 3) older workers' ability to take care of themselves through health-promoting behaviors and seeking and following medical treatment as health concerns arise.

INTRODUCTION: WORK REDESIGN FOR BETTER WORK AND BETTER HEALTH

We should be asking how work can be redesigned to support both better health and wellbeing, particularly for older workers, and better work performance. A key question is how schedules, staffing, and coordination practices can be adjusted to reflect the realities of workers' lives outside of work, including caregiving responsibilities and health challenges faced by workers themselves. In particular, how can we achieve high work performance while recognizing that most workers will have periods of time when they need to be away from work? How can we achieve high work performance while supporting flexible and sustainable work schedules?

Changing workplace policies and practices to incorporate short time outs from work (i.e. leaves) and employees' input into schedules (i.e. flexibility or control over work time) may encourage employees to remain in the labor force longer and improve older workers' health and wellbeing. There is evidence suggesting these effects – which I will briefly review below – but more research is needed to build the evidence base and identify promising policies and practices appropriate to low- and moderate-wage workforces. Additionally, there is some evidence that current policies and practices carry their own costs and inefficiencies that are often unrecognized. In other words, the standard ways of working (particularly with regard to staffing and coordination) are not necessarily optimal for organizations either.

Research should include policy analysis with strong causal inference, but it is also crucial to pursue multi-method research that investigates how organizational policies and practices are implemented in different workplaces. We need to understand both the dilemmas involved in implementing changes in workplaces and promising practices from the perspective of top managers, frontline managers, employees utilizing new options, and co-workers who are currently working in "traditional" ways. We should also study how the framing and target audience of a particular change affects its reception and impact. Given research on "flexibility stigma" and age discrimination, I would advocate for prioritizing studies of organizational policies and practices that target the entire workforce – perhaps with disproportionate benefits to older workers – rather than directly and explicitly targeting older workers.[1]

DOES PAID LEAVE ENCOURAGE CONTINUED EMPLOYMENT AND IMPROVED HEALTH?

Paid family and sick leaves facilitate continued employment and help workers weather relatively short-term periods of intensive caregiving or their own recovery from a health problem without leaving a job or dropping out of the labor force.[2] Unlike most developed countries, US employment law does not provide broad access to paid parental (particularly maternity) leave, paid sick or disability leave, or paid caregiving leave when workers are caring for seriously ill, disabled, or dying relatives. Our limited paid leave laws are well known but there is still much to learn about how unpaid and paid leaves are implemented in various US workplaces.

The passage of paid leave laws in more US states and cities provides opportunities for additional research on access to, utilization of, and the effects of paid leave policies on health, wellbeing, and employment. There are important studies to build on, including research on California's Paid Family Leave program, but more research is needed on older workers' experiences and caregiving and medical (vs. parental) leaves in particular.[3] Awareness of California's Paid Family Leave law is lowest among those aged 65 and older, though these data come from a survey of registered voters that includes people who are not currently employed.[4] Use of California's Paid Family Leave for caregiving ("caring claims") have grown over time and are highest for women ages 45 to 54 but also growing for women and men aged 55 and older. Use of California's Paid Family Leaves supports continued employment and remaining with the same employer, which may affect wages, accrual of benefits, and social support from coworkers.[5] It would be worthwhile to explore these questions in more detail and expand to consider a variety of health and wellbeing outcomes. A recent study finds no clear evidence that caregivers with access to California's Paid Family Leave program have better mental health than caregivers in other states,[6] but there is more work to be done here and recent and upcoming changes in state laws can be fruitfully analyzed with a focus on older workers.

Again, studies of paid leave laws should identify causal effects (on labor supply, financial security, workers' health) but be complemented by research that seriously examines implementation – how

policies or rights "on the books" are actually mobilized "on the ground."[7] Understanding how current leave policies are administered and implemented will help us identify policy changes that would reach underserved populations and avoid the current pitfalls. For example, the federal Family & Medical Leave Act (FMLA) provides a right to unpaid leave to workers who meet hours and tenure criteria and who work for establishments of certain sizes. Workers with more advantages (in terms of education, race, marital status, etc.) are more likely to have both official coverage and to find it feasible to take unpaid leave.[8] Employers also vary in their compliance with the FMLA; two different studies (using different surveys of employers) estimate noncompliance at 25% to nearly 50% of covered establishments, depending on weighting and treatment of missing data.[9] Again, there are disparities such that less advantaged workers are less likely to be employed by compliant organizations.[10] There is little research on compliance with paid family and sick leave laws presently.

We need to investigate how employers and employees understand current laws and how leave requests are administered and "handled" in a variety of organizational settings and for different workers at different life stages. In particular, we need to examine how paid and unpaid family and medical leaves unfold in combination with other benefits (e.g., temporary disability insurance), other employer policies (e.g., penalties for absences with regard to schedule preferences, bonuses, etc.) and with other laws (e.g., Americans with Disability Act).[11] While US leave laws are not unnecessarily complex and employers generally report that administration is not burdensome, employers and frontline managers may be unsure how the US patchwork of policies and benefits come together. These questions may affect both employees' pursuit of leaves and employers' support of leaves.

Research should also be pursued to identify strategies for supporting paid leaves in a way that actually works smoothly for employers. Communication interventions could target managers, worker advocates, workers, and even health care practitioners and social workers so that those stakeholders know more about paid leave and its interplay with other laws or employer policies. Behavioral research could be mined to develop interventions to guide both employees and frontline managers through decisions about pursuing and evaluating leave requests. Those resources or guides could be especially important in smaller private-sector organizations with less professionalized human resources staff, based on previous research on noncompliance with the FMLA and other employment laws.[12]

CONTROL OVER WORK TIME – KEY IDEAS FOR OLDER WORKERS & OTHERS

We also need to investigate workplace policies and practices that provide employees with more control or say over their work time and simultaneously support employers' interests in appropriate coordination and effective teamwork. Research suggests work schedules and related time norms can be reorganized to reduce work-life stress and improve health and wellbeing and that these changes can also address organizational needs. Recent research provides important leads on how control over work time improves health and wellbeing and facilitates staying in a job or in the labor force, but more work is

needed to understand how these findings apply to older workers specifically and how to design changes that have positive impacts (on workers and for employers) in a broader variety of workplaces.

With other scholars, I argue that control over work time should be conceptualized broadly, to reflect the realities of different occupations and workplaces. In white-collar contexts and especially in professional and managerial jobs, control over schedules may mean flexibility in start and stop times and positions that involve reduced hours (part-time) or can reasonably be accomplished in around 40 hours per week (moderate hours full-time). Long work hours drive workers, particularly those with family and caregiving responsibilities or unstable health, out of jobs but many white-collar positions still require long hours and a willingness to respond to work questions (by email, text, or phone) in the evenings and weekends.[13] Older workers in these positions are often looking for "not-so-big jobs," to use Phyllis Moen's phrase, and leave their organization or the labor force when they cannot find a moderate-hours or part-time option.[14]

In other sectors including retail, food, and hospitality, health care, manufacturing, and transportation and delivery jobs, control over work time involves a combination of stability and employee-driven flexibility. Having a fairly regular schedule that provides the desired number of hours is key, but so is the ability to have input into shifts and the ability to occasionally swap shifts without facing penalties or losing future hours.[15] The combination of predictable hours for adequate income and the possibility of shifting hours (for caregiving, medical appointments, or family events and travel) may be particularly important for older workers in these sectors.

Researchers are actively investigating the relationship between control over work time and workers' health, wellbeing, job attitudes, and employment decisions but there is more work to be done. One systematic review found evidence linking control over work time to work-life balance and job attitudes, with less evidence for a relationship with health and wellbeing, but the review also noted there are few intervention studies (and very few in the US context).[16] Additionally, studies often conflate different forms of flexibility that likely have different effects. Employer-driven flexibility, which Phyllis Moen and I label "flexibility for business needs," can mean an expectation to be available for work at any time and is associated with poor mental health and burnout. But even employee-driven flexibility may have different impacts depending on whether it is delivered as an "accommodation" that an individual seeks out or is integrated into team practices and the organizational culture through what we call "work redesign for better work and better health."[17]

The group-randomized field experiment we conducted (as part of the Work, Family, and Health Network) in a white-collar setting finds evidence that the work redesign approach reduces work-life conflicts, improves subjective wellbeing (including job satisfaction), reduces voluntary turnover, has a positive return-on-investment for the firm, and also benefits employees' adolescent children by

supporting time with parents, sleep, and emotional wellbeing.[18] This field experiment also produced evidence that older workers planned to stay longer with their current firm when they had been through the work redesign intervention that increased control over work time and support for personal life.[19] Another well-known field experiment conducted in a Chinese call center found reduced turnover and higher productivity when workers could work at home. Importantly for this discussion, the productivity effects increased further when the experimental period was finished, and workers could choose – i.e., exercise control over – their work location.[20]

These studies are exciting but raise important questions for future research. First, what are the costs to firms and for population health of the current practices, particularly "flexibility for business needs"? How are just-in-time scheduling practices and long-hours expectations affecting workers' health and their labor supply? To what extent is lean staffing and work overload behind apparent problems with work performance and absenteeism, as well as burnout and turnover? What staffing strategies facilitate high performance work over the longer run and what are the costs, compared to the benefits for the organization and population health?

Second, what workplace policies and practices allow for both workers' control over work time and effective coordination and collaboration? Research suggests that flexible work arrangements are more common when task interdependence is lower, and the popular press sometimes claims that flexibility means less collaboration and innovation, although the evidence is actually very limited. It would be useful to examine how work can be redesigned to facilitate coordination and teamwork when schedules are more varied. For example, an analysis of pharmacists suggests that occupational training and new technologies can increase flexibility and reduce any economic penalties associated with part-time schedules.[21] Team-based approaches to work redesign should be studied, in a variety of contexts. Where interdependence is higher, it may be important to integrate insights from the work-family field with research on high-performance work systems, operations research, and examine "relational coordination" within teams.[22] I am intrigued by approaches to staffing and training that combine cross-training, tech-supported routines for information sharing, and perhaps experienced "floaters" with schedules (and leave policies) that reflect the realities of workers' lives. Can we pursue work redesign that develops workers' capacity for effective teamwork *while* promoting control over work time and support for personal life, including health needs? That type of organizational change would arguably bring benefits in terms of productivity and quality, as well as reducing turnover costs and promoting better health.

A QUICK NOTE ON INSECURITY AND OPTIONS BEYOND "REGULAR" EMPLOYMENT

I have deliberately set aside an important set of questions regarding the health effects of job insecurity and restructuring associated with downsizing or automation for older workers. I have also set aside

questions about “alternative work arrangements” such as independent contracting, temporary work, and subcontracted work and “the gig economy.” A recent survey available suggests that older workers are more likely to be in these types of employment, though. 15% of employed workers ages 25-54 years are in some time of “alternative work arrangement” as compared to 26% of employed workers ages 55-75 years old.[23] It is important to investigate how the financial risks associated with those forms of employment affect older workers, specifically. It is also an open question how the flexibility and control over work hours that come with some of these work arrangements balance out against the income variations, the limited social support and engagement with a core group of coworkers, and the health and safety concerns tied to these types of work. Workers in these positions may be gaining “schedule control” but also accepting other risks and exposures that harm their health and wellbeing.

The growth of non-standard employment relationships and independent contracting (via “gig” platforms) is important to investigate. But it is also important to consider how control over work time and the ability to set moderate hours can be expanded within regular employment. While the “gig economy” is growing and is important, we should not assume that the only way to get “flexibility” is to leave a job and give up a stable paycheck, benefits, and social support at work. Instead, I believe we should thoroughly investigate how to redesign “regular jobs” to support workers and also address employers’ needs, while also exploring these new employment relationships.

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HEALTHY WORK: A CONVERGENCE RESEARCH AGENDA ON PAID/ UNPAID ENGAGEMENT PROMOTING VITALITY, LIFE EXPECTANCY, AND WELL-BEING

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THE HUMAN MEANINGS, INEQUITIES, POSSIBILITIES OF SOCIAL CHANGE

Dedicated scholars can play pivotal roles in promoting understanding of a key question of our times regarding disparities in social inclusion and exclusion:

> How can individuals, organizations, communities, policy leaders, and institutions foster healthy participation in the nation's paid and unpaid work across the life course, reducing both unequal access to the pool of healthy options and deleterious exposure to unhealthy conditions and risks?

NIA can lead in recognizing and responding to the full import for Boomers and Gen Xers of the multilayered and disrupting forces altering the landscape of healthy labor force participation but also other forms of social participation, such as civic engagement and family care work. Doing so requires a convergence agenda, bringing to bear multiple disciplinary and methodological approaches converging on the multifaceted challenges of opening up healthy work broadly defined (including volunteering, family care, and public service as well as paid work) to those in what I call encore adulthood, the years in the space opening up after career- and family-building but before the frailties conventionally associated with old age (Moen 2016; Moen and Flood 2013). Such an agenda could not only address existing and future disparities around the work/health nexus for those in their 50s, 60s, 70s and older, but also identify, invent and investigate novel initiatives designed to ameliorate inequalities, broaden and promote willing participation in healthy paid and unpaid work, reduce risks and temper vulnerabilities in ways that promote life quality and life chances.

What is healthy work? Peter Schnall and colleagues edited a book on unhealthy work describing toxic environments, including the absences of control, autonomy, and support, as well as extreme job demands, overwork and underwork (Schnall, Dobson, and Rosskam 2009a). Clearly work can be a social cause of either excellent or poor mental and physical health (Dobson and Schnall 2009; Maertens et al. 2009; Schnall et al. 2009b).

Years of research before and by the *Work, Family, and Health Network* have underscored the positive health effects of control over time, control over work processes, and supportive work environments (Karasek 1979; Karasek and Theorell 1990; Kelly et al. 2014; Kelly, Moen and Tranby 2011; Kossek et al.

2018; Moen, Fan, and Kelly 2013; Moen, Kelly, and Lam; 2013; Moen et al. 2016; Moen, Kelly, Tranby and Huang 2011).

Another consideration is the importance for health of a sense of purpose and meaning and the voluntariness of work, something especially significant for encore adults (Van Soline et al; Wang, 2012, Wang et al. 2009; Zhan et al. 2009). Healthy work also means the absence of age and other forms of bias and discrimination, and the sense of identity related to making a contribution (Giddens 1991; Posthuma 2012). In sum, I believe healthy work can be defined as: voluntary and flexible productive activity in safe, supportive environments offering autonomy, control, and support, opportunities for using one's talents, possibilities for learning, growth, and a sense of purpose. It also means some sense of security, a living wage (or stipend for volunteers). When we consider encouraging work in encore adulthood, the goal should be such health-promoting work.

FRUITFUL RESEARCH TOPICS

Social/Technological Changes Shaping Older Adult's Participation, Protections, and Health

- How are social, technological, and economic changes altering the social participation, safety-nets, health, and the participation/safety-nets/health interface of boomers and adjoining cohorts? How do these vary across age, gender, race, and for other subgroups?
- What forces, policies, impediments and innovations are accentuating or, conversely, decelerating a confluence of interconnected and seemingly enduring inequalities – of race and ethnicity, education and class, gender and caregiving obligations, nativity, disability and sexuality-- in terms of later adult access to and options for voluntary health-promoting social participation and social protections?
- Who is more vulnerable to 21st century life-course inequities associated with chronic job insecurity and broad-based social exclusion from the labor market in later adulthood? As with more conventional inequalities, do new disparities associated with prolonged insecurity, later adult job loss and lengthy unemployment, accelerated and sometimes lengthy family caregiving, chronic health conditions, and social exclusion cumulate over time, with those at some life stages and in some circumstances more at risk and more vulnerable than others?
- What technological aids, assets, apps and third parties could assist in matching individuals to paid and unpaid healthy work opportunities, facilitating processes of transition and performance, enhancing health and life quality, and extending durations of engagement for those approaching or in conventional retirement years?

Contexts: Healthy Work Engagement and Environments

- What mechanisms and contexts account for the disparities in participation in and benefits from paid and unpaid work?
- What job/volunteer conditions promote subjective and physical health and well-being in the encore years?
- What are the mechanisms and moderators of these processes?
- What accounts for voluntary versus involuntary labor market participation and voluntary versus involuntary retirement exits in the encore adult years (ages 50 to 79)?
- What are the psychological and physical health consequences of voluntary/involuntary participation and exits?
- What types, durations, timing and conditions of social participation (in full-time salaried jobs; part-time, contract, gig or self-employment; family care for grandchildren or infirm relatives; and civic engagement) are most conducive to health, vitality, and well-being for different subgroups of participants? Rather than simply "controlling" for type of job, scholarship is needed on who seeks out and thrives or are stressed in certain types of work such as gigs, contract work or self-employment?
- These are issues of selection, allocation, agency, processes and contexts that need to be investigated. For instance, why are minorities more apt to be in gig type work, and does this hold for those in the encore years?
- What are the conditions of participation promoting health and well-being for specific subgroups of the population – such as, for example, African-American women in the trailing-edge of the Boomer cohort? Needed are studies that dive deep into the experiences of different subgroups for whom social changes of the digital and longevity revolutions produce different options, constraints, and meanings.
- What is the relationship between work, education and health for encore adults? Does obtaining additional education/capacity building by returning to school promote work engagement? Healthy work?
- There is considerable evidence on the salutary effects of education for both social engagement and health, often controlling for age or else focusing a wide range on adults under 60 or 65. Needed are studies of subgroups of those in encore adulthood, not simply "controlling" for education – or race, or gender, or disability, or sexuality, or nativity. The issue is not only the effects of education and other social markers, but what are the circumstances of those in less-educated, vulnerable subgroups who participate in the social fabric and experience health from doing so? What are the labor market and working conditions of those with college degrees who nevertheless have high risks of health difficulties? Needed are intersectional studies that capture the heterogeneity of experience and conditions around work, civic engagement and health.

Human Meanings

- What are the engagement strategies, goals, expectations, identities, life satisfactions and subjective well-being ratings for those willingly remaining in, reentering, or launching next steps versus those unwillingly employed, unwillingly retired, willingly retired from the workforce, or simply outside the workforce and other forms of participation? How does this vary by, for example, subgroups defined by age, gender, race and education? The bonus years of longevity are coming not at the end of adulthood but in this arguably new encore life stage. Yet there are no blueprints.
- What pockets of innovation in the form of government, business, educational, and social-sector policies, programs, practices, and supports promote healthy participation in the encore years? What are promising recruitment, training, information exchange, work tasks, temporal control and flexibilities, and risks of layoffs or forced early retirement? Such evidence-based knowledge could inform decision-makers about what promotes healthy participation in contrast to both non-participation and unhealthy and reluctant participation in the encore years.

Insecurity

- Who is the most vulnerable to job and income disparities and insecurities in the encore adult years?
- What are the mechanisms and patterns by which social-locational inequalities translate into social exclusion and poor health?

Relationships

- What are the paid and unpaid work engagements and work/health relationships for single women and men, compared to those who are married?
- What are the paid/unpaid work transitions and pathways couples follow and how are they related to health events and conditions for both partners?
- What are the relationships between marital exits, paid/unpaid work exits and entrances, and health precursors and outcomes?

Policy innovations

- What are existing innovations, pockets of policy, technological or community advances providing opportunity for social inclusion and protections against risk for the historically disadvantaged as well as for encore adults more broadly?

- The research challenge is not what was, but what is and what could be. What social forces, deliberate policy changes, and new ways of thinking are opening up possibilities for women, men, and families at all stages of the life course? What inventive public and business policies, practices, and mindsets can promote health and equality of individuals and families? There is a clear need to design and investigate new inventions promoting health-facilitating public engagement.

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NIA WORKSHOP ON WORK, THE WORKPLACE, AND HEALTH CONCEPT PAPER

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CONSIDERATION OF MULTIPLE OUTCOME MEASURES IN STUDIES ON WORK AND HEALTH

As an overarching methodological consideration, I believe that a pressing research priority should be promoting the use of multiple outcome measures within studies. The first aspect of this is across domains of health. Studies should include measures of chronic disease risk, mental health, functional limitations and well-being. It is also critical that studies move towards also considering measures of work productivity as outcomes. New methods may need to be developed for routine inclusion of these measures in workplace based studies, including linkage to administrative data when studies are within a single firm. While the importance of including productivity data will vary depending on the exposures examined and the research question, studies on whether workplace changes or policy can be implemented without negative productivity externalities are important for the implementation of such policies. In addition, workplace changes that have the greatest net benefit on multiple health, well-being and productivity factors can be prioritized. When studies examine only a single aspect of health it is difficult to know whether the overall impact of the policy is substantial enough to warrant policy recommendations.

WORKPLACE POLICIES THAT SUPPORT CAREGIVER-CHILD RELATIONSHIPS

While older workers are less likely to have dependents in the household, there are still a large number of older workers who act as caregivers for children either in a primary or secondary role. Flexibility of work hours as workers enter their 50s and 60s may help to increase both workforce participation for the workers and satisfaction with work, with benefits for work and health for other members of the household, including primary caregivers and their dependent children. Considering the multigenerational aspects of work and caregiving should be emphasized. Since intergenerational caregiving is particularly salient for some racial/ethnic minority groups in the US and for lower income households, addressing this could help to improve equity in life course influences on healthy aging.

CONSIDERING THE IMPACT OF PSYCHOSOCIAL ASPECTS OF THE WORK ENVIRONMENT FOR GIG ECONOMY JOBS

Much of the work on psychosocial aspects of the work environment and health has been done in traditional occupations, either in blue collar factory work or in traditional hierarchical white-collar work.

Research efforts should prioritize whether new types of employment characterized by short-term contracts, working at home, and flexible work hours require different measures to assess the psychological, social and economic benefits and hazards of this type of work. Traditional measures of psychosocial work conditions suggest decision latitude or control over the performance of work tasks are health promoting, but it is unknown how this may apply to newer types of contract work.

HOW CUMULATIVE EXPOSURES ACROSS DOMAINS IMPACT HEALTH AND THE ABILITY TO WORK

There is evidence that workplace exposures across different domains (physical environment, social environment, psychological) each have important impacts on health and the ability to continue working. However, most analyses focus on how one domain or one measure influences health and work outcomes. Due to the difficulties in comparing estimates across studies with different populations, methods and measures, there is a need for comparative work that estimates the relative contribution of different domains of the work environment to health and work. This type of study is also able to better consider how joint or interactive effects across these domains may increase our understanding of the role of the work environment in health and aging.