



Aging and The Workplace – A Practical Approach

*An Ergonomist's/Therapist's
Perspective*

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Outline

- Canadian Population - General Demographics
- General Age-related Changes
- Why consider the aging worker in workplace design?
- Functional Considerations
- Case Studies



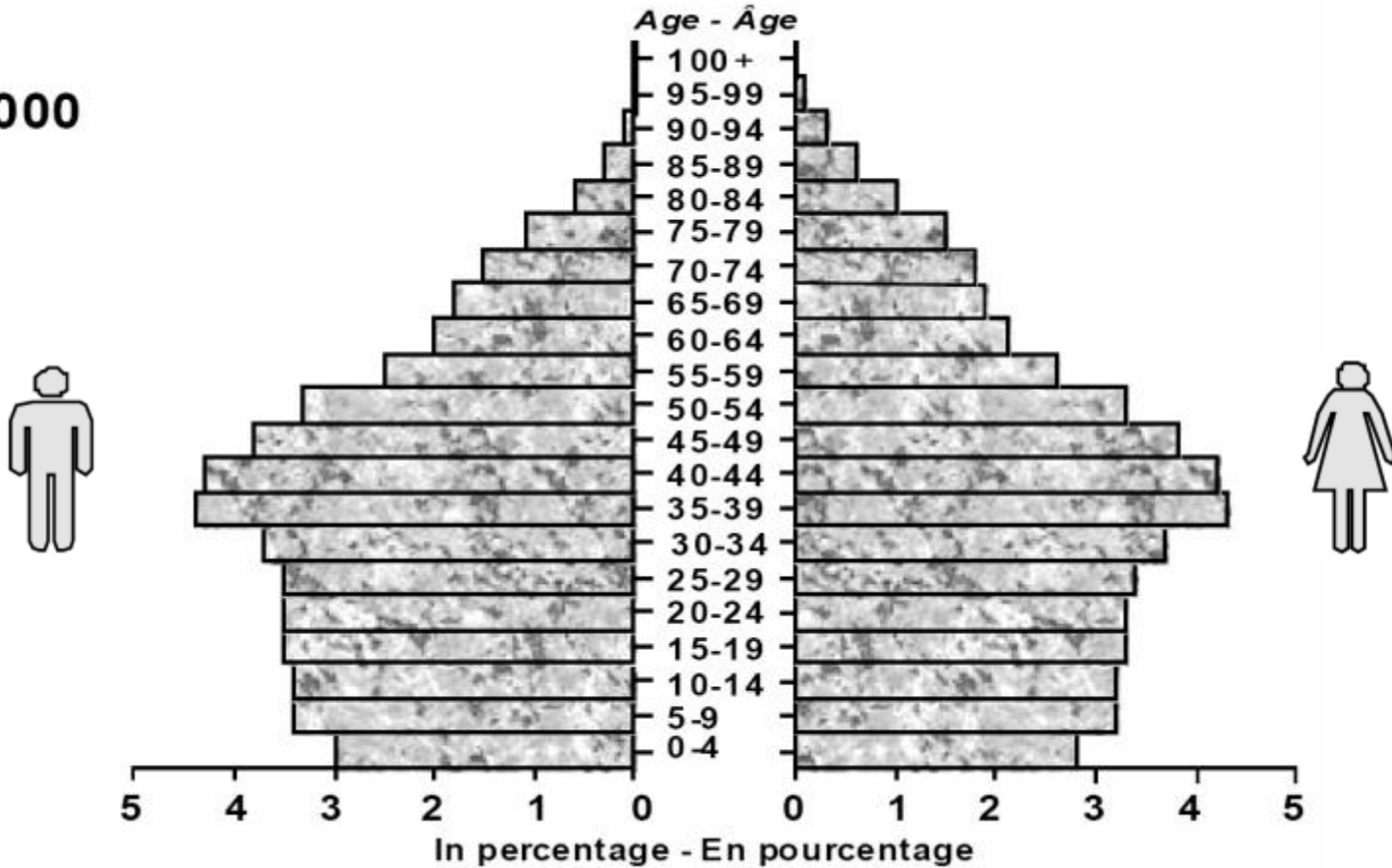
Demographics of Workers

- Baby boomers born after WW2
 - Close to their retirement or pre-retirement years
- Avg. working age
 - 2008 – 41 years
 - 1980 – 35 years
- By 2011, 41% of working population will be between ages of 45 to 64
- Increasing percentage of women in the older populations



Population Demographics

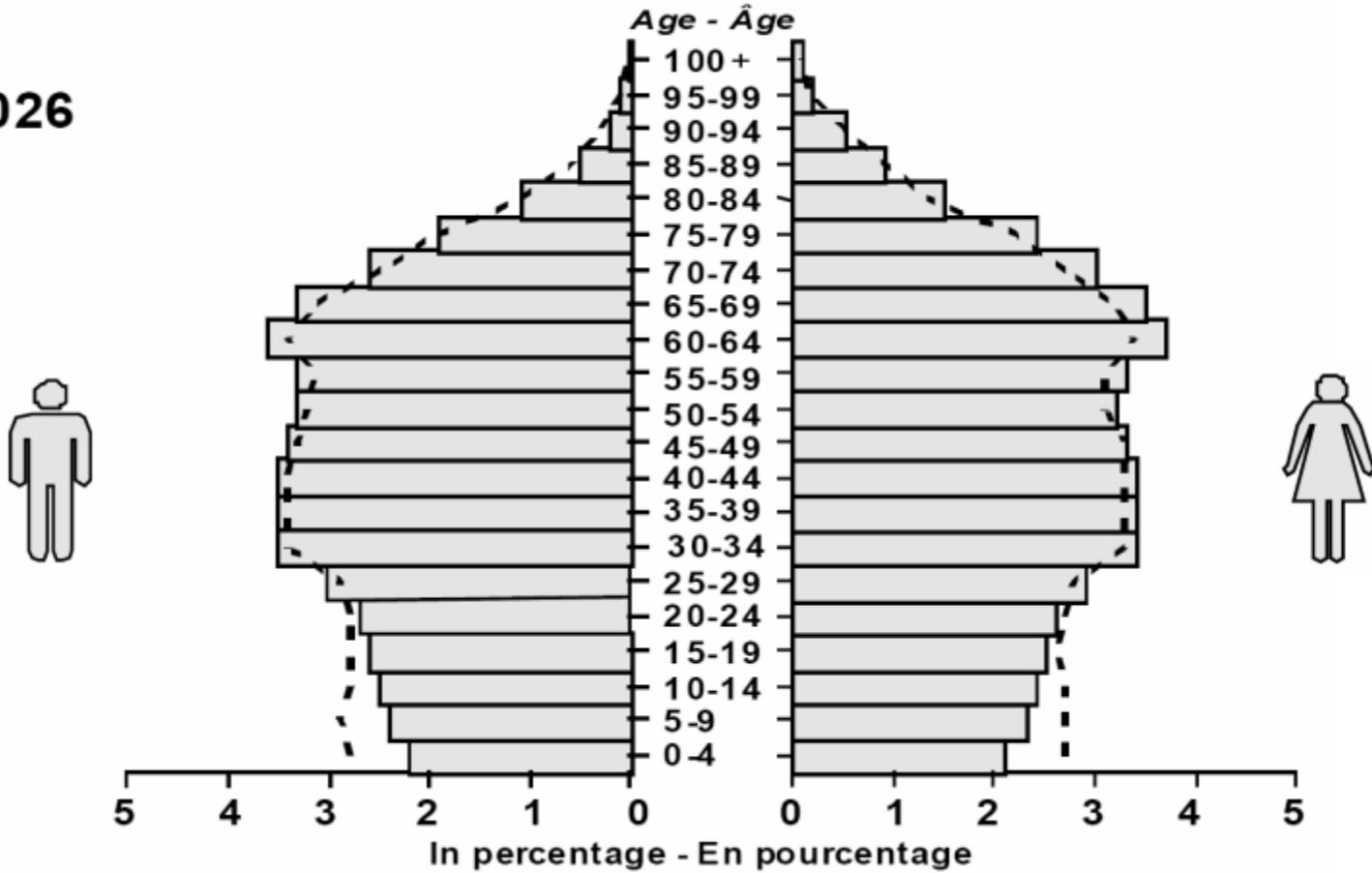
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Population Demographics

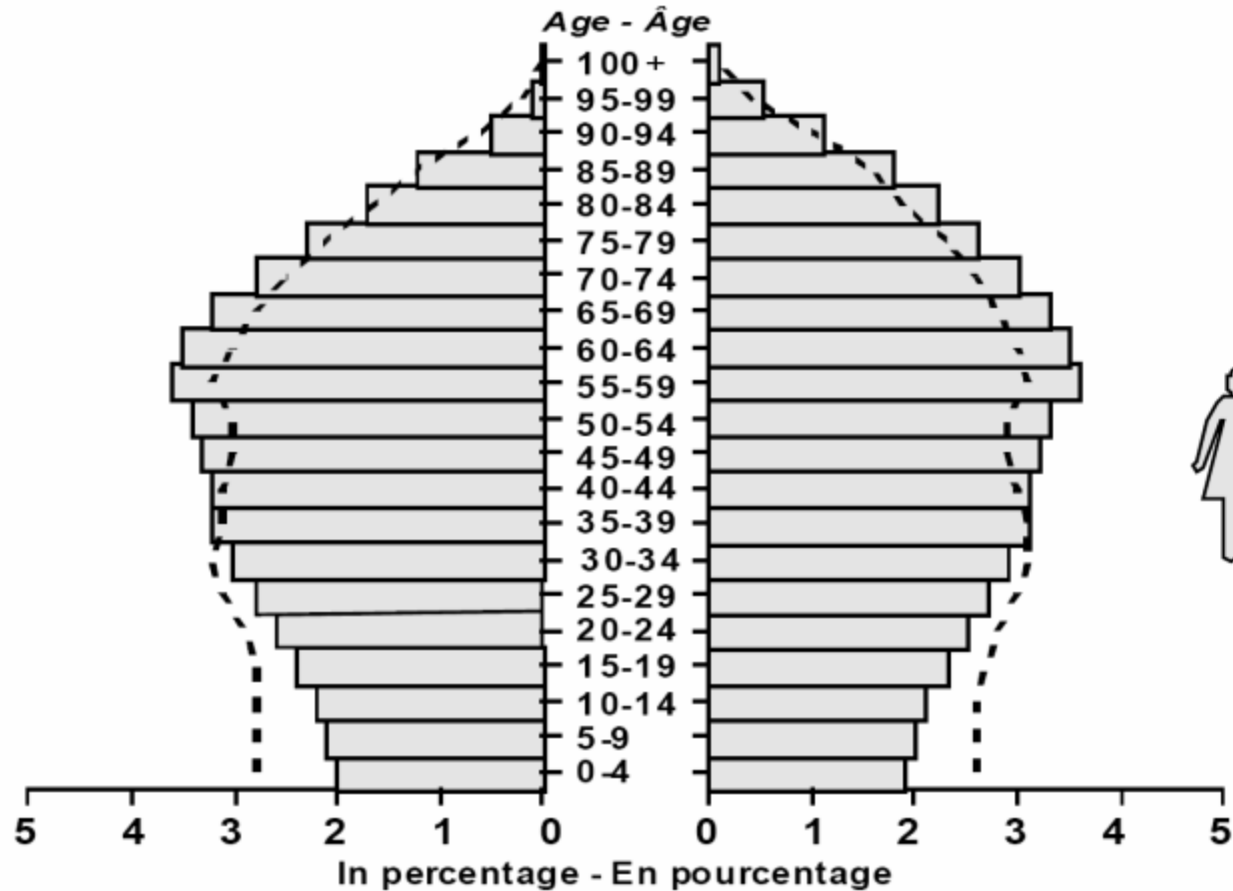
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Population Demographics

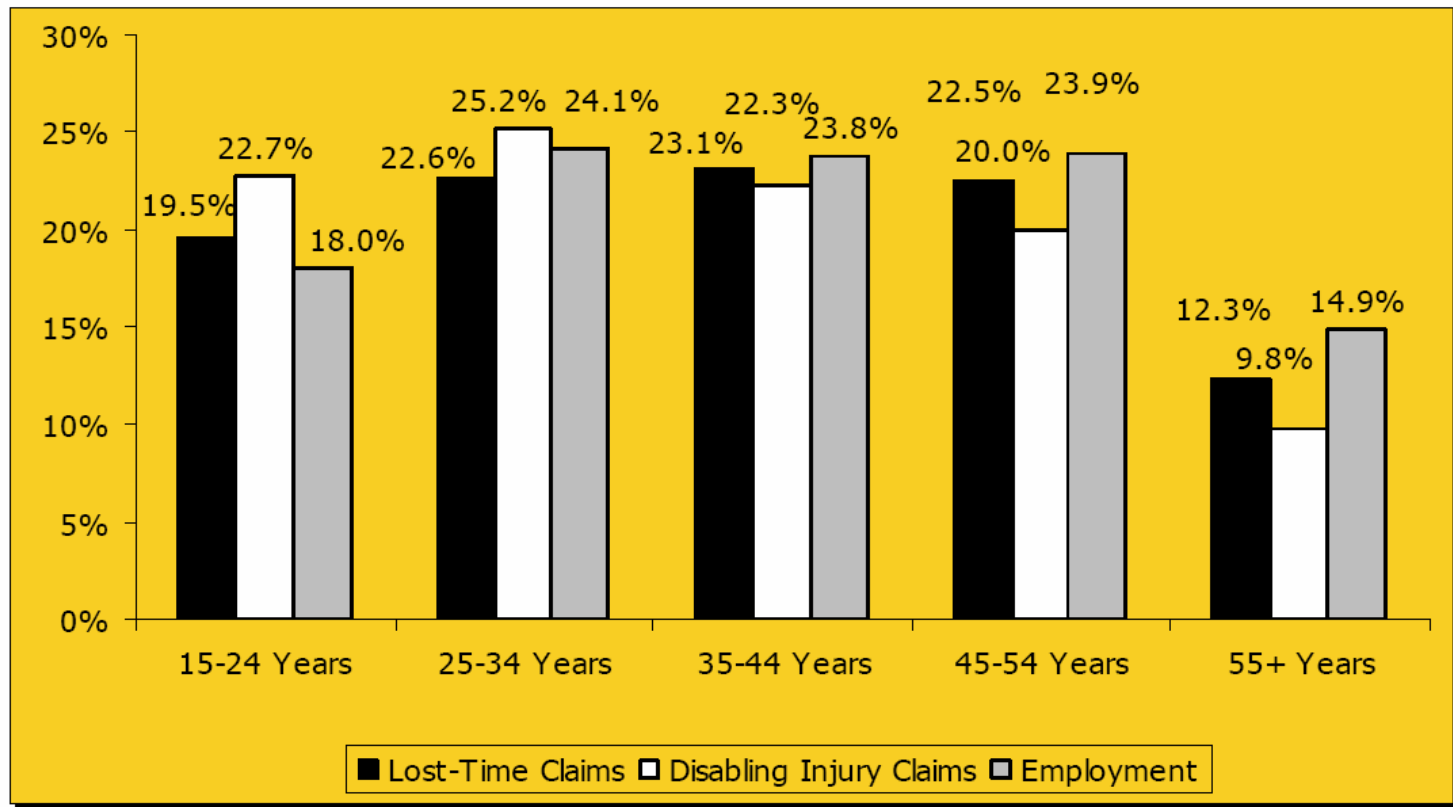
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Demographics of Injured Workers

Proportion of Lost-Time Claims, Disabling Injury Claims and Employment by Selected Age Groups – Alberta: 2007



Data Source: WCB Data, Prepared by Data Development and Evaluation; Statistics Canada's Labour Force Survey (2007 Historical Review)



Injured Alberta Workers - 2007

- Demographics
 - Older workers injured less frequently
 - Type of work
 - Greater level of experience
 - Less likely than younger workers to be injured severely enough to warrant time off work
 - ***Require more time to recover from injury***



Mining Musculoskeletal Injuries (1999-2002)

MSI Lost Time Comparison By Age



(MSHA, 2005)



What is Affected by Aging?

- Physical
- Hearing
- Visual
- Cognitive



Chronic Disease and Illness

- Heart disease
- Cancer
- Stroke
- Chronic respiratory disease
- Diabetes
- Arthritis
- Mental health
- Neurologic
- Kidney disease
- Obesity



Obesity

- Most prevalent among older workers
 - 55 to 64 years – 21% of this age group were obese in 2005
- 4 times more likely to be absent from work
- Other impact:
 - Reduced work activities
 - More disability days
 - Higher rates of work injury for certain groups





Obesity

- Job factors may be related to obesity:
 - Longer hours of work
 - Off shifts (night shift)
 - Rotating shifts (day to evening to night)
 - Psycho-social factors: stress, lack of support, job strain
- Prevention of obesity may be achieved through physical and administrative work design



Aging is not Disability

- Aging is the...
 - Steady increase in the probability of decline away from optimum performance on nearly all measures of sensory, intellectual and physical function
 - However, the magnitude and pace of this change is unique to each individual.



Aging

- Aging is impacted by our surroundings
 - Social model of aging/disability
- Example: work environment and tasks
 - *Physical tasks affect health and wellness of employees*
 - *May speed or compound aging process*



Why consider Aging in Workplace Design?

- Impacts the prevention or onset of chronic disease and illnesses
- Creates a better design for all workers, young and old



Impact for Employers

- Potential labor shortage
 - Loss of workers through retirement
 - Recruitment of younger workers more difficult
 - Loss of skilled workers

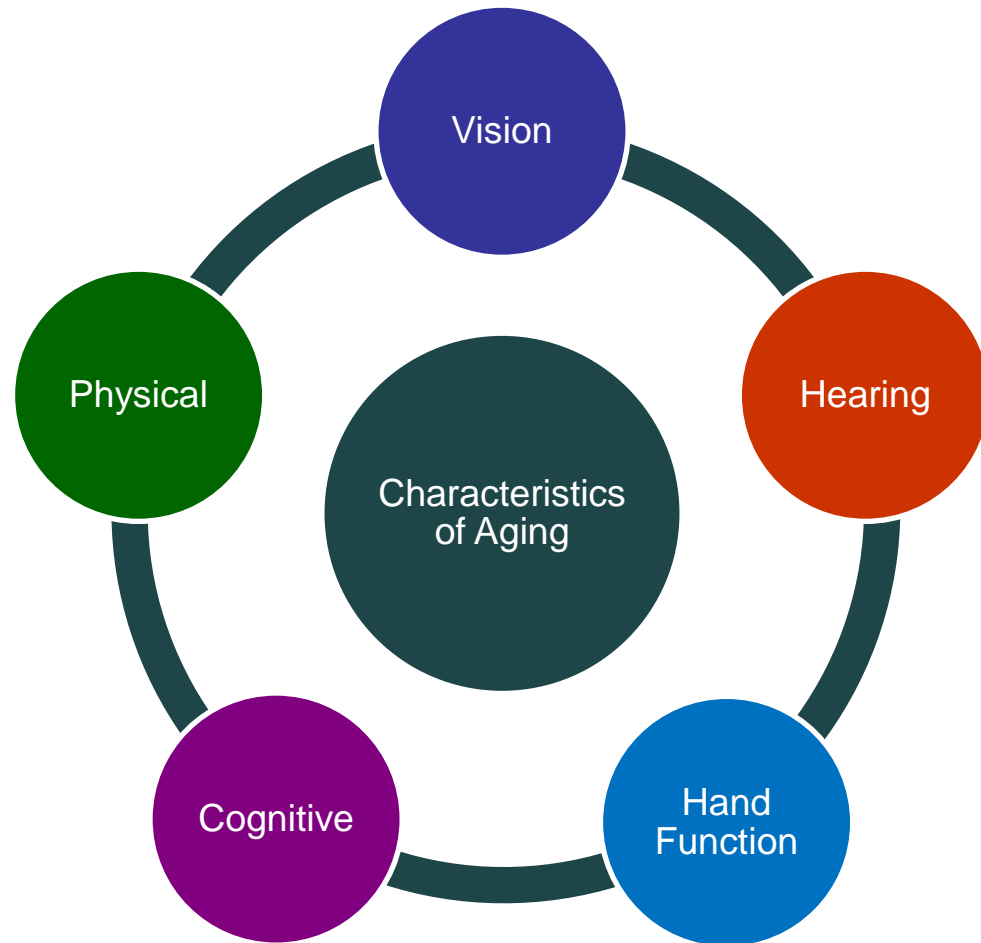


Trends

- Few boomers are retiring early
- Some may work beyond age 65
 - *Find work enjoyable and meaningful*
 - *Do not have a private pension plan*
 - *Do not have enough pensionable years accumulated to replace their earning income*



Characteristics of Aging





Characteristics of Aging - Vision

Characteristic and Description	Impact on Function	Design Consequences
Visual Acuity	Difficulty discriminating fine detail Things may appear fuzzy or unclear	More overall light required Task lighting Lighting on either side Magnification
Accommodation	Difficulty focusing on objects	Objects need to be viewed at greater distances for them to be in focus
Contrast Sensitivity	Difficulty reading when light or background is too bright or too dark	More light required at all background levels





Vision Test





Characteristics of Aging – Vision Cont'd

Characteristic and Description	Impact on Function	Design Consequences
Glare	Difficult to discriminate objects/info.	Use combo indirect & direct light
Dark Adaptation	Problems moving from light to dark areas More time required Night driving may be difficult	Provide higher level of light
Colour Vision and Discrimination	Difficulty seeing hues of blue and violet Color coded info may be misinterpreted May not detect message associated with colour codes	Avoid color combinations Use high contrast colors High illuminance fluorescent light





Example – Control Room





Example – Control Room

Task Factor	Solution
Light levels	Use of indirect lighting Window blinds controlled by operators Workstation placement Task lighting
Postures – seated	3 dimensional adjustability of monitors Adjustable chair and keyboard/mouse placement
Duration	Sit to stand desk allows for postural variation Large screen enables customize screen settings Operators set up programs in arrangement that is suitable for them



Characteristics of Aging – Vision Cont'd

Characteristic and Description	Impact on Function	Design Consequences
Depth Perception	<p>'Looming'</p> <p>Difficulty grasping/reaching for objects</p> <p>Difficulty walking on uneven ground</p> <p>May unexpectedly contact objects</p> <p>May bump objects</p>	<p>Minimize uneven surfaces</p> <p>Provide handrails & good contrast</p> <p>Provide signage or warning</p>
Peripheral Vision	<p>May not see obstacles or objects</p> <p>Difficulty in detecting information</p>	<p>Design near the direct line of sight</p>







Example – Vision





Characteristics of Aging – Hearing

Characteristic and Description	Impact on Function	Design Consequences
Hearing	<p>Reduced ability to hear sounds without amplification</p> <p>Difficulty to hear high pitch sounds</p> <p>Decreased ability to distinguish or understand auditory sounds, including speech, especially in noisy work environments</p>	<p>Use tones lower than 2000Hz</p> <p>Ensure sounds have distinct contrast</p> <p>Minimize/control environmental noise</p> <p>Provide sound control</p> <p>Provide visual cues</p> <p>Decrease speech rate</p> <p>Eliminate speech compression on automated systems (e.g. voice mail)</p> <p>Amplify sound</p> <p>Provide hearing protection</p>





Do you...

- Turn up the volume on the television?
- Ask people to repeat themselves?
- Have difficulty understanding speech in noisy environments?
- Sit near the front of a room or class to hear
- Have trouble knowing where sounds come from
- Have difficulty hearing women or young children
- Do you have trouble knowing where sounds are coming from?
- Are you unable to understand when someone talks to you from another room?
- Have others told you that you don't seem to hear them?
- Do you avoid family meetings or social situations because you "can't understand"?
- Do you have ringing or other noises (tinnitus) in your ears?





Signs and Symptoms

- 3 or less = no symptoms of hearing loss
- 3 to 5 = signs of slight hearing loss
- 5 to 7 = signs of a moderate hearing loss
- More than 7 = signs of significant hearing loss



Example - Hearing

- Plant operations
 - Wearing earmuffs with a earpiece in to aid communication
 - Redundant alarms – auditory and visual



Characteristics of Aging – Hand

Characteristic and Description	Impact on Function	Design Consequences
Hand Function	<p>Reduction in some or overall aspects of hand function</p> <p>Difficulty to grasp or hold objects</p> <p>Hard to maintain grip for long durations</p> <p>Small, fine movements difficult to perform</p>	<p>Design considerations should take into account the type, size, shape and torque (forces) of controls.</p> <p>Provide distinguishable textures and shapes when discriminating between different tactile surfaces</p>
Grip	<p>Ability to hold objects, tools and equipment is reduced</p> <p>May lose grip or drop objects</p> <p>May not be able to close hand around objects</p>	<p>Design or select tools and handles to minimize wrist deviation and forces when pinching or grasping.</p>



Example – Hand Function

- Door handle design
 - Lever handles easier to grab
 - Do not require full grip (power or pinch)
 - People with limited hand function may use levers
 - Workers carrying objects benefit from lever handles





Characteristics of Aging – Cognitive Fluid Intelligence

Characteristic and Description	Impact on Function	Design Consequences
Mental Ability and Experience	Older workers rely previous experience and knowledge . May take longer to understand new information	Provide additional time to learn When training, use examples Make associations obvious
Divided Attention	Increased difficulty 2 or more things at once Require additional time to perform tasks Difficulty working in a distracting environment Difficulty prioritizing	Keep tasks simple Allow for additional time
Problem Solving	When tasks become more complicated or complex, reaction time is slower Take longer to respond and resolve issues	Provide sufficient time Enable to draw from past experience Simplify processes





Characteristics of Aging - Cognitive

Characteristic and Description	Impact on Function	Design Consequences
Verbal Tasks and Vocabulary	Remain constant or improve	Optimize or use technology which relies on this ability
Learning and Memory	<p>When dealing with new information (short term memory), learning is slower and the ability to recall is less.</p> <p>Long term memory and ability to rely on past experience and knowledge improves</p> <p>Depth & breadth of knowledge increase</p> <p>Encoding new information takes longer</p>	<p>Allow individual control over pace of learning</p> <p>Provide opportunity to practice</p> <p>Relate information to past experience or knowledge</p> <p>Educate within their cognitive framework</p>
Reaction Time	<p>Reaction time is slower/longer, in complex tasks.</p> <p>Responding to urgent/complex matters may take longer</p>	<p>Provide time for rehearsal and planning</p> <p>Provide materials for employees to write down instructions or SOPs</p>





Training and Education - Considerations

- Involve older workers as trainers/mentor
- Participative and practical training
 - Practice time
 - Interactive, creative, visual
- Relate new skills to current or past skills, experience or knowledge
- Teach within cognitive framework
- Provide justification and logic for new information
- Allow additional time for learning at different rates
- Provide assistance, teach in small groups
- Provide immediate feedback for mistakes





Stroop Test

- Part 1 – Read Word

RED	BLUE	GREEN	BLUE	BLACK
YELLOW	GREEN	ORANGE	GREEN	RED
PINK	BLACK	BROWN	YELLOW	GRAY
BLUE	RED	GREEN	PINK	BROWN
ORANGE	BLACK	BLUE	GREEN	RED



Stroop Test

- Part 2 – Say Colour

RED	BLUE	GREEN	BLUE	BLACK
YELLOW	GREEN	ORANGE	GREEN	RED
PINK	BLACK	BROWN	YELLOW	GRAY
BLUE	RED	GREEN	PINK	BROWN
ORANGE	BLACK	BLUE	GREEN	RED



Characteristics of Aging - Physical

Characteristic and Description	Impact on Function	Design Consequences
Muscular Strength	<p>May not be able to lift/move as much weight or for as long (repeatedly).</p> <p>Many jobs do not require people to work at maximum strength however older workers will be closer to their capacity</p>	<ul style="list-style-type: none">Minimize excessive forcesReduce repetitive or static motionsPerform forceful exertions early in the shiftMinimize awkward posturesProvide assistance – people or mechanicalDesign out manual tasks, e.g. power drillProvide opportunity for recoveryMaintain equipmentReduce or eliminate contact stressTask rotation options





Characteristics of Aging - Physical

Characteristic and Description	Impact on Function	Design Consequences
Flexibility	<p>May experience discomfort when working in awkward or extreme positions</p> <p>May find it difficult to access hard to reach areas</p> <p>Repetitive or sustained movements in an awkward position may cause discomfort</p>	<p>Minimize awkward postures</p> <p>Design or select equipment that is adjustable and flexibility to accommodate a wide range of heights and statures.</p>



Characteristics of Aging - Physical

Characteristic and Description	Impact on Function	Design Consequences
Cardio-respiratory Function	Reduced capacity to perform physical activity for prolonged durations Breathlessness or shortness of breath	Avoid designing at maximal capacity.
Posture and Balance	Postural instability increases on unstable or uneven ground It is harder to maintain good balance Greater risk for slips, trips and falls	Design tasks that enable employees to work in neutral postures Provide handrails Use slip resistant flooring Use good contrast on stairs



Example - Library





Solutions

Task Factor	Solution
Heavy Lifting – bins weigh up	<p>Expanded width of shelving aisle to allow for additional people and use of carts.</p> <p>Minimize weight in bins and total weight placed into bin.</p>
Postures – reaching, bending	<p>Re-organize shelves for frequently access/retrieved material to waist/elbow level.</p> <p>Eliminated repetitive handling.</p> <p>Step stool available.</p>
Carrying	<p>Provide and utilize shelving cart for moving bins.</p>



Characteristics of Aging - Physical

Characteristic and Description	Impact on Function	Design Consequences
Reaction Time	<p>May respond slower to physical signals or during physical tasks</p> <p>May be more likely to experience slip, trip, fall or not respond well to uneven/unstable ground</p> <p>May work or move slower in physical tasks</p>	<p>Design tasks to allow for self pacing or control over pace</p>
Thermoregulation	<p>Overheating during physical activity or exertion</p> <p>Cooling during sedentary or light activities</p> <p>Difficulty working in extreme temperature conditions</p>	<p>Allow some control of temperature at local points</p> <p>Stabilize temperature</p> <p>Provide PPE (e.g. cooling vests, thermal gear)</p> <p>Education on recognition of signs and symptoms</p>





Characteristics of Aging - Physical

Characteristic and Description	Impact on Function	Design Consequences
Sleep Regulation	<p>Sleep is disrupted by changing work hours, noise, or light</p> <p>More recovery time needed between shifts or after extended work days</p> <p>Workers who travel across time zones may experience worse jet lag symptoms</p>	<p>Flexible work schedules.</p> <p>Work-rest schedules.</p> <p>Redundant systems for alarms, signals, monitoring.</p>



Do Older Workers Perform Worse?

- Not necessarily, because:
 - Work is **not always performed at maximal capacity** where many degradations are observed
 - General trends indicate decline, however **individual variation is greater**
 - Older workers **may compensate for decline** in function with other **age-related strategies**, experience and expertise



Work Ability

- An individual's capacity to perform job functions
 - Related to a number of internal and external factors
- Indicates that the aging workforce may not be a global issue, but instead an individual issue
 - Accommodation of the worker may involve a individual assessment

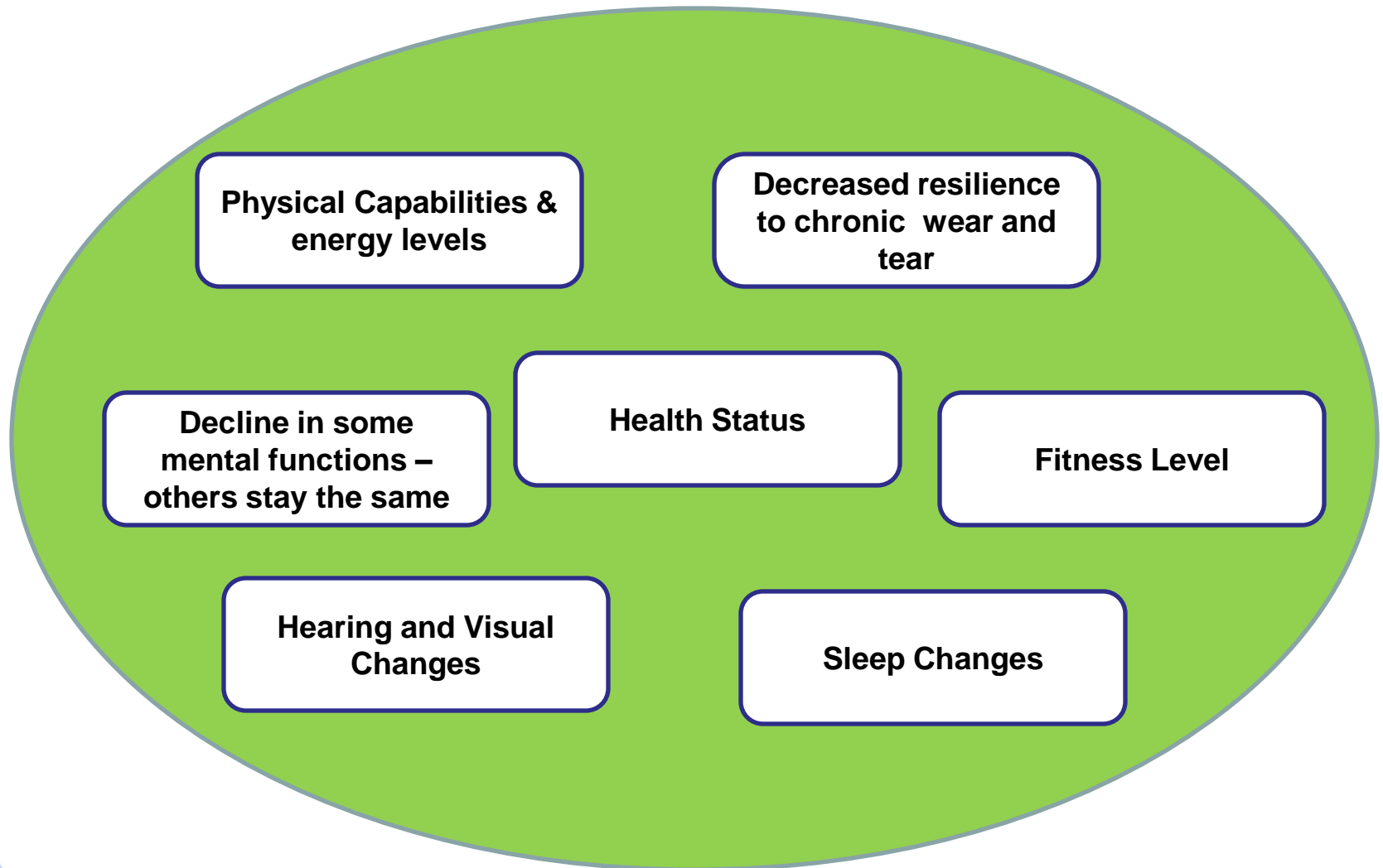


Bridging the Gap

- Individual
 - Internal factors
 - External factors
- Workplace

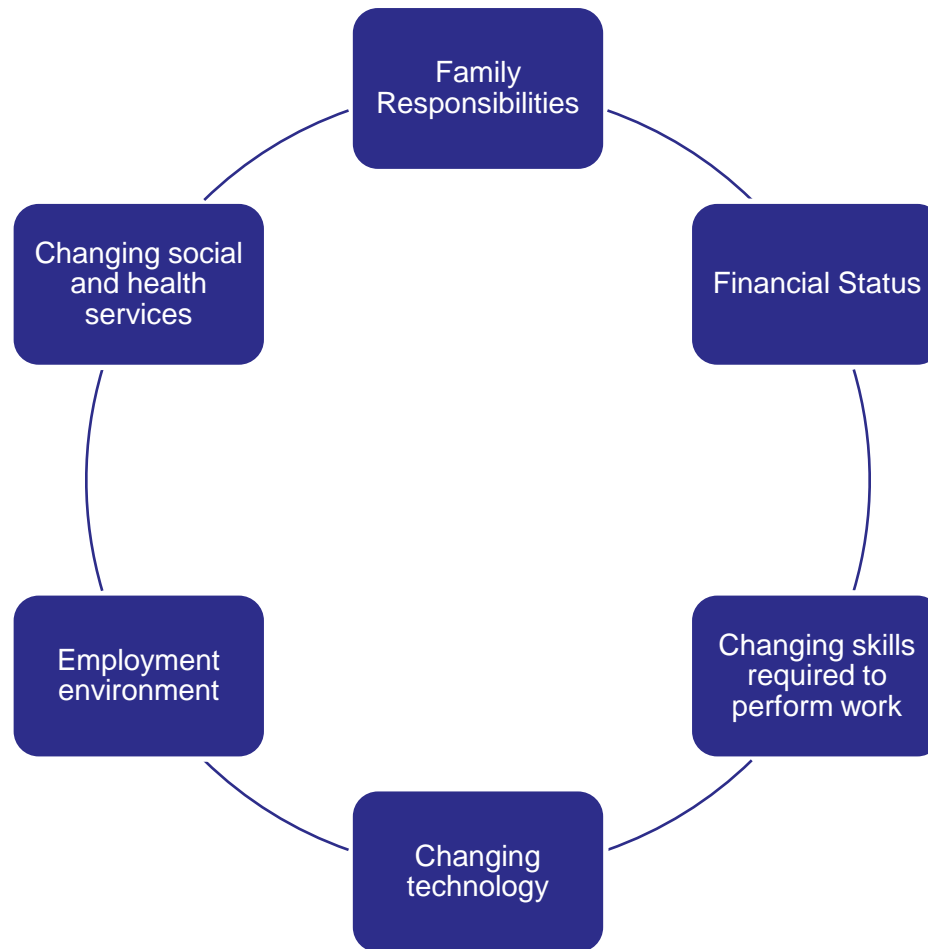


Internal Factors





External Factors





Workplace

- Design of Work Environment
 - Physical
 - Psychosocial-cognitive
- Health and lifestyle promotion
- Worker skills and competency training
- Employee Assistance Programs



References

- Silverstein, M. (2008). Protecting the aging workforce. *American Journal of Industrial Medicine*, 51: 269-280.
- Kowalski-Trakofler, K.M., Steiner, L.J. and Schwerha, D.J. (2005). Safety Considerations for the aging workforce. *Safety Science*, 43: 779-793.
- Labour Canada: http://www.hrsdc.gc.ca/eng/lp/spila/wlb/aw/01aging_workforce.shtml
 - Aging Workforce Site
- Canadian Centre for Occupational Health and Safety:
http://www.ccohs.ca/oshanswers/psychosocial/aging_workers.html
- National Eye Institute:
<http://www.medhelp.org/nihlib/GF-147.html>
- Collette Nicolle, Loughborough University Course Instructor
 - Ergonomics of Disability and Aging
- Alberta Employment and Immigration: Occupational Injuries and Diseases in Alberta, 2007 Summary
http://employment.alberta.ca/documents/WHS/WHS-PUB_oid_2007.pdf
- CDC/Workplace Health and Safety/NIOSH: Age Awareness Training for Miners
<http://www.cdc.gov/NIOSH/Mining/pubs/pubreference/outputid2701.htm>
- Canadian Obesity Network: Obesity in the Workforce
<http://www.obesitynetwork.ca/page.aspx?menu=37&app=182&cat1=457&tp=12&lk=no&page=1629>