Training for Manual Materials Handling Tasks:
Strategies for First Responders and Healthcare Workers

CREMSD Webinar
October 8, 2020

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Poll question 1

Do you think this type of training would be effective at reducing risk of injury?

a) Yes
b) No

Poll question 2

Do you think the training offered by your organization is effective at reducing the risk of injury?

a) Yes
b) Maybe
c) No

Poll question 3

Which type of work are you involved with?

a) Firefighting
b) Paramedic
c) Healthcare
d) Other

Denis et al., IRSST: Institut de recherche Robert-Sauvé en santé et en sécurité du travail, Québec

Agenda

- Our interpretation of the IRSST's findings on training
- Our recommendations for implementing training programs

Injury prevention in the workplace

More important

Fitting the *work* to the *worker*

vs

Fitting the *worker* to the *work*

Our position

- First, fit the *work* to the *worker*, then fit the *worker* to the *work*
- Worker training is important for injury prevention *particularly for occupations that require manual handling of heavy loads*

October 19
Steve Fisher
Dan Armstrong

October 30
Tyson Beach
Dave Frost

November 9
Catherine Brookman
Emily King
Mike Holmes

Our position

- First, fit the *work* to the *worker*, then fit the *worker* to the *work*
- Worker training is important for injury prevention *particularly for occupations that require manual handling of heavy loads*

5 reviews concluded that training doesn't work

Haslam et al., 2007
Martimo et al., 2007
Clemes et al., 2009
Verbeek et al., 2011
Hogan et al., 2014

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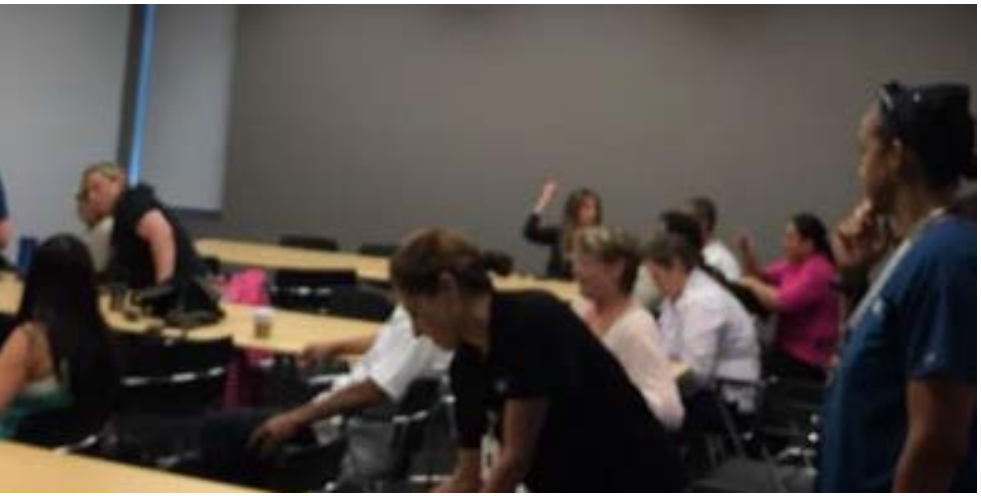
Martimo et al., 2007
Clemes et al., 2009
Verbeek et al., 2011
Hogan et al., 2014

77 papers

Denis et al. found

- The 5 reviews did not consider the *quality of the training programs*
- Instead, they only considered the *quality of the evaluation*

Training Program 1



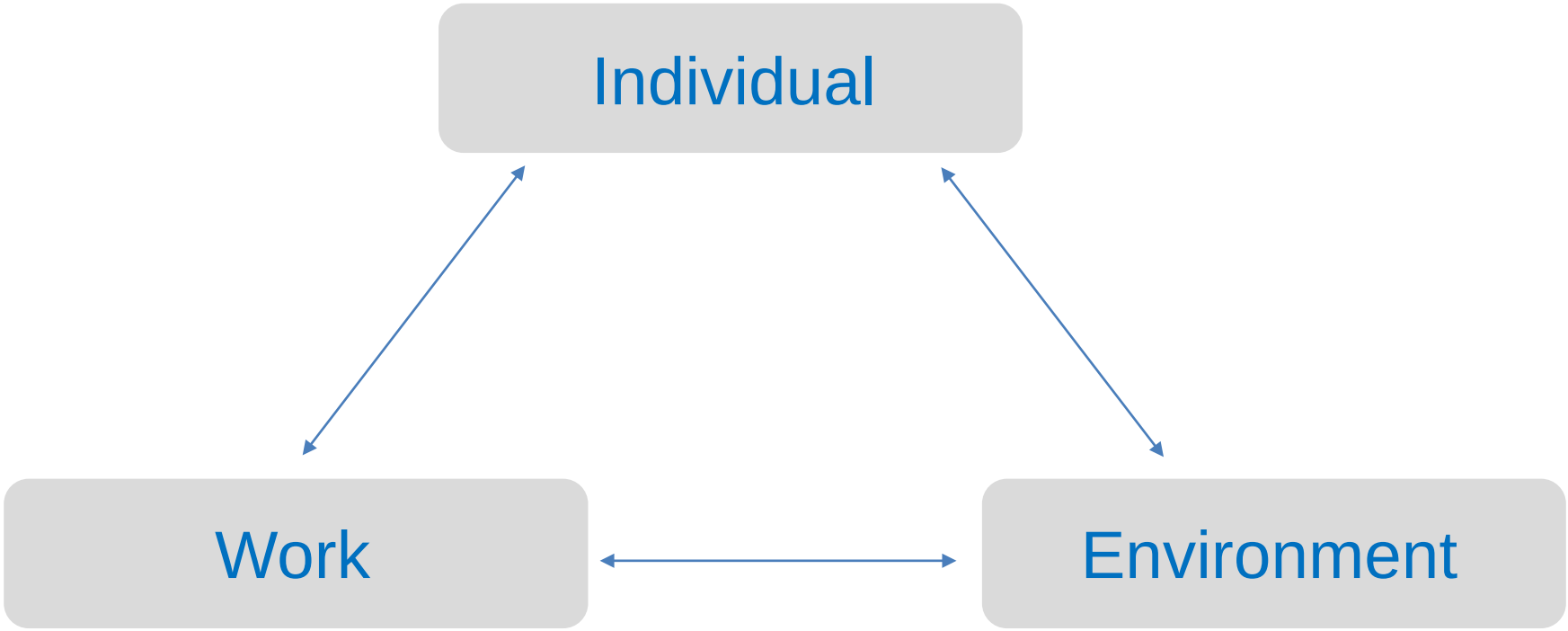
Training Program 2

High quality training programs had poor quality evaluations

Poor quality training programs had high quality evaluations

Denis et al.'s findings

- Conclusions were based on ~10% "high quality" evaluations
- Denis et al. concluded that evidence for training was stronger than the conclusions of the 5 reviews
- *Bad training doesn't work*


Individual
Work
Environment

To be effective, training should

- Help workers apply ergonomic principles in a changing work environment (rather than focus on specific techniques)
- Include practice that is representative of the real working conditions
- Teach workers how to reduce/eliminate hazardous work when possible
    - Handling frequency/duration
    - Getting help from a co-worker
    - Rearranging physical obstacles
    - Etc.

Using Best Available Evidence to Make Recommendations for Manual Handling Training Program Development, Implementation and Evaluation

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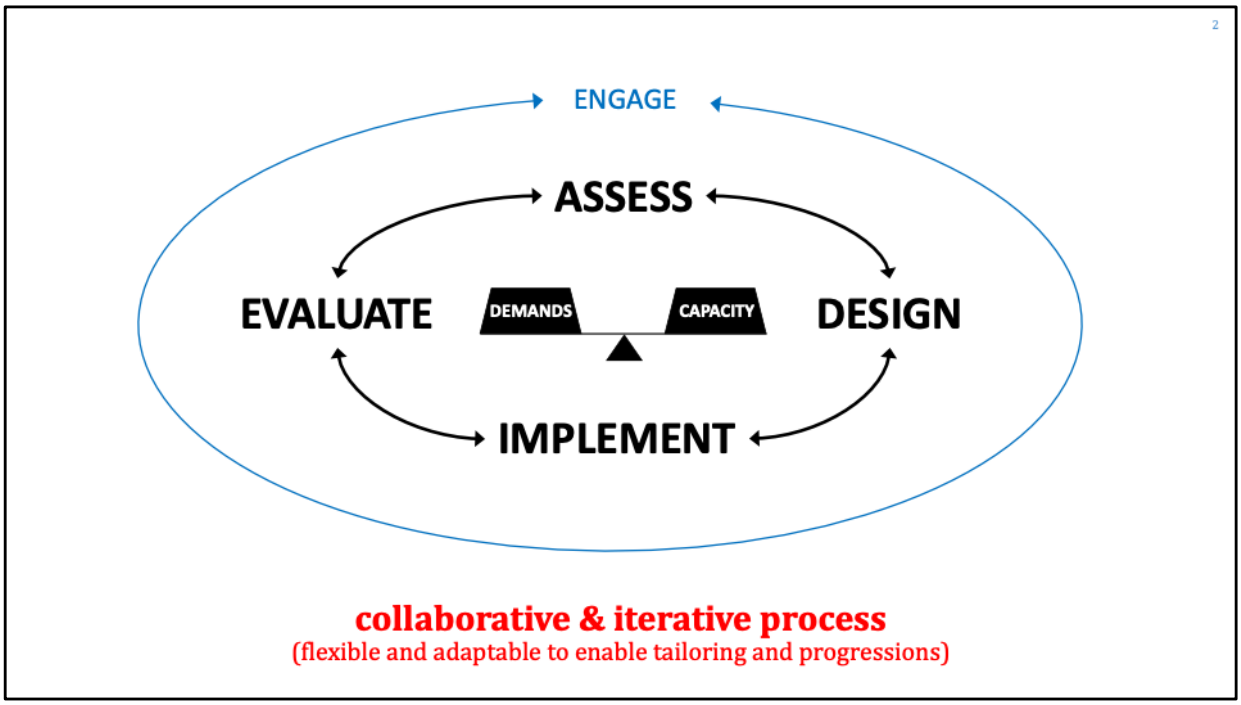
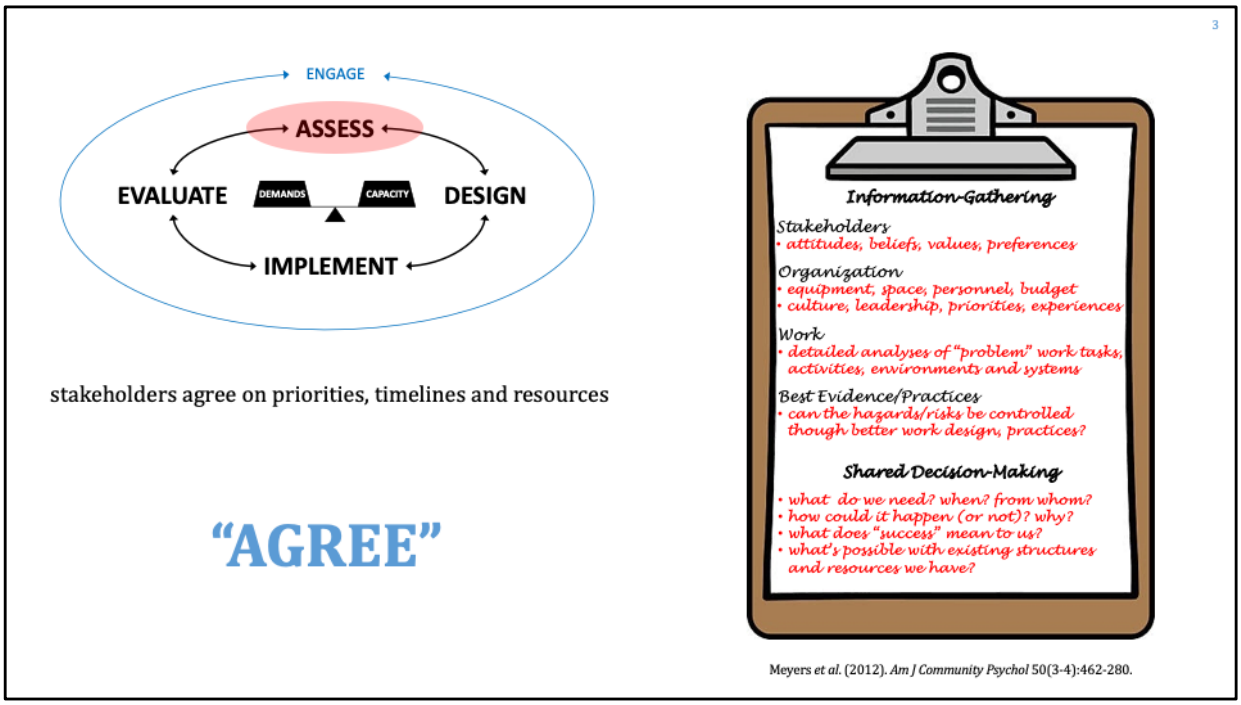


Contemporary theories and best available research evidence in kinesiology and implementation science suggests applying a transdisciplinary, participatory and iterative approach to manual handling training. Although there are many ways to do this (in principle), we propose using a process model consisting of four interdependent phases: (1) assessment; (2) design; (3) implementation; and (4) evaluation.

An accompanying position paper on the topic is forthcoming, and will be available on the CRE-MSD website.



Assessment focuses on gathering essential information and support. Key stakeholders and content experts (where possible/warranted) collaborate to develop a shared understanding of priorities, responsibilities, resources available and expected outcomes/impacts via analyses of individual- and contextual-level factors relevant to the design, implementation and evaluation of a tailored training initiative. It is critical to manage expectations, as commitment to ongoing and progressive training is likely required to affect the biological, psychological, social and cultural processes that lead to desired outcomes.

key tasks
needs, priorities and resources assessment
detailed analyses of work tasks and systems

tips
begin with end-in-mind (consider evaluation)
leverage existing programs and systems

common mistakes
unrealistic timelines, expected results, etc.
insufficient stakeholder input

common challenges
achieving and sustaining stakeholder buy-in
managing expectations

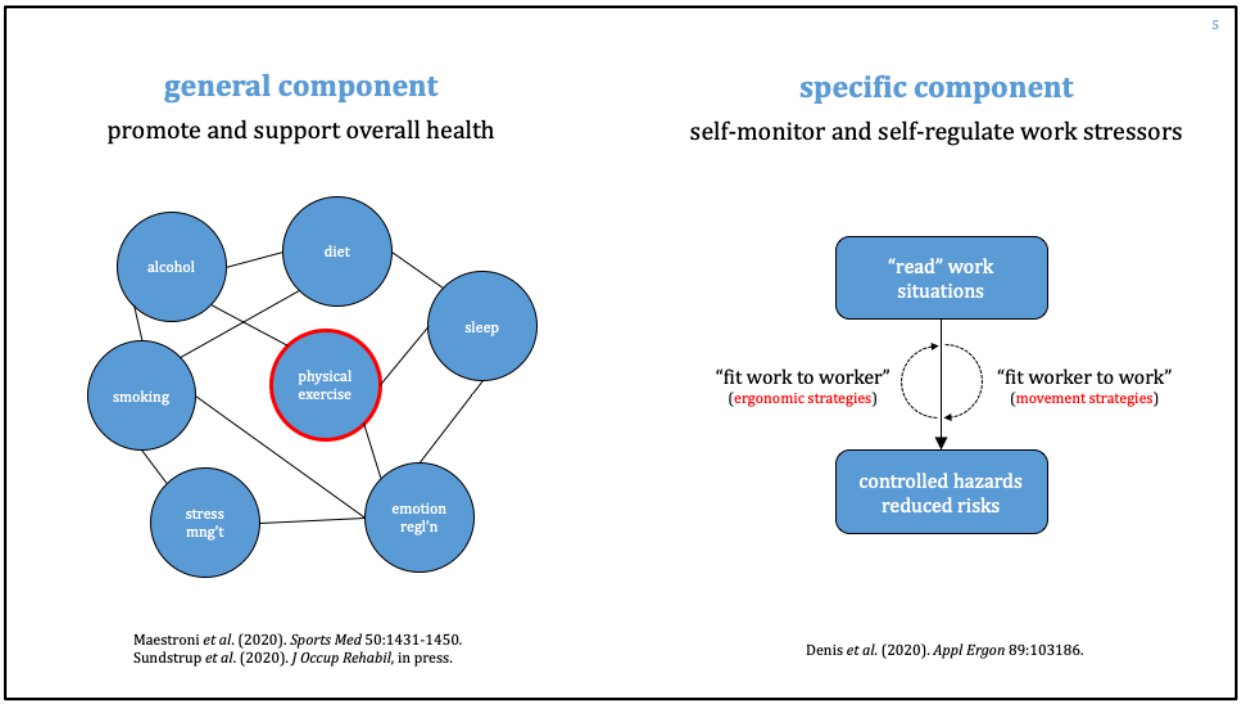
Design involves crafting a training plan – comprised of general and specific components – based on the assessment. General training is designed to promote and support health-enhancing behaviours (e.g. adequate physical activity, nutrition, sleep, stress management, etc.), with primary emphasis on using progressive exercise to build and maintain physical literacy and capacity. The general training yields the fundamental "building blocks" needed to reap benefits of specific training. Specific training is designed to train workers to first identify and assess their work-related health hazards and risks before training them to (re)organize their work and/or bodily movements to effectively regulate underpinning biopsychosocial stressors. To do this well, it is critical to co-create and continually co-evolve training with input from stakeholders who have tacit knowledge (especially experienced workers).

key tasks
adapt research to local context
accommodate barriers/enablers

tips
consult research and experienced practitioners

common mistakes
one-size-fits-all ("cookie-cutter") programs
incomplete ergonomics content and practice

common challenges
causes and consequences of MSD are complex
incorporating training into multimodal MSD prevention program



Causes/consequences of MSD multifactorial and complex – manual handling training by itself can only do so much. As such, we propose combining both general (health, fitness and performance) and job-/activity-specific components.

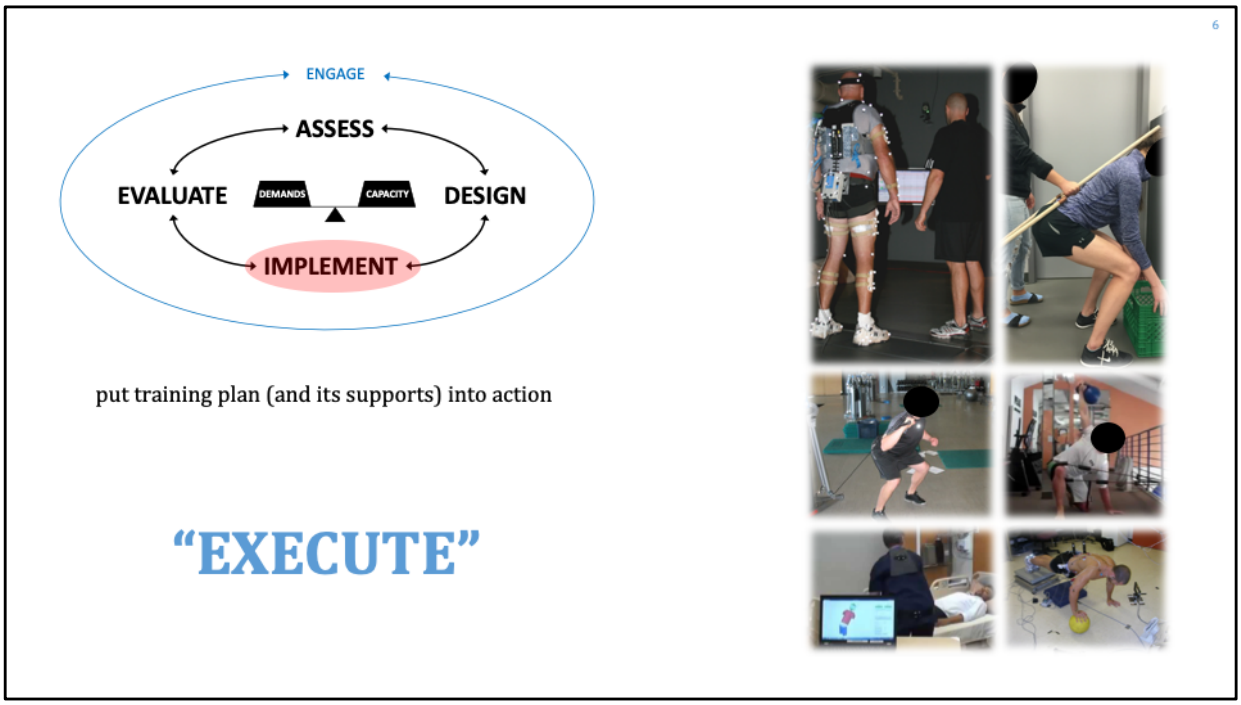
general component
promote and support overall health

- nutrition, sleep, physical exercise*
- stress management, emotional regulation
- smoking cessation, limit alcohol consumption

*There is preliminary support for the notion that engaging in physical exercise can help prevent and manage ill-effects that manual handling has on worker health and performance. Based on the available evidence, the specific exercise doses required are unknown, as are the underlying mechanisms. However, when exercise elicits improvements in physical literacy and strength, there is both theoretical and empirical grounds for its inclusion as a general complement to workplace-specific manual handling training programs, provided that overall life stresses are monitored and managed accordingly.

specific component
self-monitor and self-regulate work stressors

i. hazard identification & risk assessment
ii. interpret hazards & risks
iii. transform work (tasks, environments, systems) to control hazards & reduce risks



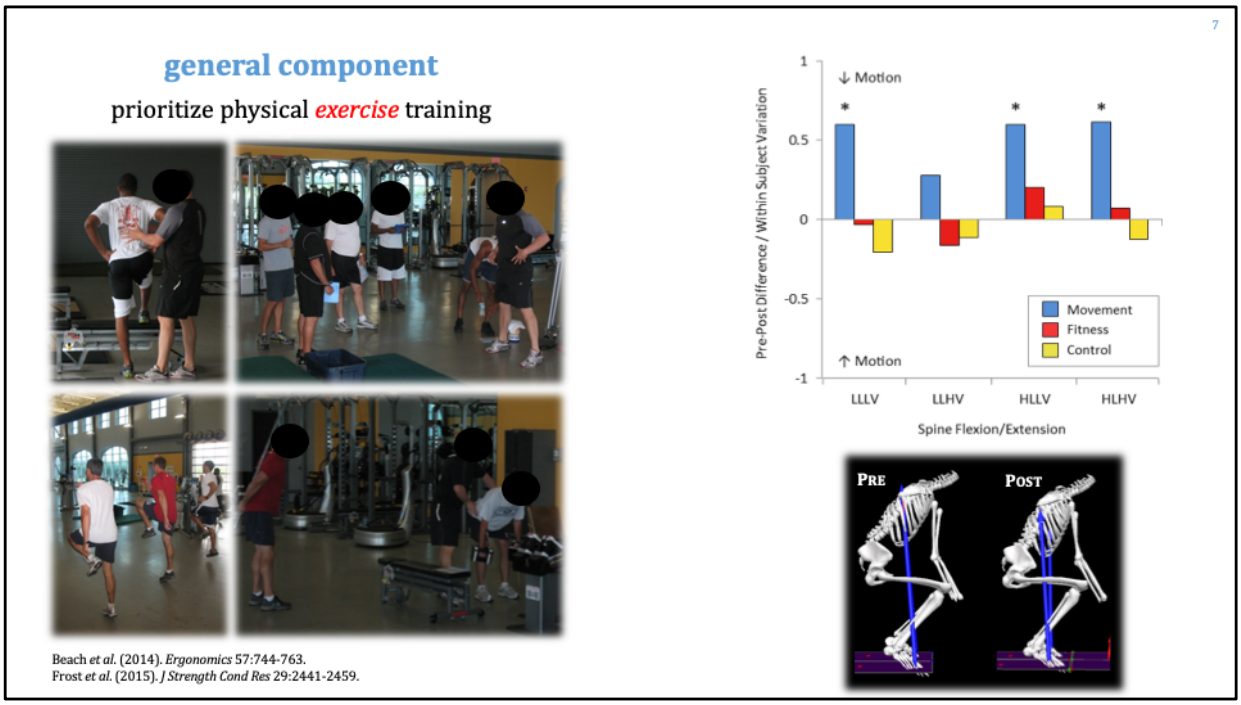
Implementation is putting the training plan into action. General training needs stakeholder-specific messaging to conjure support necessary to change attitudes, beliefs and health behaviours. A central message is that when exercise is administered based on foundational principles and practices of kinesiology, it is not only a powerful tool to cultivate overall worker health and wellbeing, but also develops the capacity to meet demands of work, life and play. Support from organizational leadership is needed to foster workers' capabilities, opportunities and motivations to exercise; this usually consists of providing: time; space; equipment; and access to health professionals who can help manage life stressors. Specific training uses experiential learning (vs. didactic teaching) methods to train workers to safely and effectively meet job demands by: using (in)formal hazard identification and risk assessment tools to "read" their work situations; and modifying hazardous or high-risk situations using a combination of ergonomic and personal movement strategies. It is critical to provide practice activities and environments that accurately represent realistic working conditions, and for workers to experiment with and reflect on their movement strategies to develop situational and body awareness required to regulate work-related stresses.

key tasks
train & *coach* (vs. *teach*) workers to handle safely and effectively

tips
prioritize competency and skill development (vs. technique-training)

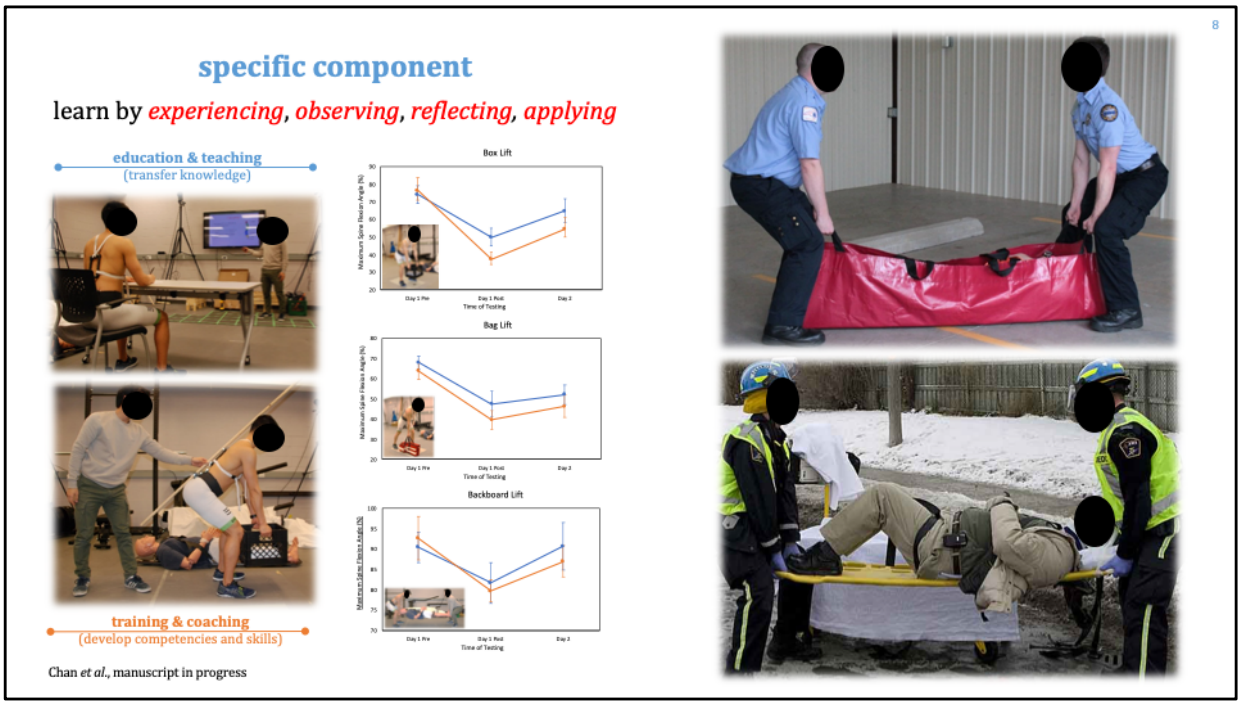
common mistakes
overemphasize knowledge transfer (education & teaching): train*er* vs. train*ee*-centred
underemphasize practice (training & coaching): manual handling is a *motor* activity, after all

common challenges
appropriate communication/messaging
prioritizing *learning* over *teaching*
lack of time and expertise



On one hand, exercise simply provides the “raw materials” or ”ingredients” to make the most of specific training. But, using more sophisticated methods of exercise design and implementation (i.e. based on fundamental kinesiology theory), we have also shown that if we “coach” exercise to change preferred movement “habits”, these habits transfer to job-specific activities without having to rehearse/practice the job-specific activities themselves. This is especially promising for the activities performed by emergency responders and healthcare workers (esp. in-home) because their work environments and tasks are often highly variable and unpredictable.

Using this more sophisticated exercise approach, trainees essentially learn to position and move their bodies more effectively when executing real-world tasks because they have developed the capabilities to better “read” and “interpret” their task-environment, and to have better awareness of their own capabilities in given circumstances (i.e. to “act” based on their interpretation).



Experiential learning paradigms used to train workers to develop situational- and self-awareness. We compared the standard ”teaching/educating” (didactic method) to “coaching/training” (experiential learning method), and found slight advantage for the latter approach for acquisition, retention and positive transfer of learning/training in a contrived laboratory study. Either approach may work well when the job tasks are similar and predictable to the training/learning setting, but… [next slide]

…the evidence is not consistent on how well contrived training/learning activities transfer to complex, real-world scenarios that differ remarkably from the practice setting.

10

specific component

offer *realistic* and sufficient *dose* of learning opportunities
learn to combine *ergonomic* and *movement* strategies

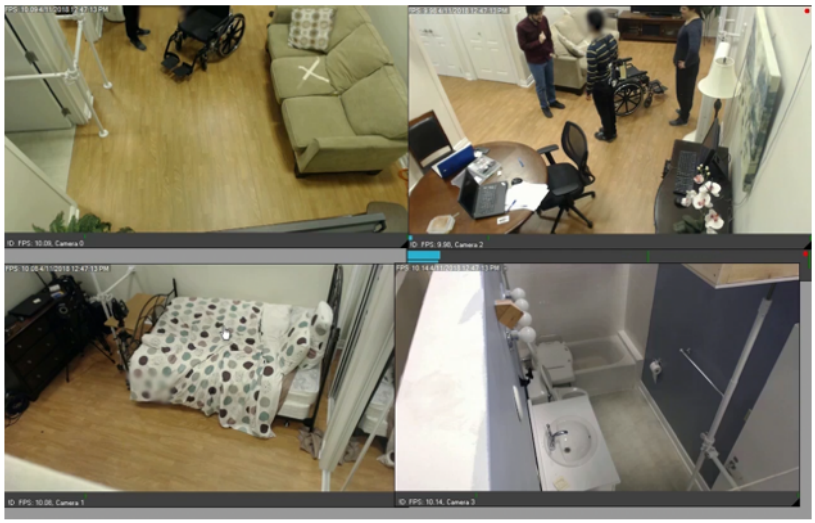
Carnegie *et al.*, data analyses in progress

We have started taking our research to the field to better design realistic practice conditions (to facilitate positive training transfer). We've been experimenting with training firefighters to recognize hazards/risks associated with their tasks, and learning to adapt their work tasks, environments and systems (using ergonomic controls/strategies), and by adapting their movement strategies to regulate the stressors imposed on the body without negatively impacting performance/safety. Our initial results are promising, but we have a lot of analyses left to finish.

11

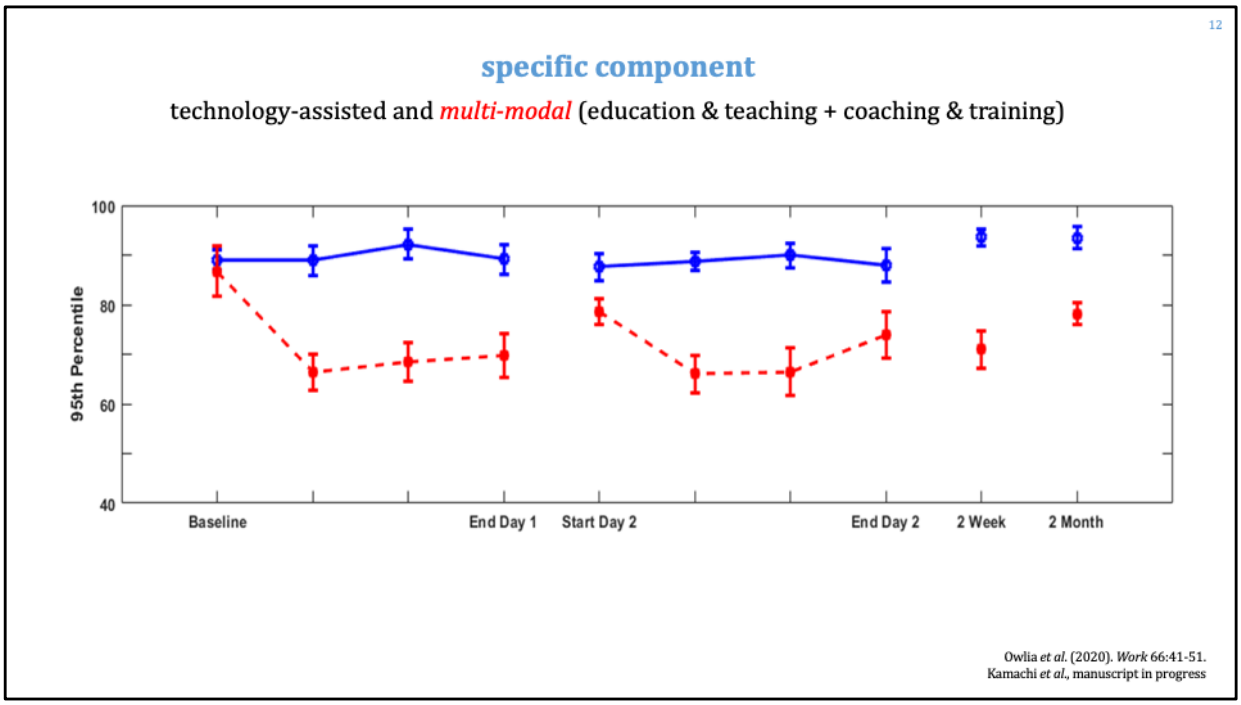
specific component

technology-assisted and *multi-modal* (education & teaching + coaching & training)

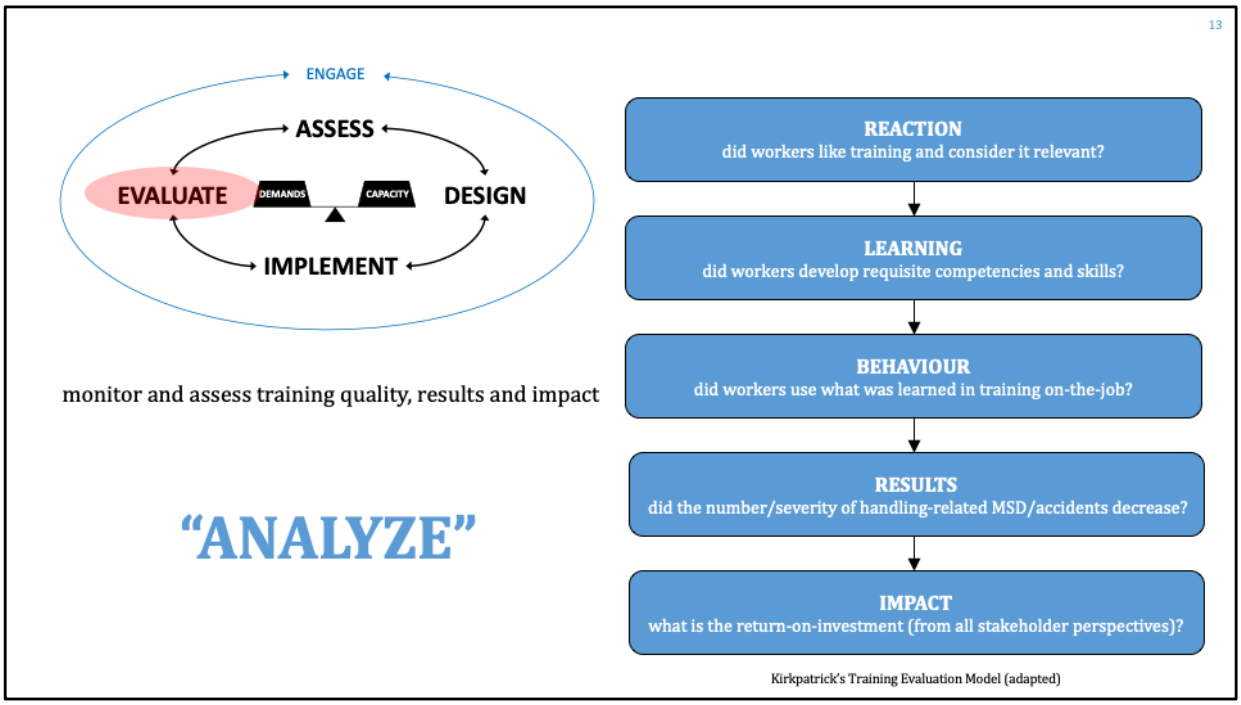


Owlia *et al.* (2020). *Work* 66:41-51.
Kamachi *et al.*, manuscript in progress

Some of the most promising work is being done on this topic is that done by Dr. Dutta's team. They're combining didactic teaching and experiential learning methods together with "wearables" to facilitate learning in realistic practice settings. Biofeedback (vibrotactile and/or audio) is being used to alert performers about their spinal motions during various patient handling scenarios in a simulated home-living environment. This biofeedback approach is combined with education and teaching about the reasons why controlling spine motion during physically demanding handling activities can help build low-back resilience and maintain health.



Their initial results are extremely promising. They've shown that using their multi-modal technique can not only facilitate desired changes in movement strategies, but that these changes are sustained over 2 months!



Evaluation refers to the ongoing monitoring and critical review of training processes, outcomes and impacts. Process evaluation focuses on judging the quality of training and its delivery, and consists of indicators that training: reaches and engages intended workers; is dosed sufficiently to build and maintain requisite skills and competencies; and leads to expected changes in work practices. Outcome evaluation focuses on the ultimate goal(s) of training, commonly evidenced by reduced number, severity and impact of MSDs without negatively impacting worker or organizational performance benchmarks (impacts). Prior to designing and implementing training, it is critical to agree on the evaluation indicators, how and when they will be assessed, and by whom.

key tasks
assess training processes, outcomes and value

tips
finalize evaluation plan *before* training starts
identify quality improvement opportunities (ongoing feedback on processes)
allow time (behaviour change slow process)

common mistakes
worker reactions, learning and behaviour seldom evaluated (appropriately)

common challenges
insufficient resources
maintaining controls and objectivity

14

take-home messages

healthcare workers & emergency/first responders

- manual handling *training is recommended*, but needs to be "high-quality"
- "high-quality" means that training content, delivery and evaluation is *tailored* to develop and maintain the competencies and skills to:
  - recognize and interpret their health hazards and risks; and
  - adapt their work situations and bodily movements to control hazards and reduce risks

Manual handlers should receive high-quality training to prevent and manage the associated musculoskeletal health risks. Training programs are ineffective if they fail to develop and maintain requisite competencies and skills of these workers to: recognize and interpret their health hazards and risks; and adapt their work situations and bodily movements accordingly. General guidelines for developing, delivering and evaluating high-quality manual handling training are provided on next slide, but training should be tailored to accommodate stakeholder needs and wants (identified via a thorough assessment).

open resources

general training component – design & implementation

Maestroni L, et al. (2020). The benefits of strength training on musculoskeletal system health: Practical applications for interdisciplinary care. *Sports Med* 50(8):1431-1450. https://link.springer.com/article/10.1007/s40279-020-01309-5

Performance Redefined (PR) – Making Exercise Matter: https://performanceredefined.ca

Ready for Duty (R4D) App: https://www.pshsa.ca/resources/ready-for-duty-r4d-app-for-android

specific training component – design & implementation

Denis D, et al. (2013). Participatory training in manual handling: Theoretical foundations and proposed approach. Report from the *Institut de recherche Robert-Sauvé en santé et en sécurité du travail* (IRSST). http://www.irsst.qc.ca/media/documents/PubIRSST/R-784.pdf

Denis D, et al. (2018). Why doesn't training based on safe handling techniques work? A critical review of the literature. Report from the IRSST. https://www.irsst.qc.ca/en/publications-tools/publication/i/100981/n/reasons-training-based-safe-handling-techniques-critical-review-literature

Haslam C, et al. (2007). Manual handling training: Investigation of current practices and development of guidelines. Report from the *Work and Health Research Centre* for the Health and Safety Executive. https://www.hse.gov.uk/research/rrhtm/rr583.htm

assessment–design–implementation–evaluation

Consolidated Framework for Implementation Research (CFIR): https://cfirguide.org

Exploration–Preparation–Implementation–Sustainment (EPIS) Framework: https://episframework.com

Reach–Effectiveness–Adoption–Implementation–Maintenance (RE-AIM) Framework: https://www.re-aim.org