

Implementation Science Approaches for Advancing Occupational Safety and Health Research and Practice

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2023 Research Day Symposium

April 6, 2023

Presentation overview

- Complex occupational safety and health challenges and systems-based solutions
- Implementation science at NIOSH
- Applying an implementation science lens to NIOSH young worker research



Acknowledgements

- Dr. Borsika Rabin and Dr. Kelli Cain, Herbert Wertheim School of Public Health and Human Longevity Science, University of California San Diego
- Dr. Amia Downes and members of the NIOSH Implementation Research Workgroup
- Dr. Andrea Okun, Dr. Lauren-Menger Ogle, Brenna Keller, Devin Baker, NIOSH Safe-Skilled-Ready Workforce program
- Dr. Samantha Harden, Department of Human Nutrition, Foods, and Exercise, Virginia Tech
- Dr. Russ Glasgow, University of Colorado Anschutz Medical Campus

**Systems-based approaches to address
occupational safety and health research to
practice gaps**

Complex future of work challenges

- **Changing nature of work, the workforce, and the workplace**
- **“Megatrends”** [ILO 2020]
 - Globalization
 - Technology
 - Demography changes
 - Climate change
- **Global pandemics**
- **Rise in psychosocial hazards** [Schulte et al. 2020, Sorensen et al. 2021, Tamers et al. 2020]
- **Occupational health equity**



Image credit: <https://www.twentytwo.co.nz/blog/workplace-change-the-dangers-of-not-embracing-how-people-adapt/>

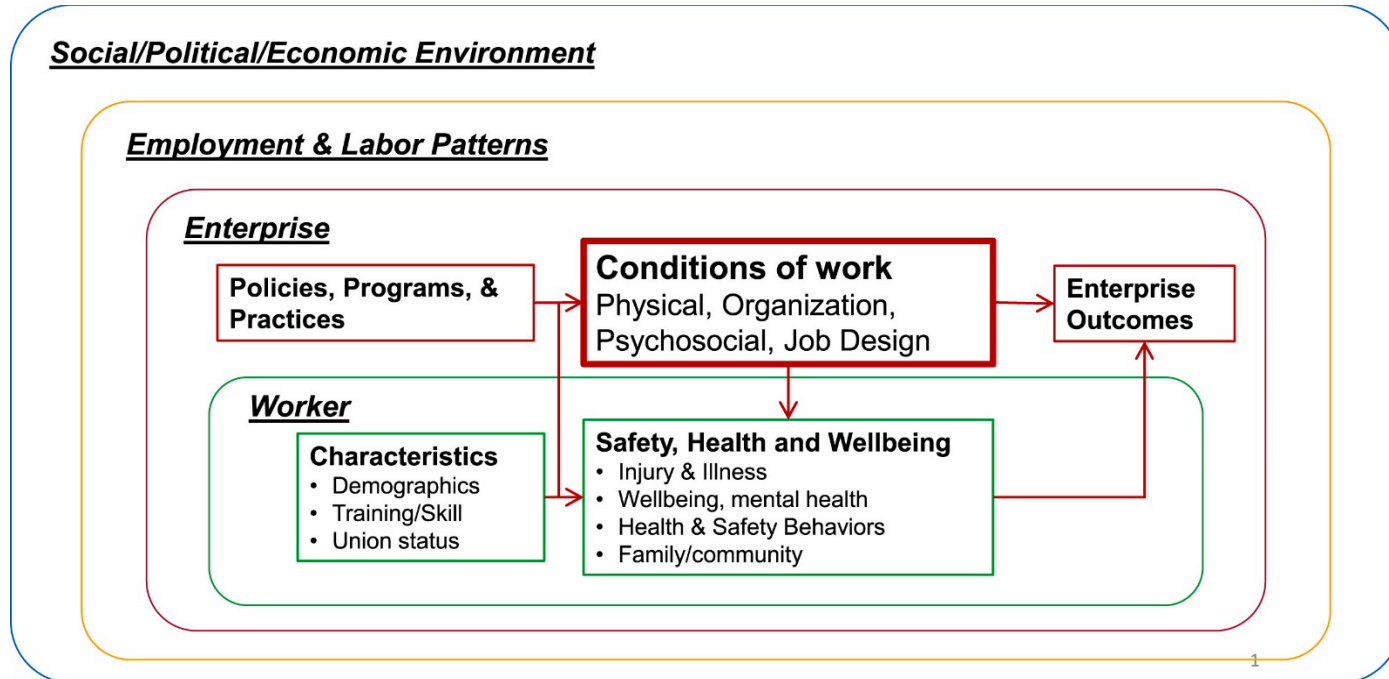
International Labor Organization, 2020. www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_591502.pdf
Schulte et al. [2020]. <https://doi.org/10.1093/annweh/wxaa051>
Sorensen et al. [2021]. <https://doi.org/10.1016/j.socscimed.2020.113593>
Tamers et al. [2020]. <https://doi.org/10.1002/ajim.23183>

Complex systems

The whole is greater than the sum of its parts...

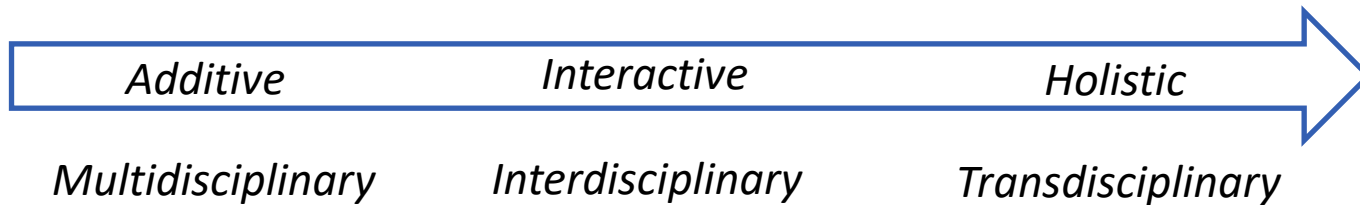


Systems-based approaches in occupational safety and health



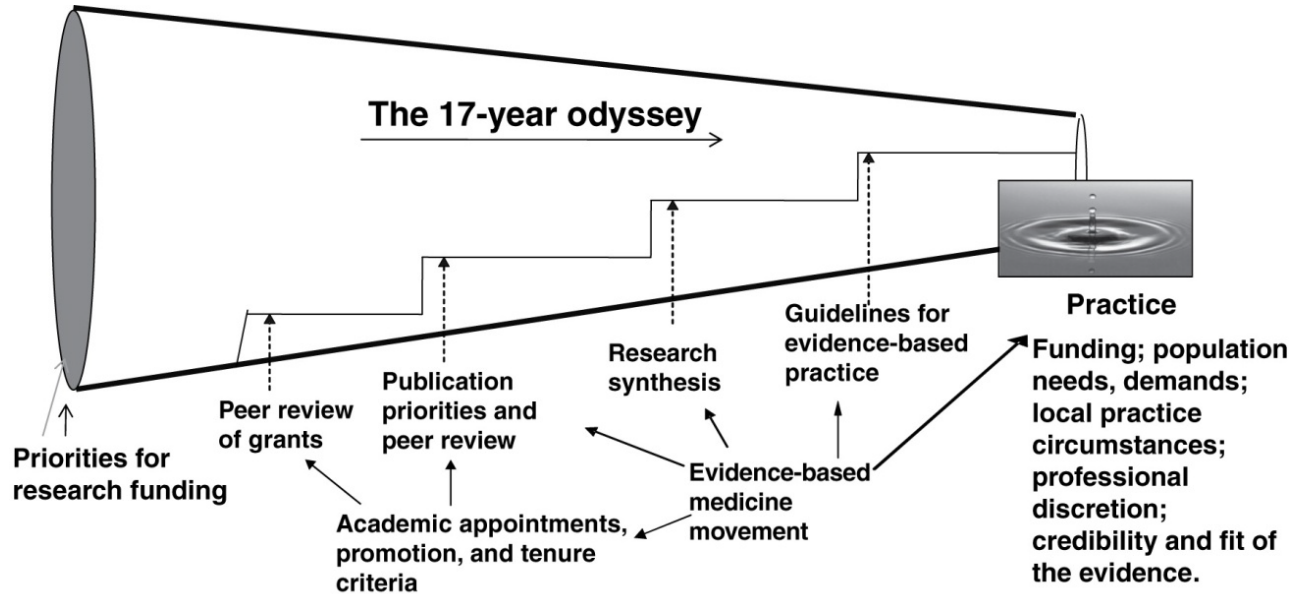
Sorensen G, Dennerlein JT, Peters SE, Sabbath, EL, Kelly EL, Wagner GR [2021]. The future of research on work, safety, health and wellbeing: a guiding conceptual framework. *Social Science & Medicine*, 269, 113593.
<https://doi.org/10.1016/j.socscimed.2020.113593>

A team science approach



Barnett ML, Stadnick NA, Proctor EK, Dopp AR, Saldana L [2021]. Moving beyond Aim Three: a need for a transdisciplinary approach to build capacity for economic evaluations in implementation science. *Implementation Science Communications*, 2(1), 133. <https://doi.org/10.1186/s43058-021-00239-1>
Choi BC, Pak AW [2006]. Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness. *Clinical and Investigative Medicine*, 29(6), 351–364.

The “leaky” research-to-practice pipeline



Green LW, Ottoson JM, García C, Hiatt RA [2009]. <https://doi.org/10.1146/annurev.publhealth.031308.100049>;

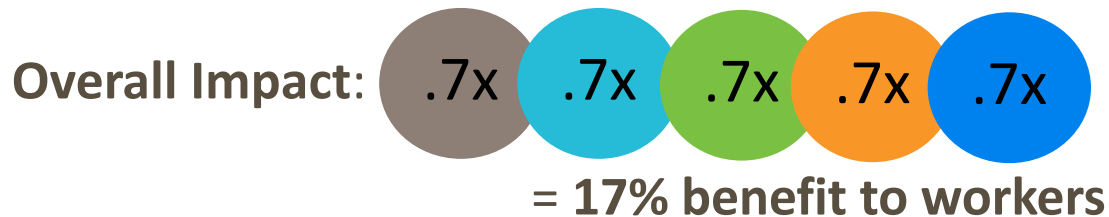
Balas EA, Boren SA [2000]. Managing clinical knowledge for health care improvement. Yearbook of Medical Informatics, 1, 65–70.

Implementing an evidence-based intervention

Even if **100% effective** ...it is only as good as how and whether:

- It is **adopted** widely, including in low resource workplaces
- Employers choose to deliver it
- It can be **implemented** consistently with quality
- Intended recipients (workers, employers), including those at highest risk, **receive** it
- It can be **sustained**

If we optimistically assume 70% success for each step above...



Pipeline issues in occupational safety and health

- Effective OSH interventions are not broadly adopted or implemented; Research “sits on the shelf”
 - For instance, only 17% of U.S. fishing safety research has been adopted in workplaces to benefit workers
[Lucas et al. 2014]
- Limited evidence exists of workplaces that adopt, implement, and maintain workplace safety and health programs
- These gaps seriously impact worker safety, health, and well-being

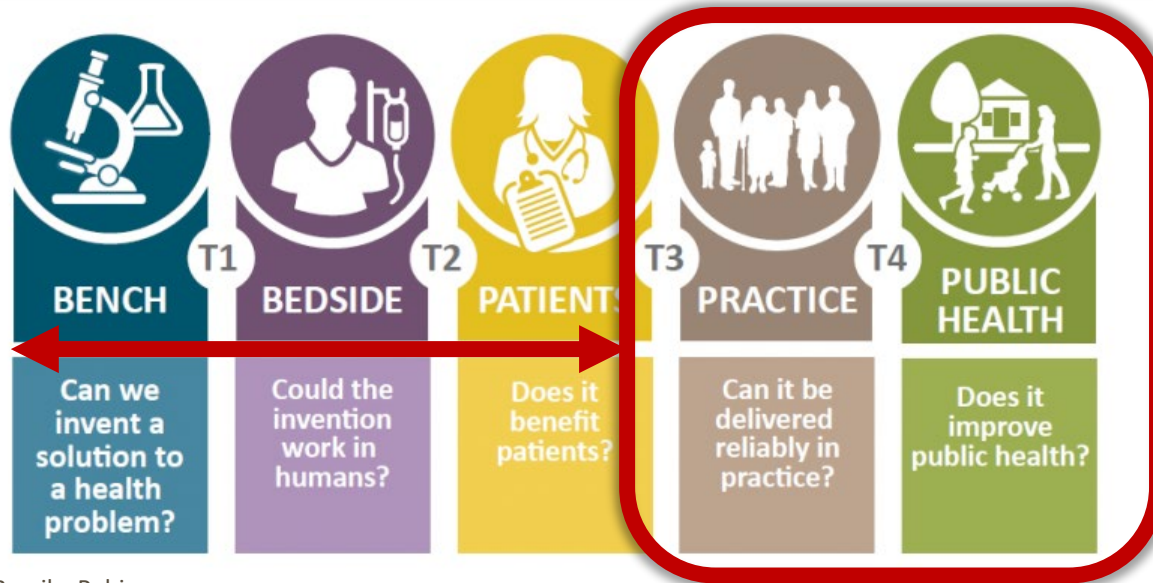


Anger et al. [2015]. <https://doi.org/10.1037/a0038340>.
Lucas et al. [2014]. <https://doi.org/10.1016/j.ssci.2013.11.023>
Punnett et al. [2020].
<https://doi.org/10.1093/annweh/wxaa003>.

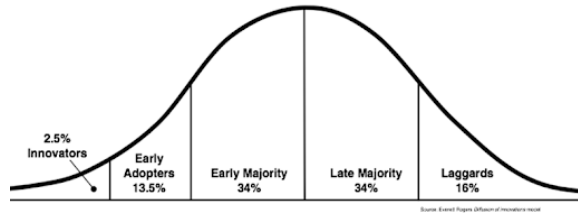
Implementation science: bridging the research to practice gap

“Study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve our impact on population health.”

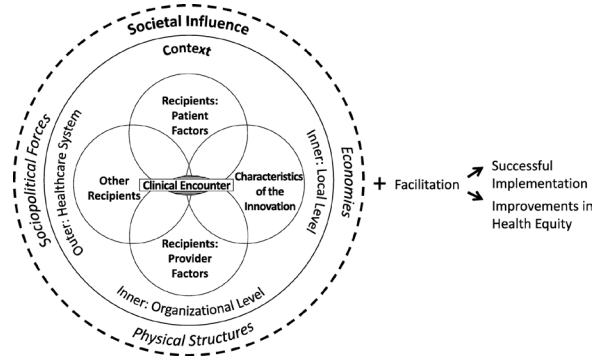
—National Cancer Institute



Wealth of theories, models, frameworks



Diffusion of Innovations
(Rogers, 2003, 5th ed.)



Healthy Equity Implementation Framework

Woodward, E. N., Matthieu, M. M., Uchendu, U. S., Rogal, S., & Kirchner, J. E. (2019). doi:10.1186/s13012-019-0861-y

• 61 models with research focus

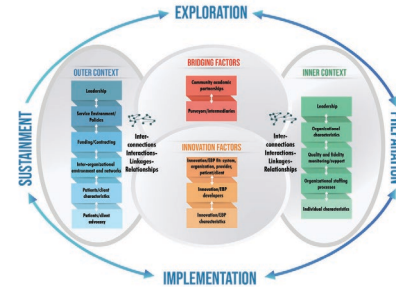
Tabak, R. G., Khoong, E. C., Chambers, D. A., & Brownson, R. C. (2012). doi: 0.1016/j.amepre.2012.05.024

> 100 used in an international sample

Birken, S.A., et al., (2017). doi:10.1186/s13012-016-0534-z

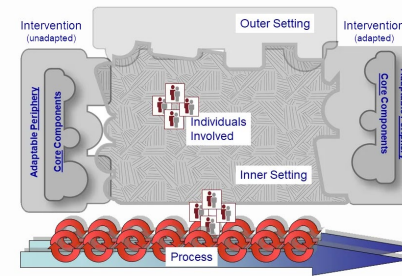
• 159 identified

Striffler, L., et al., (2018). doi: 10.1016/j.jclinepi.2018.04.008



Exploration, Preparation Implementation Sustainability (EPIS) framework

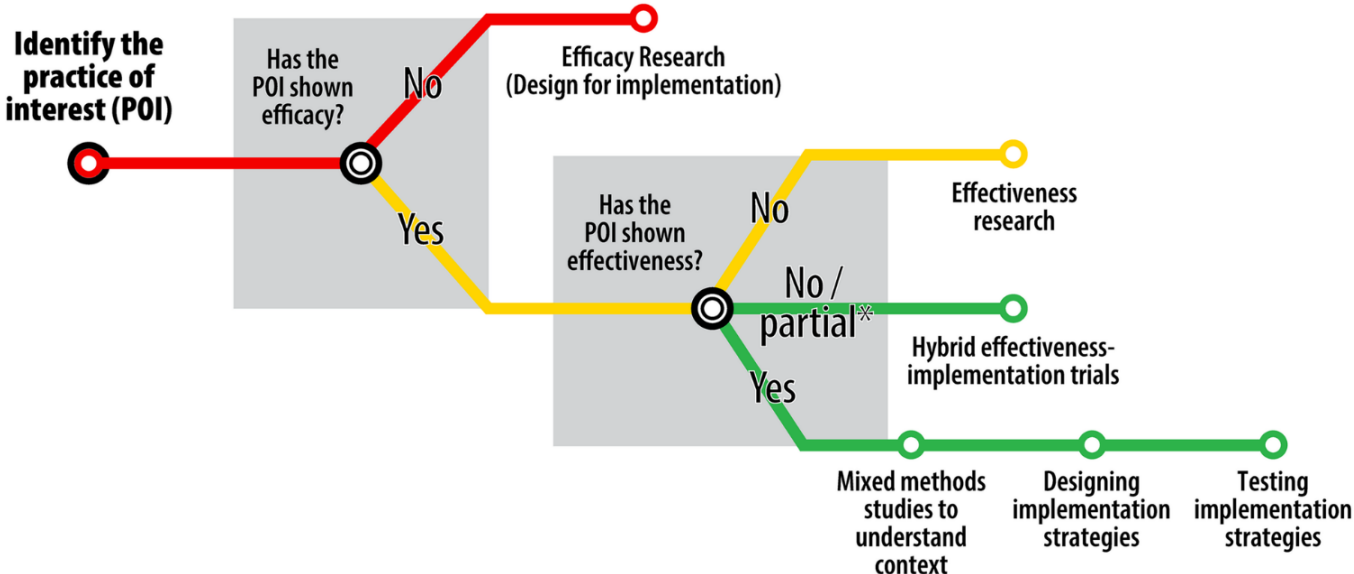
Aarons, G. A., Hurlburt, M., & Horwitz, S. M. (2011). doi:10.1007/s10488-010-0327-7



Consolidated Framework for Implementation Research (CFIR)

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). doi:10.1186/1748-5908-4-50

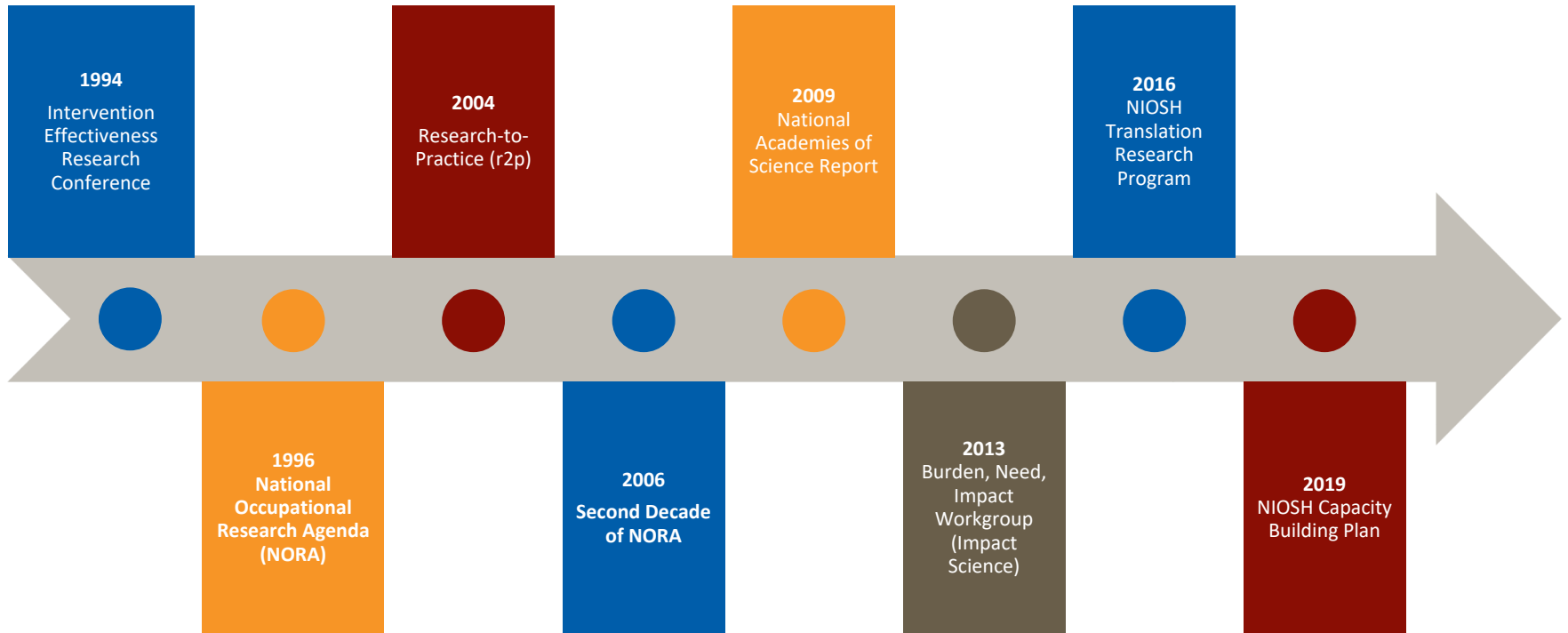
Implementation study designs (example)



Lane-Fall, MB, Curran, GM, & Beidas, RS [2019].
<https://doi.org/10.1186/s12874-019-0783-z>

Implementation science at NIOSH

Moving research into practice at NIOSH: A brief history and timeline



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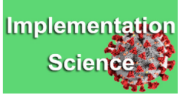
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Toward More Precision in Implementation Science in the Age of COVID-19

June 26, 2020 by Mindy Clyns, David A Chambers, Division of Cancer Control and Population Sciences, National Cancer Institute, Rockville, Maryland and Maim J. Khoury, Office of Genomics and Precision Public Health, Centers for Disease Control and Prevention, Atlanta, Georgia

Implementation Science (IS) is “the study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve the impact on population health.” The various factors that must be taken into consideration in designing, conducting, and evaluating IS studies dictate an inherent “precision” to ensure the success of evidence-based practice implementation within studied populations. These include but are not limited to:

- consideration of the different stakeholders involved;
- the context in which an intervention takes place;
- identification of appropriate implementation strategies;
- the multi-level, multi-sectoral, and dynamic nature of implementation; and
- the need to consider scale-up and sustainability.



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Implementation Science in Environmental Health

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Theme two of the [NIEHS Strategic plan](#) (Promoting Translation - Data to Knowledge to Action) supports research to develop, test, and validate evidence-based prevention and intervention strategies, to reduce or avoid exposures and their resulting health impacts. The NIEHS supports the use of implementation science to improve environmental public health through the adaptation, uptake, sustainment and spread of evidence-based interventions, practices, and policies that prevent or mitigate harmful exposures and support environmental health equity.

What is Implementation Science?

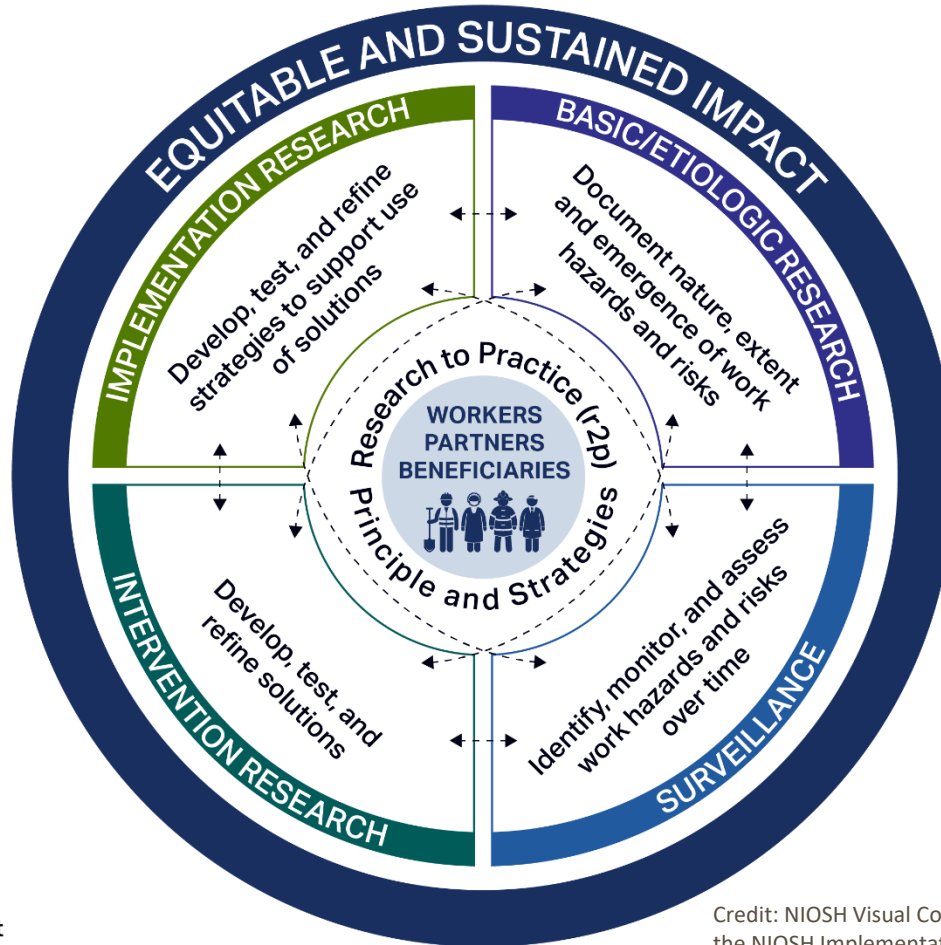
Implementation science is the study of methods to promote the



Implementation research for NIOSH

- Studies how promising interventions are disseminated, adopted, implemented, sustained, and scaled equitably in real-world settings
- Uses models, methods, and measures to systematically identify, develop, evaluate, and refine strategies (to support these processes)
- Applies to all workplaces and workers (addresses health equity)

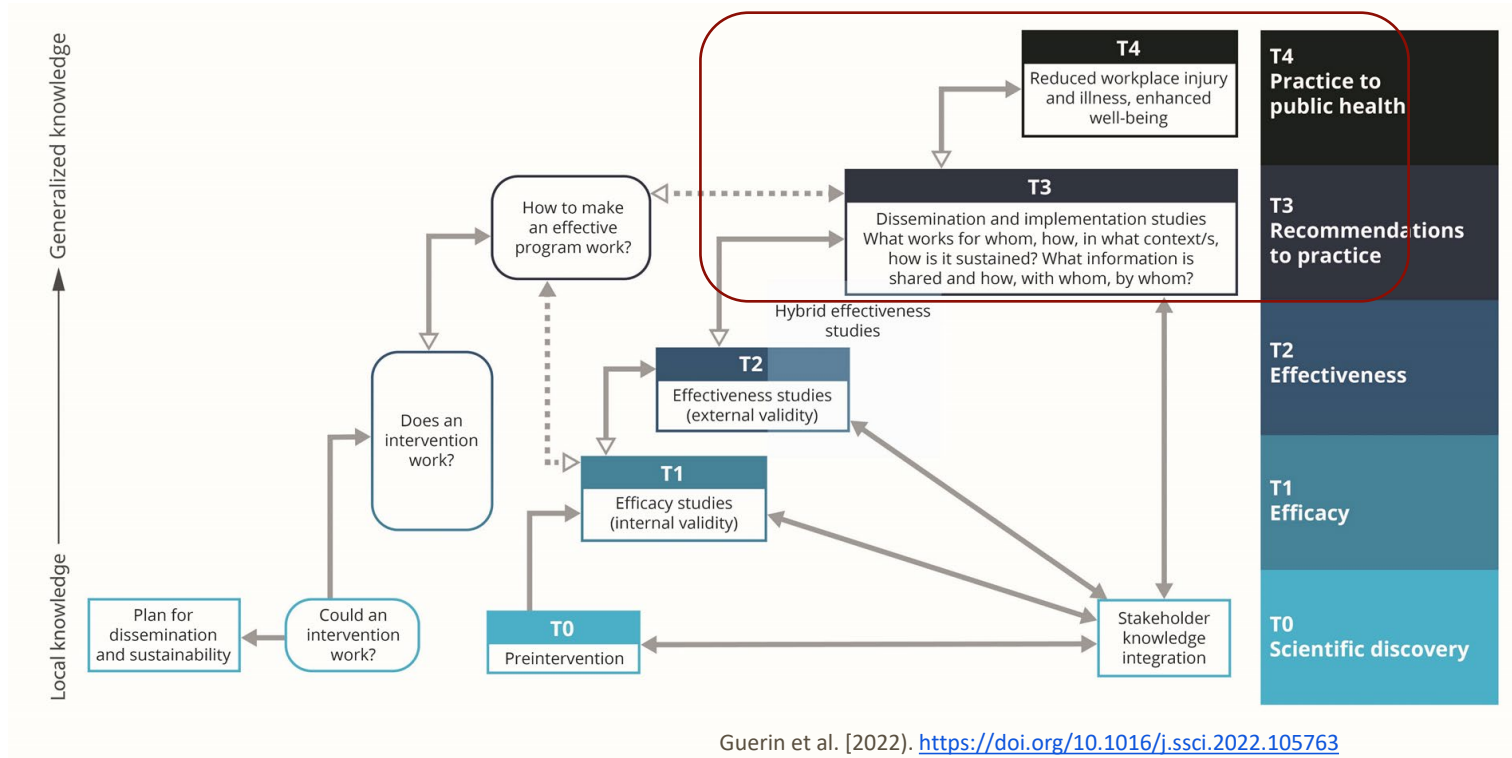
NIOSH Research for Impact Framework



Draft

Credit: NIOSH Visual Communications Team and the NIOSH Implementation Research Workgroup

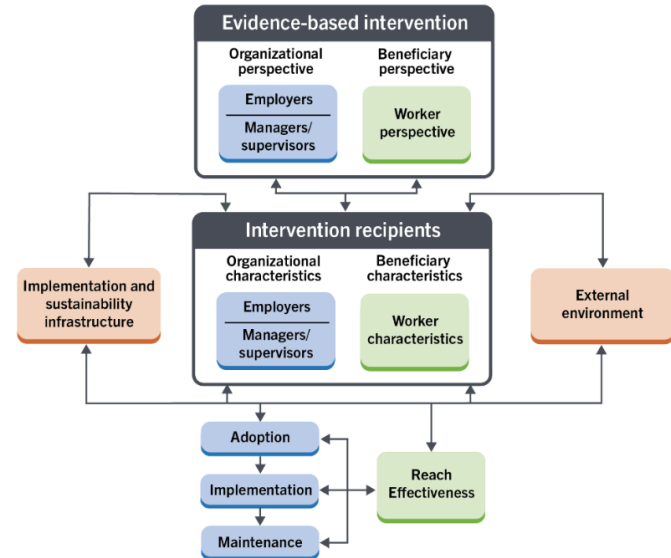
The research continuum in occupational safety and health



Implementation research, implementation science and NIOSH

- Conduct “T3” implementation research
- Identify, develop, evaluate, and refine strategies to disseminate, adopt, implement, sustain, and scale successful workplace interventions

The Practical, Robust, Implementation and Sustainability Model (PRISM) for Occupational Safety and Health



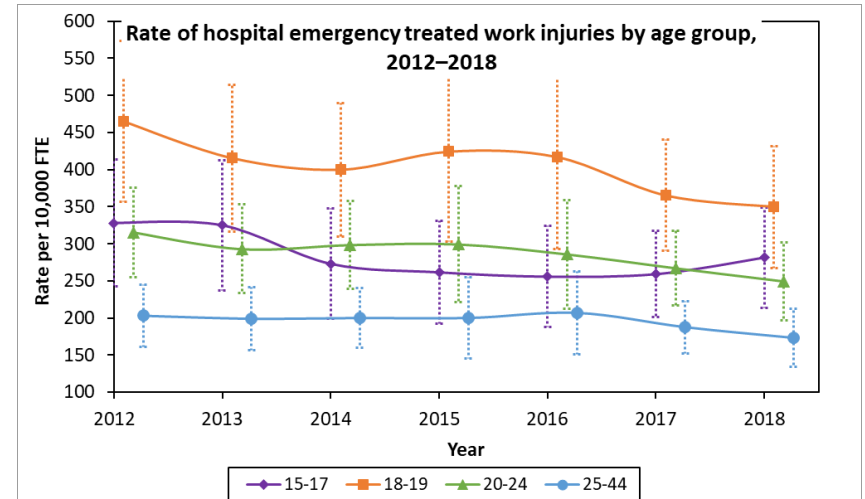
Adapted from Feldstein and Glasgow (2008).
Guerin NJ, Glasgow RE, Tyler A, Raboin BA, Huebnermann AG (2022).
<https://doi.org/10.1016/j.ssci.2022.105763>



Applying implementation science to young worker safety and health research

The problem: Young worker injuries

- From 2012–2018, about 3.2 million nonfatal, job-related injuries to young workers (15–24 years) were treated in hospital ERs.
- Compared with adult workers, young workers have rates of job-related injury that are about twice as high.
- Long-term impacts on health and well-being; “cumulative burden of morbidity” [KoeHoorn et al. 2008]
- Adolescent workers (< age 18) face unique risks



Guerin RJ et al. [2020]. <https://doi.org/10.15585/mmwr.mm6935a3>

Solutions:

OSHA 10-hour training

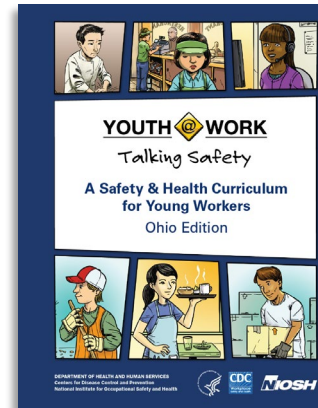
- Is the industry standard work safety training; used in career and technical education (CTE)
- Teaches general workplace safety and health, like ladder or chemical safety, and regulations
- Trained, authorized instructors teach it.
- Has evidence it's effective, but not about its implementation



Guerin RJ et al. [2019].
<https://doi.org/10.1007/s11121-019-01008-2>

NIOSH *Talking Safety*

- Based on efforts by NIOSH and its partners
- Is a free, interactive, middle and high school curriculum; six 45-minute lessons
- Teaches Core OSH Competencies
- Customized for each state
- Has evidence that it's effective and about its implementation [Guerin et al. 2019]



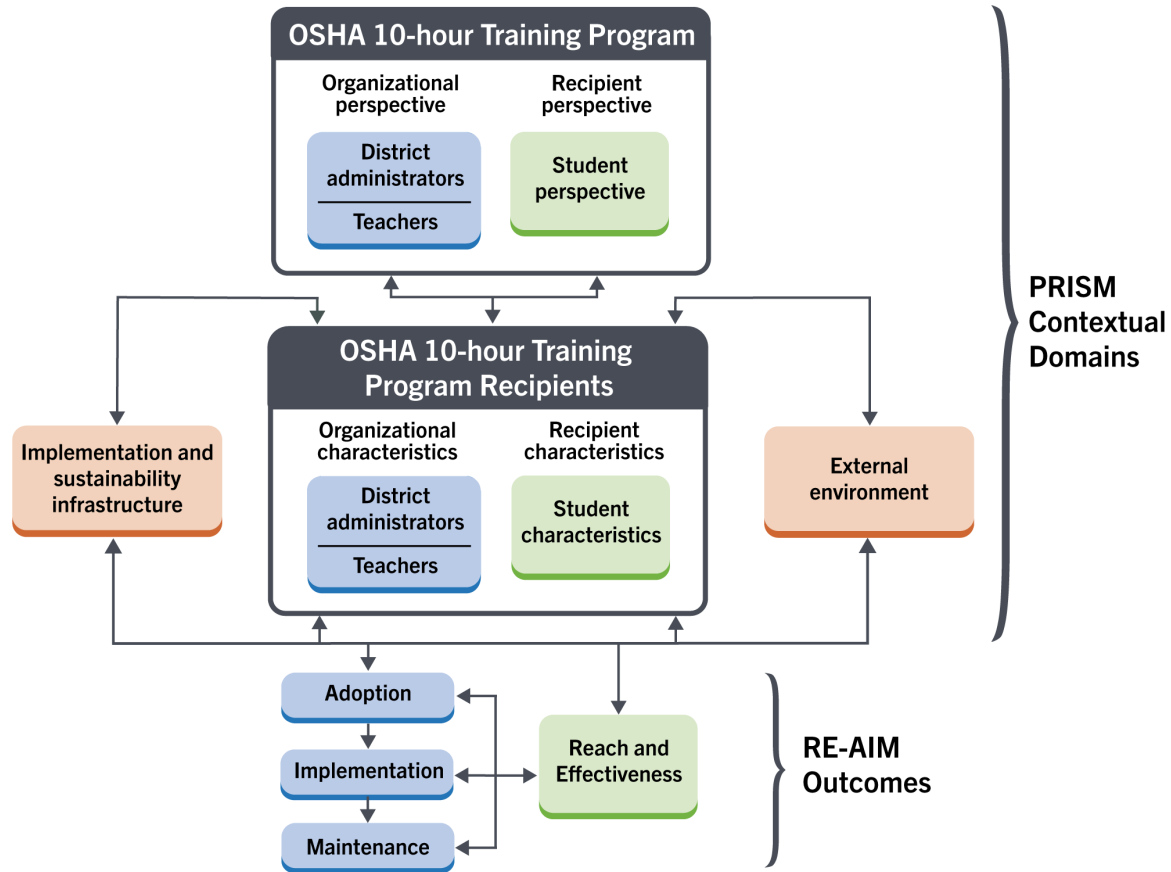
Study population and environment

- Service providers: about 40 M-DCPS high school CTE teachers
- Intervention recipients: 2,000–3,000 career tech students in health sciences pathway, grades 9–12
- Key partners: M-DCPS administrators, Board of Education, union leaders (American Federation of Teachers), OSHA

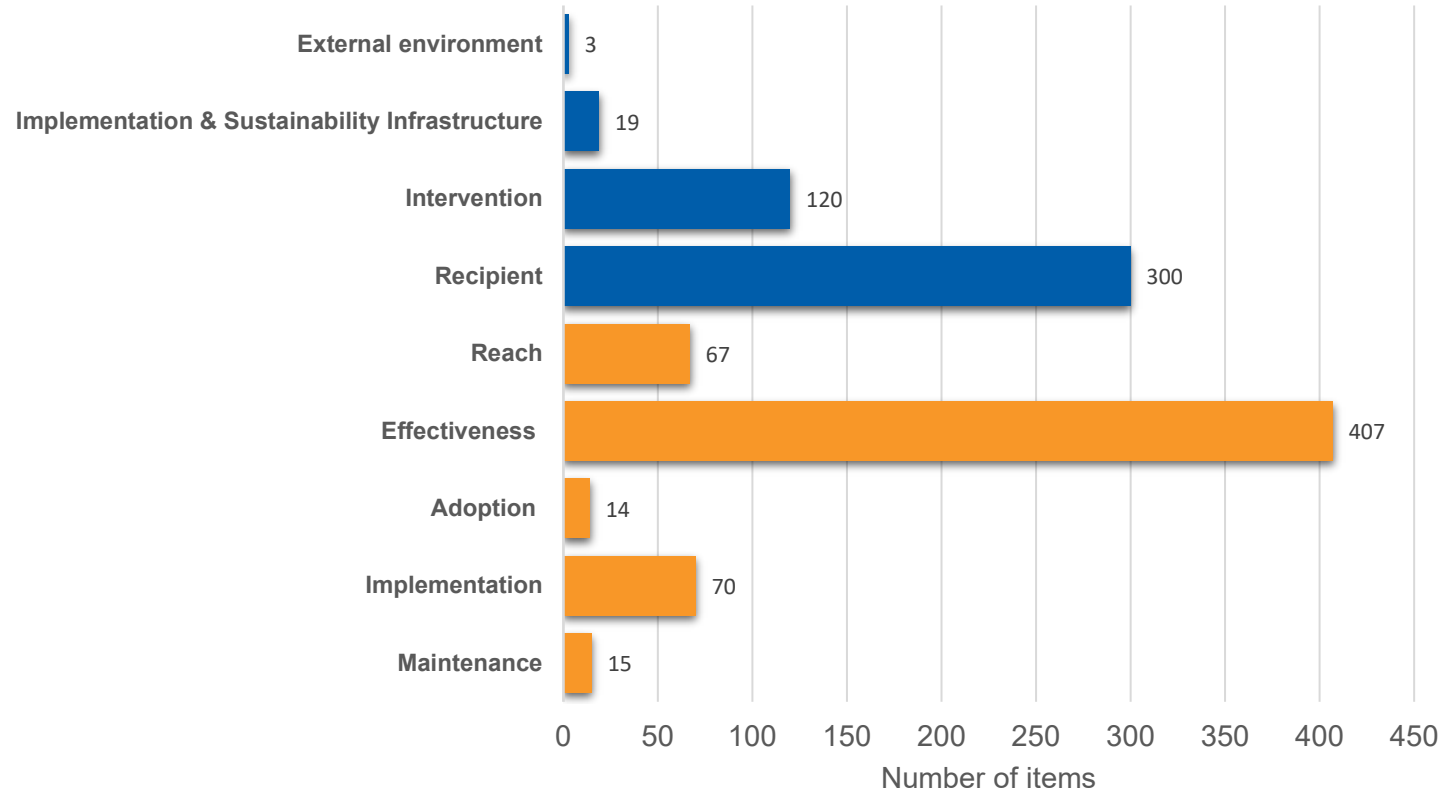


(Former) MDCPS Superintendent, Alberto Carvalho (center), and the Board of Education

Adapted PRISM



Number of items for PRISM Context Domains and RE-AIM Outcomes*



*Items can address more than one construct and may be double counted.

Final thought ...



Systematic methods and team science are needed to better understand and address complex future of work challenges



Implementation science moves workplace safety and health forward, putting effective interventions into practice, fitting end user needs, enhancing equity, sustaining actions, and having a positive impact

Learn more



Artwork for the NIOSH *Youth@Work-Talking Safety*
curriculum by Chi-Yun Lau



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journal homepage: www.elsevier.com/locate/safety



Review

Methods to improve the translation of evidence-based interventions: A primer on dissemination and implementation science for occupational safety and health researchers and practitioners



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Commentary

Dissemination and Implementation Science Approaches for Occupational Safety and Health Research: Implications for Advancing Total Worker Health

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Thomas R. Cunningham ¹, Megan R. TePoel ⁶, Megan Parish ⁷ and Russell E. Glasgow ⁵



Citation: Guerin, R.J.; Harden, S.M.; Rabin, B.A.; Rohlman, D.S.; Cunningham, T.R.; TePoel, M.R.; Parish, M.; Glasgow, R.E.

Dissemination and Implementation Science Approaches for Occupational Safety and Health Research: Implications for Advancing Total Worker Health. *Int. J. Environ. Res. Public Health* **2021**, *18*, 11050. <https://doi.org/10.3390/ijerph182111050>

Academic Editors: Paul B. Tchounwou and Giulio Arzangeli

Received: 7 August 2021

Accepted: 14 October 2021

Published: 21 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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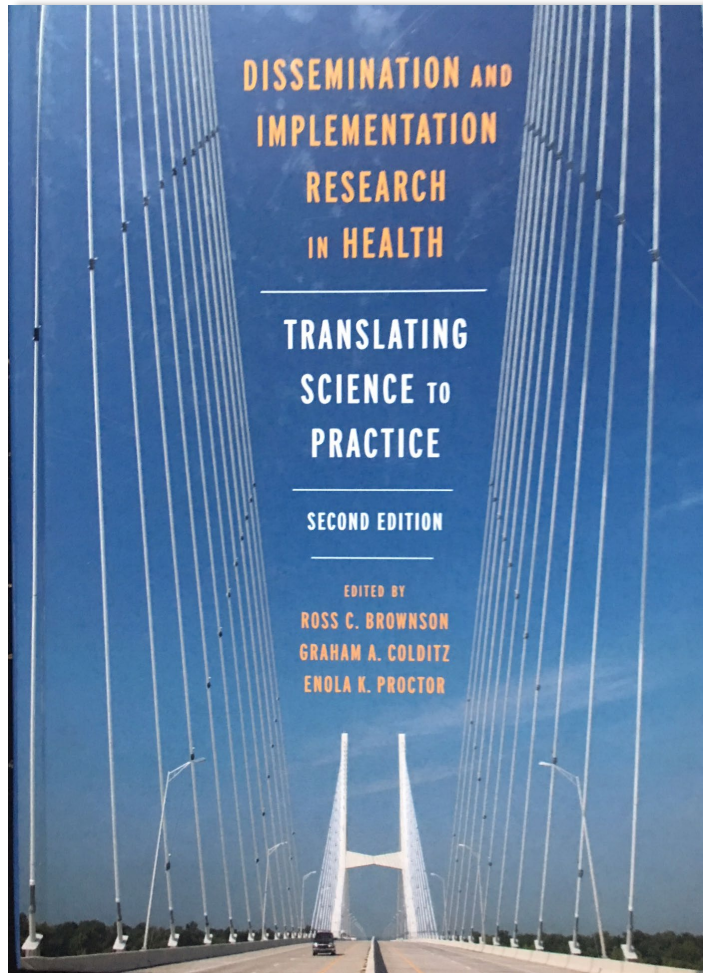
⁶ Occupational and Environmental Health, University of Iowa, 145 N. Riverside Drive, Iowa City, IA 52245, USA; diane-rohlman@uiowa.edu (D.S.R.); megan-tepoel@uiowa.edu (M.R.T.)

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Abstract: Total Worker Health[®] (TWH), an initiative of the U.S. National Institute for Occupational Safety and Health, is defined as policies, programs, and practices that integrate protection from work-related health and safety hazards by promoting efforts that advance worker well-being. Interventions that apply the TWH paradigm improve workplace health more rapidly than wellness programs alone. Evidence of the barriers and facilitators to the adoption, implementation, and long-term maintenance of TWH programs is limited. Dissemination and implementation (D&I) science, the study of methods and strategies for bridging the gap between public health research and practice, can help address these system-, setting-, and worker-level factors to increase the uptake, impact, and sustainment of TWH activities. The purpose of this paper is to draw upon a synthesis of existing D&I science literature to provide TWH researchers and practitioners with: (1) an overview of D&I science; (2) a plain language explanation of key concepts in D&I science; (3) a case study example of moving a TWH intervention down the research-to-practice pipeline; and (4) a discussion of future opportunities for conducting D&I science in complex and dynamic workplace settings to increase worker safety, health, and well-being.

Keywords: dissemination and implementation science; Total Worker Health; translational science; occupational safety and health; evidence-based interventions; health equity



Third edition includes a chapter on dissemination and implementation research in occupational safety and health!



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Glasgow et al (2019). RE-AIM Planning and Evaluation Framework: 20-Year Review. *Front Public Health*, 7, 64. <https://doi.org/10.3389>

Holtrop et al. (2021) Understanding and applying the RE-AIM framework *J Clinical Translat Sci*, page 1 of 10.

<https://doi.org/10.1017/cts.2021.789>

Special issue *Front PH*- 13 articles <https://www.frontiersin.org/research-topics/10170/>

Additional Resources at www.re-aim.org

Questions?



rguerin@cdc.gov

For more information, contact CDC
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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

