Evaluation in Implementation Science

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Objectives

- At the end of today's lecture, the learner will be able to;
  - Define implementation monitoring and describe its importance in D&I research
  - List the components of implementation monitoring
  - Define measurement terminology
  - Identify important constructs to measure in D&I research
  - Demonstrate understanding of implementation monitoring and measurement in the context of a grant application

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What is evaluation, really?

- There are three primary evaluation types to be considered.
  - Process, impact, and outcome
- Process evaluation is a combination of formative evaluation and implementation monitoring
  - Formative evaluation typically occurs before the start of the intervention, and the data generated are used to improve the design of the intervention and evaluation
  - Implementation monitoring is conducted during the delivery of the intervention to determine if the intervention is being delivered as designed, and to identify areas for improvement
- Impact and outcome evaluations allow researchers to identify markers of success for interventions (e.g., behavior change, improvement in markers of health)

Moore JB, Oniffrey TM, Singletary CR, Maddock JE. Evaluation of Physical Activity Interventions: Impact, Outcome, and Cost Evaluations. In: Bornstein DB, Eyler AA, Maddock JE, Moore JB, eds. Physical Activity and Public Health Practice. Springer Publishing Company; 2019.

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Impact evaluation

- Impact evaluation should encompass all aspects of the intervention setting and target population that can be expected to change in response to intervention activities
- These include;
  - Knowledge
  - Skills
  - Attitudes
  - Policies
  - Systems
  - Environments
  - Behaviors
  - Costs

Moore JB, Oniffrey TM, Singletary CR, Maddock JE. Evaluation of Physical Activity Interventions: Impact, Outcome, and Cost Evaluations. In: Bornstein DB, Eyler AA, Maddock JE, Moore JB, eds. Physical Activity and Public Health Practice. Springer Publishing Company; 2019.

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What is implementation monitoring?

- Implementation monitoring can be thought of as the measurement of what is actually happening during an intervention compared to what is supposed to be happening in an intervention.

- Implementation monitoring is one of the most important components of of a comprehensive evaluation plan, since summative evaluation results are often less encouraging than one initially hopes.

Saunders RP, Evans MH, Joshi P. Developing a process-evaluation plan for assessing health promotion program implementation: a how-to guide. *Health Promot Pract.* 2005;6(2):134-147.

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Why conduct implementation monitoring?

- Implementation monitoring can provide information about the quality of the implementation of the intervention so that necessary adjustments can be made during the delivery of the intervention.

- Implementation monitoring data can answer a crucial question for programs that are ineffective or less effective than expected.
  - Specifically, was the failure attributable to a failure of the intervention or a failure of the implementation?

- Implementation monitoring can be useful even when the intervention is a success, as it can highlight aspects of the intervention that were necessarily modified to implement the program.

Planning for implementation monitoring

- Ultimately, implementation monitoring can be reduced to one thing: what was supposed to be done versus what was actually done.

- Implementation monitoring should start with a clear, documented understanding of what the intervention should be under ideal circumstances.

The Gold Standard

- In popular use, the term 'gold standard' has become synonymous with the prototypical or exemplar version of something to which other variations are compared.

- For the purposes of implementation monitoring, it is the "complete and acceptable" implementation of a specific program.

- Comprised of reach, adoption, fidelity, dose, and context.

Reach

- This can be thought of as the target audience (all possible participants) of the intervention in the broadest sense.
- It should be considered from a participant, site, and "intervention agent" (i.e., those who deliver the intervention) level.

Adoption

- Very similar to Reach, adoption is the proportion of the target audience (those Reach-ed) who agree to participate.

- Again, it should be considered from a participant, site, and intervention agent perspectives.

Fidelity

- The most complex component of establishing the gold standard that you will use to measure and compare your intervention.

- Fidelity results from the comparison of the activities that were conducted versus those that were planned.

- To make this comparison, one must have a complete checklist of measurable activities that constitute complete delivery.

Dose (delivered and received)

- Closely related to fidelity are the dose delivered and the dose received.

- These should be thought about from both from the perspective of the participant and the intervention agent.

Context

- Often overlooked, context (i.e., the physical, social, and policy environments) can be very important to understanding the other data collected during implementation monitoring.

- Without assessing context, these important moderators of the program's effectiveness would be misattributed or overlooked completely.

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Role of theory

- Ideally, theory (or a conceptual framework) should inform the intervention that you are implementing, and should be observable in the activities of the intervention

Role of stakeholders

- When possible, stakeholders should be involved in the development of an implementation monitoring plan.

- Since implementation monitoring often seeks to assess the quantity and quality of programmatic activities and participant engagement in these activities, designing an effective implementation monitoring plan requires an intimate knowledge of the activities being delivered.

Objectives

- While objectives should drive the impact evaluation for an intervention, they can also be very useful for implementation monitoring, as they can help quantify the components of interest for ideal and complete implementation.
  - These might include aspects such as the number and type of environmental changes, the number of sessions to be delivered, provision of equipment, or any number of other necessary ingredients for success of an intervention.

Data Sources - Qualitative Versus Quantitative

- The type of data to be collected should *always* be tied to the objectives and driven by their formatting and characteristics.

- Data collection should *never* drive the choice of objectives, which would result in squandered resources and data with little to no utility.

Sampling

- As with other types of evaluation, it is important to develop a strategy that will capture a representative sample of the sites and intervention agents.

- Unless a project is very small (e.g., one site), it is unlikely that implementation monitoring will be conducted in the same manner at all locations at all times.

Barriers To Effective Implementation Monitoring

- The most common barrier to effective evaluation is a lack of human and financial resources.

- It is important to prioritize objectives so that the most important implementation constructs are assessed at the expense of those that would be nice to have, but a lack of resources prevents inclusion of low-priority constructs and objectives.

Conducting implementation monitoring

- The day to day conduct of intervention monitoring will depend on a number of factors including;
  - who will be conducting the monitoring
  - the role of technology in the monitoring and storage of the data
  - availability of staffing
  - the speed at which the monitoring results need to be returned to the intervention team
- One of the key tradeoffs when designing an implementation monitoring plan is whether data will be provided directly from participants, intervention agents, evaluation staff, or some combination of those sources.

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Data management

- A good data management plan will identify the roles and responsibilities of the staff (e.g., who will enter the data), detail how the data will be stored, how and when data will be backed-up, how the data will be retrieved, and how documentation will occur and be stored.

- At a minimum, guidelines should be written to detail how files/versions will be named, how data should be entered and by whom, and how regularly they will be entered/reported.

How do you put this in a grant application?

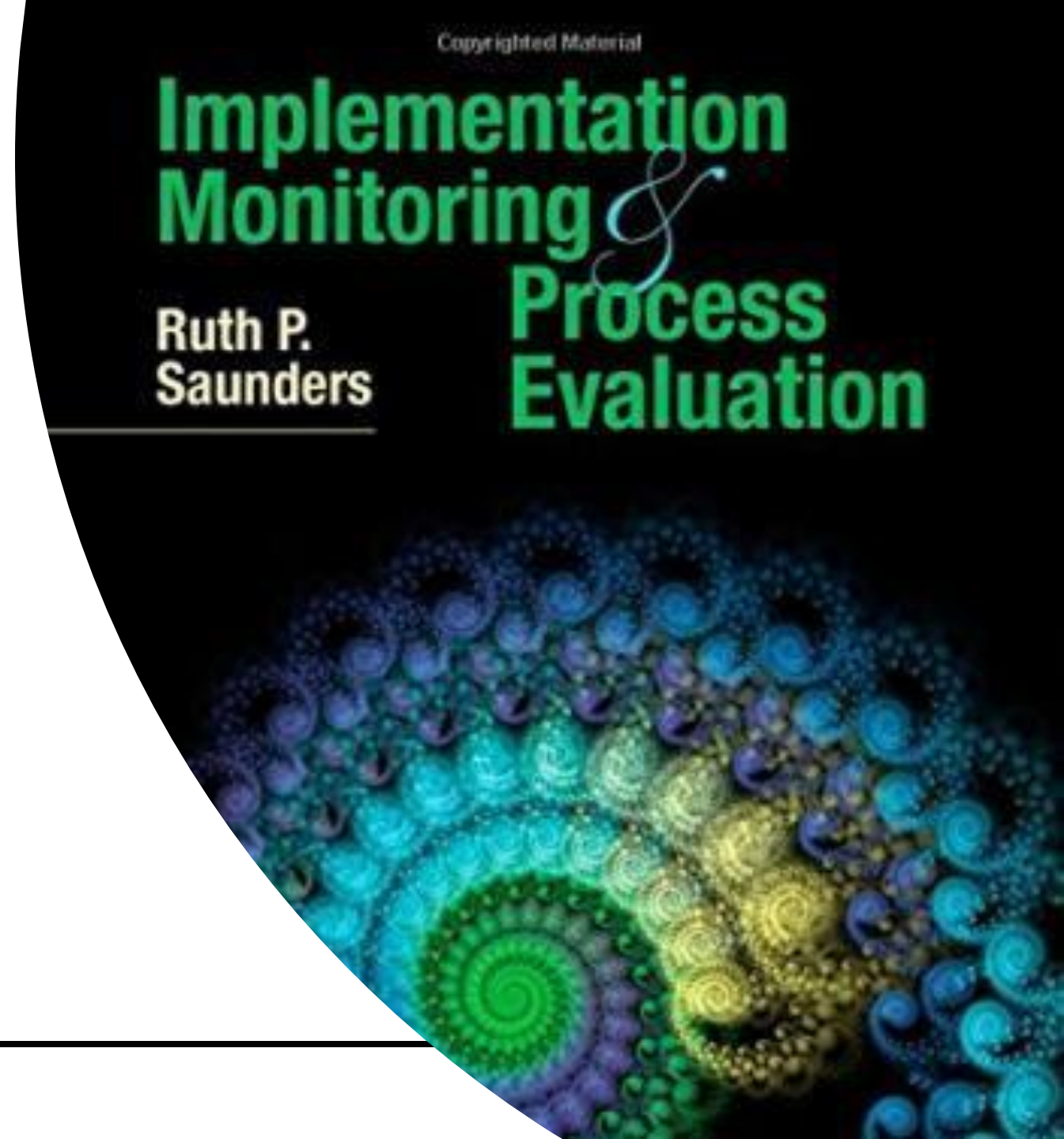**Table 7. Description of measures** *(I refers to Implementation Indicators for the Specific Aims)*

Aim	Data Source	I	Variable	Measure	Reference	Procedures/Description of Measure	Outcome
Aim 1		●	ASP PA Environmental Characteristics	Healthy Afterschool Activity and Nutrition Document (HAAND; PA items only).	[151]	Assess the activity promoting environments in each ASP program. Systematic review of publically available documents and interviews with ASP site leaders for policies and/or language related to PA, current practices, curriculum, and evaluation of activity.	Overall site-level measure of the quality of the ASP environment to promote PA.
Aim 3	**Site level**	●	ASP leadership	Qualitative interviews with ASP leaders.	[162]	Key informant interviews with ASP leadership and staff related to implementation.	Description of the process to establish and successful implementation.
Aim 1		●	Schedule of Activities	Review of weekly ASP schedule.	Developed by Co-Is	Modified version of the afterschool session observation system	Describe occurrence of scheduled time for PA.
Aim 1		●	Environmental support for PA	SOPLAY.	[163,164]	Identification of locations for PA to take place, presence of portable (eg, balls) and fixed (eg, swings) equipment for PA.	Site level indicator of supportive environment for PA.
Aim 2			Cost of Intervention Implementation	Actual costs determined during procurement, ASP records.	[165,166]	Costs include hourly wages for trainers (training and traveling time to and from on-site trainings and booster sessions), and time dedicated to phone calls, emails, and other forms of technical support; the wages for program leaders and staff to attend the trainings and booster sessions; and the mileage reimbursement for any travel associated with the trained facilitator, ASP leaders, or staff. Cost also include equipment, training materials, and other curricular resources as appropriate.	Costs associated with implementation of the intervention components.
Aim 3	**ASP Leader**	●	Perceptions of Policies and Practices	Qualitative semi-structured interview.	[167]	Key informant interviews with each ASP leader.	ASP leader support for curricula (intervention) adoption.
Aim 3	**ASP Staff**	●	Professional development training	Self-report post-training.	Developed by Co-I	Satisfaction.	Quality of training.

Things to consider

- Find a way to stay organized that works for you. It is of the utmost importance to maintain a clear view and command of the many moving parts during implementation monitoring.
- Be mindful to continuously document in detail all monitoring events and procedures. Data collected during implementation monitoring can reveal weaknesses in intervention delivery and lead to adjustments in implementation to improve the intervention.
  - All changes need to be documented to inform all other monitoring activities extending from those changes as you move forward with the evaluation.
- Always have a back up plan. It never fails, when things are busiest, that your plans will come to a halt due to weather, electronics with dead batteries, a lack of pens, or staff calling out sick.

For further reading

- Saunders RP. Implementation monitoring and process evaluation. Sage Publications; 2015.

Measurement in Dissemination & Implementation Research

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Implementation outcomes

- **Acceptability**: Extent to which implementation stakeholders perceive a treatment, service, practice, or innovation to be agreeable, palatable, or satisfactory.

- **Adoption**: Intention, initial decision, or action to try or employ an innovation or evidence-based practice.

- **Appropriateness**: Perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation or evidence-based practice to address a particular issue.

- **Cost**: Financial impact of an implementation effort. May include costs of treatment delivery, cost of the implementation strategy, and cost of using the service setting.

- **Feasibility**: Extent to which a new innovation or practice can be successfully used or carried out within a given setting.

- **Fidelity**: Degree to which an intervention or implementation strategy was delivered as prescribed in the original protocol or as intended by program developers.

- **Penetration**: Extent to which an innovation or practice is integrated within a service setting and its subsystems.

- **Sustainability**: Extent to which a recently implemented practice is maintained within a setting's ongoing, stable operations.

Gerke, D., Lewis, E., Prusaczyk, B., Hanley, C., Baumann, A., & Proctor, E. Implementation Outcomes. [Internet]. St. Louis, MO: Washington University; 2017 July. Eight toolkits related to Dissemination and Implementation. Available from https://sites.wustl.edu/wudandi

Implementation Outcome	Other Terms	Example Articles with Measures
Acceptability	• satisfaction	• Van Schaik, P., Bettany-Saltikov, J. A., & Warren, J. G. (2002). Clinical acceptance of a low-cost portable system for postural assessment. *Behaviour & Information Technology*, 21(1), 47-57. • Haddad, M., Walters, P., & Tylee, A. (2007). District nursing staff and depression: a psychometric evaluation of Depression Attitude Questionnaire findings. *International journal of nursing studies*, 44(3), 447-456.
Adoption	• uptake • utilization • initial implementation • intention to try	• Aarons, G. A. (2004). Mental health provider attitudes toward adoption of evidence-based practice: The Evidence-Based Practice Attitude Scale (EBPAS). *Mental health services research*, 6(2), 61-74.
Appropriateness	• perceived fit • relevance • compatibility • suitability • usefulness • practicability	• Sheppard, M., McDonald, P., & Welbourne, P. (2010). The Parent Concerns Questionnaire and Parenting Stress Index: comparison of two Common Assessment Framework-compatible assessment instruments. *Child & Family Social Work*, 15(3), 345-356.
Cost	• marginal cost • cost-effectiveness • cost-benefit	• Mdege, N. D., Chindove, S., & Ali, S. (2012). The effectiveness and cost implications of task-shifting in the delivery of antiretroviral therapy to HIV-infected patients: a systematic review. *Health policy and planning*, czs058.

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Implementation Outcome	Other Terms	Example Articles with Measures
Feasibility	• actual fit or utility • suitability for everyday use • practicability	• Roth, M. T., Watson, L. C., Esserman, D. A., Ivey, J. L., Hansen, R., Lewis, C. L., & Weinberger, M. (2009). Methodology of a pilot study to improve the quality of medication use in older adults: Enhancing Quality in Psychiatry Using Pharmacists (EQUIPP). *The American journal of geriatric pharmacotherapy*,7(6), 362-372. • Galukande, M., Kaggwa, S., Sekimpi, P., Kakaire, O., Katamba, A., Munabi, I., ... & Luboga, S. (2013). Use of surgical task shifting to scale up essential surgical services: a feasibility analysis at facility level in Uganda. *BMC health services research*, 13(1), 292.
Fidelity	• delivered as intended • adherence • integrity • quality of program delivery	• Cross, W., West, J., Wyman, P. A., Schmeelk-Cone, K., Xia, Y., Tu, X., ... & Forgatch, M. (2015). Observational measures of implementer fidelity for a school-based preventive intervention: development, reliability, and validity.*Prevention Science*, 16(1), 122-132.
Penetration	• level of institutionalization • spread • service access	• Langabeer 2nd, J. R., & Worthington, D. J. (2009). Operations research diffusion in health care management. *Journal of health care finance*, 36(3), 73-87.
Sustainability	• maintenance • continuation • durability • incorporation • integration • institutionalization • sustained use • routinization	• Luke, D. A. (2014). The Program Sustainability Assessment Tool: a new instrument for public health programs. *Preventing chronic disease*, 11.

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Organizational constructs important for D&I research

- **Organizational Readiness for Change**: Organizational members' shared commitment to implement a change and belief in their collective capability to do so.

- **Organizational Culture**: The set of expectations and norms that influence behavior within an organization

- **Organizational Climate**: Employees' collective perceptions of the psychological impact of their work environment on their own functioning and well-being

- **Implementation Climate**: The extent to which employees collectively perceive that the adoption, implementation, and use of an innovation such as an evidence-based program or practice is expected, rewarded, and supported by the organization.

Ramsey, A., Lawrence, K., Prusaczyk, B., Baumann, A., Kryzer, E., & Proctor, E. Organizational Measures. [Internet]. St. Louis, MO: Washington University; 2016 October. Eight toolkits related to Dissemination and Implementation. Available from https://sites.wustl.edu/wudandi

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Example measures

Tool Name	Psychometric Properties and Subscales	Settings/Samples	Original Source	Study Using Tool
Organizational Readiness for Change				
Organizational Readiness for Implementing Change (ORIC)	Total scale: N/A Subscales: Change commitment scale (α = .91-.92) Change efficacy scale (α = .88-.89)	Hospitals, international non-governmental organizations	Shea, C. M., Jacobs, S. R., Esserman, D. A., Bruce, K., & Weiner, B. J. (2014).	Wu, R. R., Kinsinger, L. S., Provenzale, D., King, H. A., Akerly, P., Barnes, L. K., … & Jackson, G. L. (2014).
Organizational Culture				
Organizational Culture Domain from the Organizational Social Context (OSC) Scale	Total scale: α = .71-.90 Subscales: Rigidity (α = .81), Proficiency (α = .94), Resistance (α = .81)	Medical clinics, mental health agencies	Glisson, C. (2007).	Aarons, G. A., Glisson, C., Green, P. D., Hoagwood, K., Kelleher, K. J., & Landsverk, J. A. (2012).
Organizational Climate				
Organizational Climate Domain from the Organizational Social Context (OSC) Scale	Total scale: α = .72-.91 Subscales: Stress (α = .94), Engagement (α = .78), Functionality (α = .90)	Medical clinics, mental health agencies	Glisson, C. (2007).	Aarons, G. A., Glisson, C., Green, P. D., Hoagwood, K., Kelleher, K. J., & Landsverk, J. A. (2012).

Ramsey, A., Lawrence, K., Prusaczyk, B., Baumann, A., Kryzer, E., & Proctor, E. Organizational Measures. [Internet]. St. Louis, MO: Washington University; 2016 October. Eight toolkits related to Dissemination and Implementation. Available from https://sites.wustl.edu/wudandi

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Resources

Useful links

- Grid-Enabled Measures Database

  - https://www.gem-measures.org/public/home.aspx

- NIH Sites

  - https://www.pcori.org/research-results/dissemination-and-implementation/dissemination-and-implementation-framework-and

  - https://cancercontrol.cancer.gov/IS/index.html

  - https://www.fic.nih.gov/About/center-global-health-studies/neuroscience-implementation-toolkit/Pages/default.aspx

- University Sites

  - http://impsciuw.org/

  - https://impsci.tracs.unc.edu/

  - https://sites.wustl.edu/wudandi/

- A Systematic Review and Synthesis of Implementation Science Instruments (membership required)

  - https://societyforimplementationresearchcollaboration.org/sirc-instrument-project/

Measurement Science in D&I

- Various initiatives attempting to harmonize, standardize and improve the rigor of measurement. A few of the most widely known are…

  - [NCIs Grid-Enabled Measures Portal (GEM)—public](#)

  - [Comprehensive Review of D&I Science Instruments by SIRC (Seattle Implementation Research Conference)—must subscribe](#)

  - [Quality Enhancement Research Initiative (QUERI)](#)

    - Lewis et al (2018). An updated protocol for a systematic review of implementation-related measures. Systematic Reviews, 2018 7:66. https://doi.org/10.1186/s13643-018-0728-3

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GEM Grid-Enabled Measures Database

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Welcome to GEM, a web-based collaborative tool containing behavioral, social science, and other relevant scientific measures.

The goal of GEM is to support and encourage a community of users to drive consensus on best measures and share the resulting data from use of those measures.

GEM enables users to:

- Add constructs or measures to the database
- Contribute to and update existing information (metadata) about constructs and measures
- Rate and comment on measures to drive consensus on best measures
- Access and share harmonized data
- Search for and download measures

Learn more about GEM

| ▼ Community News | ▲ Recent Additions |

Check out the Team Science Toolkit blog about GEM

See a recent blog by Richard Moser and Kisha Coa about how GEM can be used to facilitate team science on the Team Science Toolkit website (https://www.teamsciencetoolkit.cancer.gov). Make sure to explore this helpful site that has information and... *More*

Click here to read the blog

Inaugural GEM-inar! GEM Care Planning: Advancing Survivorship Care Planning

In case you missed it, click the link below to watch the first GEM-inar that highlights real-world application and use of GEM. NCI's Carly Perry, PhD, MA, MSW and University of Pittsburgh's Ellen Beckjord, PhD, MPH presented on the GEM-Care... *More*

Click here to watch the Gem-inar

More Community News

Recent Workspaces
Customizable virtual areas to collaborate on a specific project

- **Smoking Cessation at Lung Examination (SCALE) Collaboration Special Collection**
  The Smoking Cessation at Lung Examination (SCALE)... *More*

- **Assessment of Cancer Patient Symptoms and Needs**
  The primary aim of the Assessment of Cancer Patient... *More*

- **ACRM Cancer Rehabilitation Research Outcomes Project**
  The primary aim of the ACRM Cancer Rehabilitation Research... *More*

- **CaPTC-AC3-MADCaP Consortia**

My Subscriptions

Login to receive updates on constructs, measures, data, and workspaces.

I want to know more…

- NC TRaCS Institute Dissemination & Implementation Portal (full of great resources)
  - https://impsci.tracs.unc.edu/
- Society for Implementation Research Collaboration (SIRC)
  - https://societyforimplementationresearchcollaboration.org/
- Quality Enhancement Research Initiative within the VA
  - https://www.queri.research.va.gov/implementation/default.cfm
- Archived Webinars on Implementation Science
  - https://cyberseminar.cancercontrolplanet.org/implementationscience/
- NCI Div of Population Sciences, Div of Cancer Control & Population Sciences Implementation Science
  - https://cancercontrol.cancer.gov/is/
  - Grid-Enabled Measures Database: https://www.gem-beta.org/Public/Home.aspx
- NCIs Research to Reality
  - https://researchtoreality.cancer.gov/

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Systematic reviews of implementation science instruments

- Measuring team factors thought to influence the success of quality improvement in primary care: a systematic review of instruments (Brennan et al., 2013)

- Dissemination and Implementation Measurement Compendium: A Systematic Review of Structural, Organizational, Provider, Patient, and Innovation Level Measures (Chaudoir, Dugan & Barr, n.d.)

- Outcomes for implementation science: an enhanced systematic review of instruments using evidence-based rating criteria (Lewis, Fischer, Weiner, Stanick, Kim & Martinez, 2015)

- Measures for Predictors of Innovation Adoption (Chor, Wisdom, Olin, Hoagwood & Horwitz, 2015)

- Systems Antecedents for Dissemination and Implementation: A Review and Analysis of Measures (Emmons, Weiner, Fernandez & Tu, 2012)

- A Systematic Review of Instruments to Assess Organizational Readiness for Knowledge Translation in Health Care (Gagnon, Attieh, Ghandour, Légaré, Ouimet, Estabrooks & Grimshaw, 2014)

Thank you.

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