

Evidence, and Evidence-Based Practices and Findings

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Introduction

The **Physical Activity Guidelines for Americans** has moved from evidence-informed in 2008 to evidence-based in the 2nd edition published in November 2018¹. An emphasis in the continuing education self-study course, **The “Evidence-Based” Physical Activity Guidelines for Americans (2nd edition)** (2018)², is to show how evidence was gathered, the findings and resulting guidelines for 1) physical activity and 2) health education/promotion to increase regular physical activity. This paper gives an overview of evidence used for interventions to avoid harm and improve health.

Importance of Using Evidence-Based Practices and Findings for CHES®, MCHES® and CPH

Evidence-based is emphasized because Certified Health Education Specialists (CHES®), the Master Certified Health Education Specialists (MCHES®) Certified in Public Health (CPH) and are expected to use **evidence-based practices**. “Evidence” and “evidence-based” are stated in three of the seven areas of responsibility of the Health Education Specialist Practice Analysis (HESPA) 2015 Competencies³ for CHES® and the MCHES®. And there are four sub-competencies (see bullet point items below, two competencies are “**Advance-1**,” for MCHES®) stating that CHES® and the MCHES® should identify, apply and use **evidence-based** findings. “Evidence” and “evidence-based” are stated six times in four of the 10 domain areas of the CPH Content Outline.⁴ **NOTE:** the term evidence-informed is not listed in the HESPA Responsibilities and Competencies or CPH Content Outline.

Health Education Specialist Practice Analysis (HESPA) 2015 Competencies

Area II: Plan Health Education/Promotion

- 2.3.3 Apply principles of **evidence-based practice** in selecting and/or designing strategies/interventions (Advance-1).

Area V: Administer and Manage Health Education/Promotion

- 5.4.2 Identify **evidence** to justify programs

Area VII: Communicate, Promote, and Advocate for Health, Health Education/Promotion and the Profession

- 7.3.5 Use **evidence-based findings** in policy analysis

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- 7.3.6 Develop policies to promote health using **evidence-based findings** (Advance-1)

The [Responsibilities and Competencies for Health Education Specialists](#) (web page) have [Areas of Responsibility, Competencies and Sub-competencies for Health Education Specialists 2015](#) (pdf, note color coding for **Advanced-1** and **Advanced-2**).

Certified in Public Health Content Outline

Domain Area: Evidence-based Approaches to Public Health

14. Apply **evidence-based** theories, concepts, and models from a range of social and behavioral disciplines in the development and evaluation of health programs, policies and interventions

Domain Area: Public Health Biology and Human Disease Risk

1. Apply **evidence-based** biological concepts to inform public health laws, policies, and regulations

Domain Area: Program Planning and Evaluation

10. Apply **evidence-based** practices to program planning, implementation and evaluation

13. Plan **evidence-based** interventions to meet established program goals and objectives

19. Use available **evidence** to inform effective teamwork and team-based practices

Domain Area: Policy in Public Health

5. Use scientific **evidence**, best practices, stakeholder input, or public opinion data to inform policy and program decision-making

Additionally, in 2001 Rimer, Glanz and Rasband⁵ described why using evidence-based practices is important. They wrote “Health educators and behavioral scientists should care about evidence-based practice. Our goal is to improve the health of the public. Given a shortage of resources, we must invest wisely in interventions that are most likely to work. Moreover, we do not want to harm people by knowingly exposing them to interventions that do not work, especially when there are proven effective strategies. Using interventions that evidence shows are ineffective not only wastes the resources invested in them but also crowds out alternative actions. The best interventions are those with the greatest chance of changing something that will make a desired difference.”

Types of Evidence

Anecdotal: Not “Evidence-Informed” or “Evidence-Based”

For comparisons, it may be useful to see descriptions of health promotion practice and findings that are not objective research evidence. Below are examples of how not evidence-based/informed might be described. Key text to consider noting are in **bold** and underlined.

From Richard Troiano, PhD (2008 PA Guidelines Advisory Committee member) GWU Grand Rounds presentation in 2008.⁶

“. . . public health practice . . . is moving towards a science-based, evidence-based paradigm **so that we don't just kind of do what we think is good**, but we really have a strong evidentiary base to support it.”

From US DHHS Office of Assistant Secretary for Planning and Evaluation⁷

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“In the absence of evidence-based interventions, and often even when evidence-based approaches exist, program operators frequently **rely primarily on their personal experiences and good intentions without careful consideration of related research evidence**. While past experience is valuable, ignoring existing evidence and developmental theory can lead to missed opportunities, unintended results, and inefficient progress.”

From International Union for **Health Promotion and Education**⁸

“The report concludes that programmes . . . are largely driven by **“informed guesswork, expert hunches, . . .”**¹¹

From the journal **Health Promotion Practice**⁹

“Evidence-based practice is an extension of evidence-based medicine, which moves from **“uninformed intuition, unsystematic clinical experience,** and pathophysiologic rationale” as the basis of clinical decision making, emphasizing instead the assessment of clinical research evidence.”

From article in journal **Health Education and Behavior**⁵

“Do we make decisions based on what does or does not “work” according to the evidence or based on tradition, intuition, precedent, and available resources? Would we replace what we *feel* works best with what we know is better, based on evidence?”

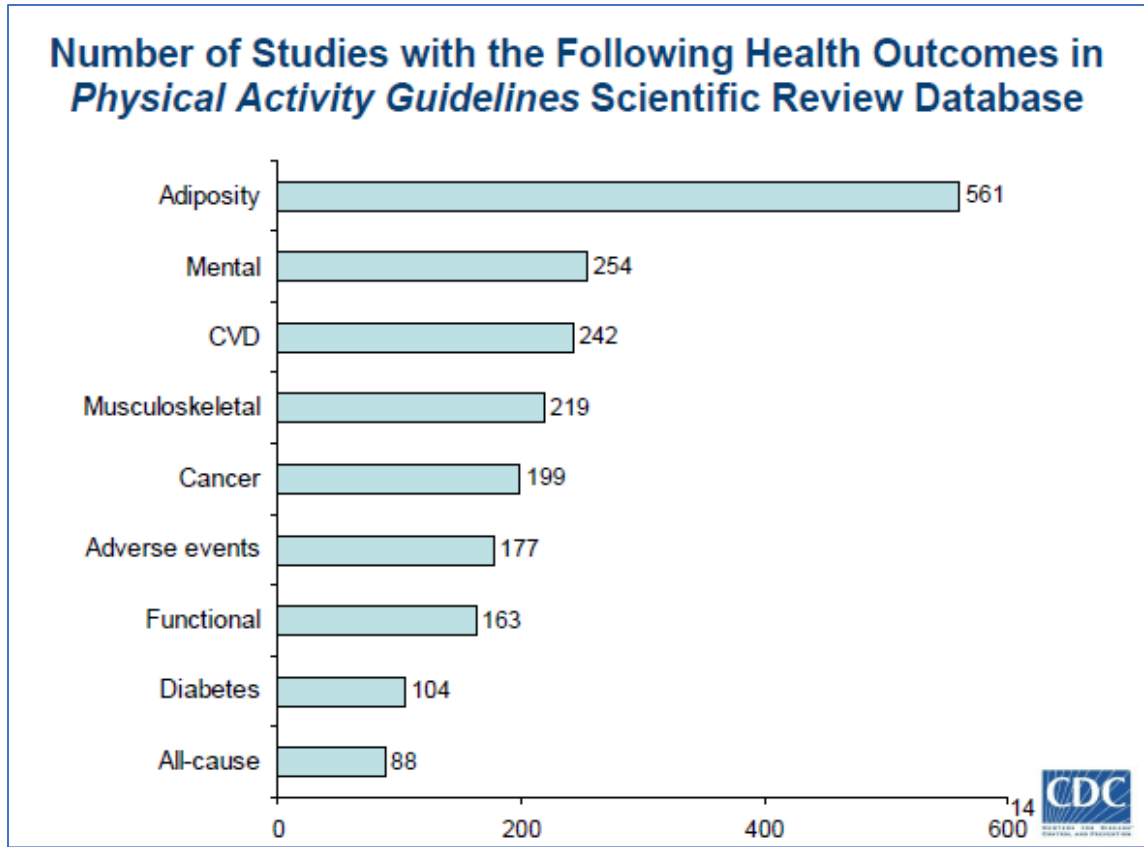
Evidence-Informed

Below are examples of how evidence-informed has been described. Key text to consider noting are in **bold** and **underlined**.

From Richard Troiano, PhD (2008 PA Guidelines Advisory Committee member) GWU Grand Rounds presentation in 2008.⁶

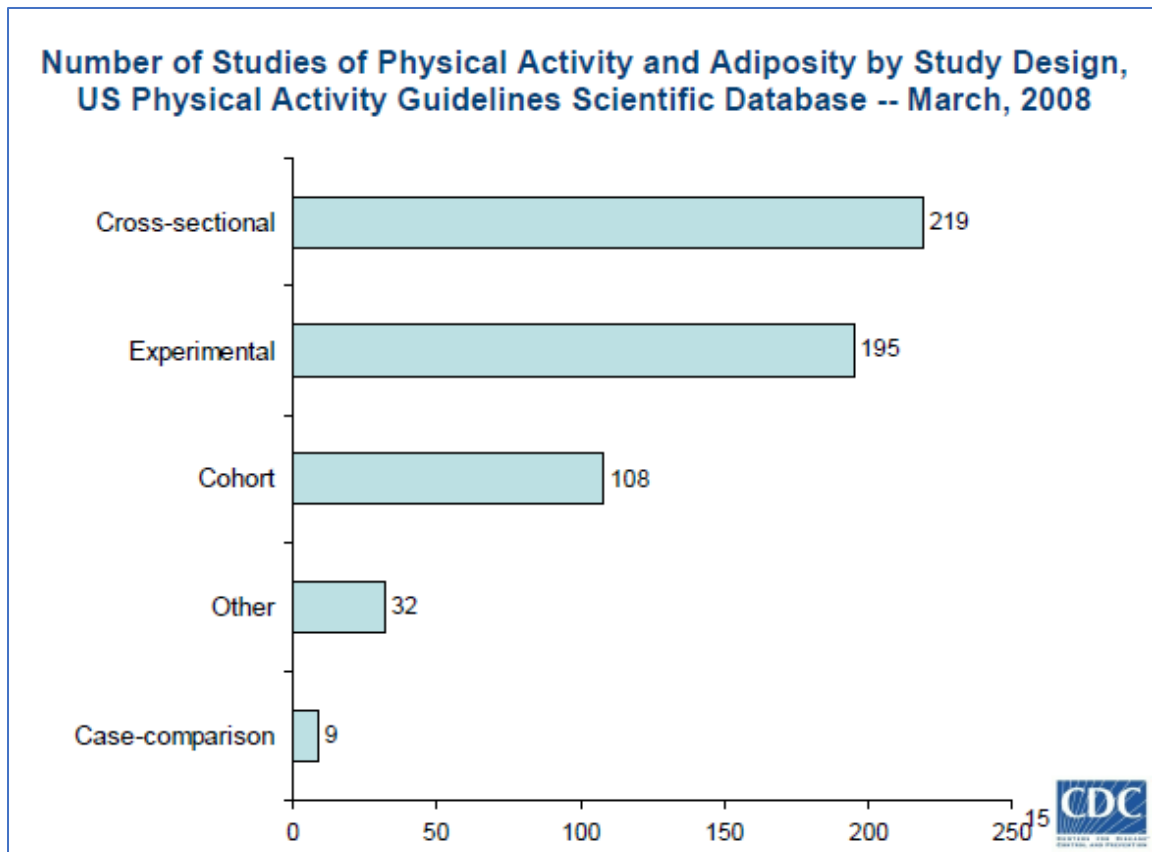
“The other thing, if we just look at those studies, those 560 studies on adiposity, you can see that there’s quite a variety of study designs incorporated in that number. This again reflects on why **we had to evolve to this evidence-informed** concept from an evidence-based concept. So out of the 560 studies, a little **less than 200 were experimental** but that is both randomized and non-randomized studies.

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So, if you took the drug trial model and said I'm only going to rely upon randomized control trials, when you're looking at behaviors, you really don't have much that you can go with. So, you really need to cast a wider net and realize the tradeoffs when you're looking at observational and cross-sectional studies, but they do have information to contribute."

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From National Alzheimer's and Dementia Resource Center (NADRC)^{10, 12}

For consideration as evidence-informed, an intervention must have

- substantial research evidence that demonstrates an ability to improve, maintain, or slow the decline in the health and functional status of older people or family caregivers.

Evidence-informed interventions

- (1) have been tested by at least one quasi-experimental design with a comparison group, with at least 50 participants; OR
- (2) have been adapted from evidence-based interventions.

From article in journal British Journal of Social Work¹¹

“Evidence-informed practice (EIP) should be understood as **excluding non-scientific prejudices and superstitions**, but also as leaving ample room for clinical experience as well as the constructive and imaginative judgements of practitioners and clients who are in constant interaction and dialogue with one another. . . . practitioners will become knowledgeable of a wide range of sources—empirical studies, case studies and clinical insights—and use them in creative ways throughout the intervention process.”

Evidence-Based

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Below are examples of how evidence-based has been described. Key text to consider noting are in **bold** and underlined.

From article in journal Health Education & Behavior⁵

. . . make **decisions based on what does . . . “work” according to the evidence** . . . replace what we *feel* works best with what we know is better, based on evidence?

“Jenicek called evidence-based public health **“the process of systematically finding, appraising, and using contemporaneous research findings as the basis for decisions in public health.”**”

From National Alzheimer’s and Dementia Resource Center (NADRC) and Administration on Community Living (ACL) to receive grants^{10, 12}

For consideration as evidence-based, an intervention must have

- **been tested through randomized controlled** trials and
 - (1) be effective at improving, maintaining, or slowing the decline in the health or functional status of older people or family caregivers;
 - (2) be suitable for deployment through community-based human services organizations and involve nonclinical workers or volunteers in the delivery of the intervention;
 - (3) have results published in a peer-reviewed scientific journal; and
 - (4) be translated into practice and ready for distribution through community-based human services organizations.

ACL Definition of **Evidence-Based Programs**

- Demonstrated through evaluation to be effective for improving the health and well-being or reducing disease, disability and/or injury among older adults; *and*
- Proven effective with older adult population, using Experimental or Quasi-Experimental Design;* *and*
- Research results published in a peer-review journal; *and*
- Fully translated** in one or more community site(s); *and*
- Includes developed dissemination products that are available to the public.

**Experimental designs use random assignment and a control group. Quasi-experimental designs do not use random assignment.*

***For purposes of the Title III-D definitions, being “fully translated in one or more community sites” means that the evidence-based program in question has been carried out at the community level (with fidelity to the published research) at least once before. Sites should only consider programs that have been shown to be effective within a real-world community setting.*

Note: ACL distinguishes between “evidence-based program” and “evidence-based service/practice.” Services and practices are within programs. See answer to question 8 of the

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Frequently Asked Questions on this page <https://acl.gov/programs/health-wellness/disease-prevention>. The “Resources” section on this page also gives three items for “Understanding and Finding Evidence-Based Programs.”

From Physical Activity Guidelines for Americans (2nd edition)¹³

Use “. . . a methodology informed by best practices for systematic reviews (SRs) developed by the United States Department of Agriculture’s (USDA) Nutrition Evidence Library (NEL),¹ the Agency for Healthcare Research and Quality (AHRQ),² the Cochrane Collaboration,³ and the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine SR standards to **review, evaluate, and synthesize published, peer-reviewed physical activity research**. The literature review team’s rigorous, protocol-driven methodology was designed to maximize transparency, minimize bias, and ensure the SRs conducted by the Committee were relevant, timely, and of high quality. Using this evidence-based approach enabled compliance with the Data Quality Act,⁵ which states that federal agencies must ensure the quality, objectivity, utility, and integrity of the information used to form federal guidance.”⁶

Steps to Finding Evidence

The techniques of evidence-based medicine involve these steps:¹⁴

- (a) asking research questions to precisely defining the patient or population problem and the information required to solve it,
- (b) conducting an efficient literature search,
- (c) selecting high-quality relevant studies,
- (d) applying rules of evidence to determine their validity,
- (e) describing the content of the study along with its strengths and weaknesses, and
- (f) extracting the health message for application to the problem.

The Physical Activity Guidelines for American Advisory Committee followed each of the steps listed below. It was instructed to examine the scientific literature. The [Executive Summary](#)¹⁵ states that the Committee conducted detailed searches of the scientific literature, evaluated and discussed at length the quality of the evidence, and developed conclusions based on the evidence as a whole. The Committee used state-of-the-art methods for systematic reviews to address 38 research questions and 104 subquestions. [Part E. Systematic Review Literature Search Methodology](#)¹⁶ details the process used are described approaches to reviewing research. Part E lists and describes the process as:

- Step 1: Develop systematic Review Questions
- Step 2: Develop Systematic Review Strategy
- Step 3: Search, Screen, and Select Evidence to Review
- Step 4: Abstract Data and Assess Quality and Risk of Bias
- Step 5: Describe the Evidence
- Step 6: Complete Evidence Portfolios and Draft Scientific Report

A set of steps to assess evidence is in CDC’s online tool, [Continuum of Evidence of Effectiveness](#).¹⁶ The Continuum of Evidence of Effectiveness clarifies and defines standards of the Best Available Research Evidence. In Understanding Evidence, the Continuum is applied specifically to the field of violence

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prevention, but it can be used to inform evidence-based decision-making in a wide range of health-related areas. Evidence is assessed from harmful and unsupported through well supported. The dimensions covered include:

- Effect (effectiveness) – effective through practice constitutes risk of harm
- Internal validity – true experimental design through no research and research with results of negative effect
- Types of evidence/research (randomized control and meta-analysis / systematic review) through anecdotal / Needs assessment and design with negative effect
- Independent replication – program replication with evaluation through possible replication / evaluation
- Implementation guidance – comprehensive through none or partial
- External and ecological validity – two or more studies with different settings through not real world and possible same or different settings

Questions in the assessment include:

1. Are there any indications from research or practice that this strategy has been associated with harmful effects?
2. Does the available research on this strategy include **two** or more well-conducted studies (Randomized Control Trials or Quasi-experimental designs)?
3. Have any of these studies shown significant effects in areas that you are concerned about?
4. Is the study you are reviewing a Randomized Control Trial?
5. Does the study you are reviewing use a Quasi-Experimental design?
6. Has the program or strategy been implemented in more than one setting?
7. Has the program or strategy been evaluated in almost exactly the same way in both of these settings?
8. Are any of the following formal systems in place to support implementation of the program or strategy?
9. If formal systems to support implementation are in place, are these resources available and accessible?
10. Has the program or strategy been implemented in two or more applied ("real world") settings?
11. Does the strategy include components that are consistent with an applied setting (i.e. uses materials and resources that would be available/appropriate in an applied setting)?
12. Has the strategy been implemented in ways that mirror conditions of the "real world" (in other words, delivered in ways that it would have to be delivered in real world settings)?

Click on the image of the ASSESSMENT tool on the next page to go to the web page with the assessment. The link is <https://vetoviolence.cdc.gov/apps/evidence/continuumIntro.aspx#&panel1-8>.

NOTE: the tool may work best with the Microsoft Edge browser. The tool uses Adobe Flash Player which may need to be installed on your computer if you find the highlighted boxes don't appear after completing the assessment.

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You can click through and answer the questions without having to login, use as a Guest. Once you complete the assessment several colored (green, brown, purple, etc.) boxes should be white showing you where your answers mapped to each dimension. This will give you an indicator of the strength of evidence informing the various aspects of the strategy you are considering. Click on the white boxes to learn more about your results.

	Well Supported	Supported	Promising Direction / Emerging / Undetermined More Research Needed			Unsupported	Harmful
Effect	Found to be effective		Some evidence of effectiveness	Expected preventive effect	Effect is undetermined	Ineffective	Practice constitutes risk of harm
Internal validity	True experimental design	Quasi-experimental design	Non-experimental design	Sound theory only	No research No sound theory	True or quasi-experimental design	Any design with results indicating negative effect
Type of evidence/research design	Randomized control trials and meta-analysis / systematic review	Quasi-experimental design	Single group design	Exploratory study	Anecdotal / Needs assessment	Randomized control trials or quasi-experimental design	Any design with results indicating negative effect
Independent replication	Program replication with evaluation replication		Program replication without evaluation replication	Partial program replication without evaluation replication		Program replication with evaluation replication	Possible program replication with / evaluation replication
Implementation guidance	Comprehensive		Partial	None		Comprehensive	Comprehensive / partial
External and ecological validity	Applied studies - different settings (2+)	Applied studies - similar settings (2+)	Real-world informed	Somewhat real-world informed	Not real-world informed	Applied studies - same / different settings	Possible applied studies - similar / different settings

START ASSESSMENT ▶

	Well Supported	Supported	Promising Direction / Emerging / Undetermined More Research Needed			Unsupported	Harmful
Effect	Found to be effective		Some evidence of effectiveness	Expected preventive effect	Effect is undetermined	Ineffective	Practice constitutes risk of harm
Internal validity	True experimental design	Quasi-experimental design	Non-experimental design	Sound theory only	No research No sound theory	True or quasi-experimental design	Any design with results indicating negative effect
Type of evidence/research design	Randomized control trials and meta-analysis / systematic review	Quasi-experimental design	Single group design	Exploratory study	Anecdotal / Needs assessment	Randomized control trials or quasi-experimental design	Any design with results indicating negative effect
Independent replication	Program replication with evaluation replication		Program replication without evaluation replication	Partial program replication without evaluation replication		Program replication with evaluation replication	Possible program replication with / evaluation replication
Implementation guidance	Comprehensive		Partial	None		Comprehensive	Comprehensive / partial
External and ecological validity	Applied studies - different settings (2+)	Applied studies - similar settings (2+)	Real-world informed	Somewhat real-world informed	Not real-world informed	Applied studies - same / different settings	Possible applied studies - similar / different settings

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Reasons Evidence-Based May Not be Used

From keynote presentation: “Evidence-Based Public Health” for 2018 Nevada Public Health Association conference.¹⁷

- Formal training - <50% of public health workers
- No single credential or license required – but voluntary credentialing as Certified in Public Health, Certified Health Education Specialist, Master Certified Health Education Specialist
- Evidence-based practice needs multidisciplinary approach and needs multiple perspectives
- Interventions are based on: 1) political and media pressure, 2) anecdotal evidence, 3) “the way it’s always been done
- Barriers are: 1) lack of funds, skilled personnel, incentives, time; 2) limited buy-in from leadership and elected officials

From Pathways to “Evidence-Informed” Policy and Practice: A Framework for Action⁷

“ . . . hindered by a lack of good-quality, synthesized evidence, capacity to apply the evidence, and organizational support and resources to make evidence-based decisions.”

A Visual Description of Evidence: the Hierarchy of Evidence¹⁸

The hierarchy of evidence reflects the relative authority of the literature. Relative authority can be depicted in a pyramid format where the base of the pyramid includes research with the lowest quality of evidence (anecdotal) and the top of the pyramid with the highest quality of evidence (systematic review, meta-analyses and random control trials). Quality of evidence refers to the range of bias and opportunity for research to have systematic errors. For example, anecdotal or opinions and editorials can have a significant level of bias based on the author and their experience. On the other hand, randomized controlled trials or systematic reviews control for bias through prescribed study designs and represent the highest level of evidence.



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Summary

Rimer, Glanz and Rasband⁴, and the National Commission for Health Education Credentialing³ state that it is important for health educators and health promotion professionals to use evidence-based practices. There is a range of evidence to use for selecting and/or designing strategies/interventions and policies. Likely least effective and could harm and waste resources are interventions based on personal experiences, tradition, intuition, doing what is thought to be good, and lack of resources. Evidence-informed findings can provide support for interventions that could improve, maintain or slow decline in health. Application of evidence-informed findings may leave room for experience, and constructive and imaginative judgements. Interventions and policies from the process of asking research questions, using a systematic literature review strategy, assessing quality of data, describing the evidence and applying the evidence is the basis of evidence-based practices.

Thought / Critical Thinking Questions

Think of a group, committee, organization or health education/promotion team you might or do work with. Describe the group purpose, members' knowledge and experience, and your role (e.g., leader, topic expert, member).

For the group, team organization you described in the previous question and considering your role, how would you explain anecdotal, evidence-informed and evidence-based? How do you or might you influence the members to use evidence-based practices and findings for interventions, strategies, programs and policies.? Explain how do you or would you influence the members to use evidence-based practices and findings for strategies, programs and policies?

Glossary of Terms*

Anecdotal - evidence in the form of stories that people tell about what has happened to them.

Case-control study - A type of epidemiologic study design in which participants are selected based on the presence or absence of a specific outcome of interest, such as cancer or diabetes. The participant's past physical activity practices are assessed, and the association between past physical activity and presence of the outcome is determined.

Cross-sectional study - A type of epidemiologic study that compares and evaluates specific groups or populations at a single point in time.

Intervention - Any kind of planned activity or group of activities (including programs, policies, and laws) designed to prevent disease or injury or promote health in a group of people, about which a single summary conclusion can be drawn.

Observational study - A study in which outcomes are measured but no attempt is made to change the outcome. The two most commonly used designs for observational studies are case-control studies and prospective cohort studies.

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Prospective cohort study - A type of epidemiologic study in which the practices of the enrolled subjects are determined, and the subjects are followed (or observed) for the development of selected outcomes. It differs from randomized controlled trials in that the exposure is not assigned by the researchers.

Retrospective study - A study in which the outcomes have occurred before the study data collection has begun.

Fidelity - Fidelity is the degree to which a program, practice, or policy is conducted in the way that it was intended to be conducted. This is particularly important during replication, where fidelity is the extent to which a program, practice, or policy being conducted in a new setting mirrors the way it was conducted in its original setting.

Meta-analysis - A review of a focused question that follows rigorous methodological criteria and uses statistical techniques to combine data from studies on that question.

Quasi-experimental - Experiments based on sound theory, and typically have comparison groups (but no random assignment of participants to condition), and/or multiple measurement points (e.g., pre-post measures, longitudinal design).

Random Control Trial (RCT) –

From Physical Activity Guidelines for Americans: A type of study design in which participants are randomly grouped on the basis of an investigator-assigned exposure of interest, such as physical activity. For example, among a group of eligible participants, investigators may randomly assign them to exercise at three levels: no activity, moderate-intensity activity, and vigorous-intensity activity. The participants are then followed over time to assess the outcome of interest, such as change in abdominal fat.

From Understanding Evidence: A trial in which participants are assigned to control or experimental (receive strategy) groups at random, meaning that all members of the sample must have an equal chance of being selected for either the control or experimental groups (i.e., flipping a coin, where “heads” means participants are assigned to the control group and “tails” means they are assigned to the experimental group). This way, it can be assumed that the two groups are equivalent and there are no systematic differences between them, which increases the likelihood that any differences in outcomes are due to the program, practice, or policy and not some other variable(s) that the groups differ on.

Systematic Review -

From Physical Activity Guidelines for Americans: A review of a clearly defined question that uses systematic and explicit methods to identify, select, and critically evaluate relevant research, and to collect and analyze data from the studies included in the review.

From CDC’s Understanding Evidence: The assembly, critical appraisal, and synthesis of all relevant studies of a specific program, practice, or policy in order to assess its overall effectiveness, feasibility, and “best practices” in its implementation.

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* Most definitions are from the Physical Activity Guidelines for Americans (2nd edition) are available in the Scientific Report, Appendix H-1. Glossary of Term [PDF – 874 KB]
https://health.gov/paguidelines/second-edition/report/pdf/19_H_Appendix_1_Glossary_of_Terms.pdf.
CDC's Understanding Evidence definitions in its "Resources" web page
<https://vetoviolence.cdc.gov/apps/evidence/resourcesIntro.aspx#&panel1-7>. Scroll down to the box "GLOSSARY."

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Original and Current links for the mp3 audio and transcript



Transcript provided by kaisernetwork.org, a free service of the Kaiser Family Foundation¹
(Tip: Click on the binocular icon to search this document)

www.kaisernetwork.org/health_cast/hcast_index.cfm?display=detail&hc=3084
kaisernetwork.org/health_cast/uploaded_files/120908_gwu_troiana_transcript.pdf

- www.kaisernetwork.org no longer available –

Audio: www.healthedpartners.org/ceu/pag2nd/ei-eb/pag01_02_troiano_audio.mp3

Original Transcript: www.healthedpartners.org/ceu/pag2nd/ei-eb/pag01_02_troiano_transcript.pdf

PowerPoint: www.healthedpartners.org/ceu/pag2nd/ei-eb/pag01_02_troiano_powerpoint.pdf

Transcript with the audio's times of corresponding slides:

www.healthedpartners.org/ceu/pag2nd/ei-eb/pag01_02_troiano_transcript_with_slide_times.pdf

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Additional Resources

[Toolkit on Evidence-Based Programming for Seniors \(Community Research Center for Senior Health\)](#)

A comprehensive guide on finding and implementing evidence-based programs in a community setting. <http://www.evidencetoprograms.com/>

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[National Council on Aging Evidence-Based Program Resources](https://www.ncoa.org/center-for-healthy-aging/basics-of-evidence-based-programs/)

Guides to understanding, implementing, and building a business case for evidence-based programs.
<https://www.ncoa.org/center-for-healthy-aging/basics-of-evidence-based-programs/>

[Evidence-Based Leadership Council](http://www.eblcprograms.org/)

This organization represents a small but notable group of evidence-based programs that are shown to improve older adult health.
<http://www.eblcprograms.org/>

Evidence-Based Programs 101 (one-page pdf)

http://www.eblcprograms.org/docs/pdfs/EBPs_101.pdf

The Evidence Continuum

<https://www.nationalservice.gov/resources/evaluation/evidence-continuum>
<https://youtu.be/fzF08edFXmc>

Experimental Design: Evidence-based Programs

<http://www.episcenter.psu.edu/research/experimentaldesign>



The Differences Between CHES® and CPH

<https://www.nchec.org/cph-vs-ches>