RMPDS 19TH ANNUAL
SCIENTIFIC MEETING

# In measurement we trust

## Psychometric validation of survey items

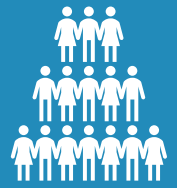
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# Validating Opt-In, Online, Panel Surveys

Survey validation proactively uses best practices to minimize bias, then tests accuracy using a variety of methods.



## Sample Validation

Goal is to ensure the sample collected is a faithful representation of the targeted inference population



## Psychometric Validation

Goal is to ensure that variable measurement is accurate and represents what the researchers intend it to represent

One comment before proceeding:

1. Reliability is also an important psychometric, but not covered here

# Measuring what we intend

- Every question or “item” in a survey is a measurement
  - Consider age. It can be measured by…
    - Reading a birth certificate
    - Testing telomere shortening in DNA
    - Asking someone how old they are
- High quality measurements in surveys are grounded both in theory and statistical evidence
- Presentation Goal: Outline major methods and describe the RMPDS approach to psychometric validity



# Six Types of Measurement Validity

01

**Face validity**

Informal, or surface-level, assessment of whether the items look like they measure what's intended

02

**Content validity**

Respondent-driven cognitive interviewing identify what respondents are thinking about when answering

03

**Convergent validity**

Assessing whether an item correlates with similar items measured at the same time

04

**Divergent validity**

Assessing whether an item is not correlated (or anti-correlated) with unrelated items measured at the same time

05

**Concurrent validity**

Assessing whether an item associates with similar items measured in other contexts

06

**Predictive validity**

Assessing whether an item associates with outcomes that one expects would occur later

# 1: Face validity

Do experts like the item?

## Face validity is informal, but a first step

- Weakest form of validation
- Initial consensus that an item appears to measure what it intends to
- Invoked when one says…."That doesn't look right."

Formal face validity approaches seek external counsel or use items from other, well-established surveys

<u>Expert Review Panel for NSIHT</u>

1. Peer support expert
2. Person with lived psychedelic use experience
3. Colorado state health department employee

The review panel read the full questionnaire and took a pilot version of the survey online.

We asked them for written comments and in-line suggestions.

Suggested changes included:

- Identified gaps in adverse health effects
- Reworded items about health benefits
- Provided perspective on what data would be useful for state-level rulemaking
- Generate nuanced, evolving lists of drugs

# 2: Content validity

Do respondents understand the item? Is every necessary concept covered and nothing extra?

## Cognitive interviewing

- Test the extent to which responses to an item cover the content as expected
- Respondents rephrase questions in their own words and identify incomprehensible phrases.
- Experts may also provide quantitative metrics on which content must be covered (essential, non-essential).

The question is understood as it's intended to be fielded and all concepts are included.

## Must this be an interview?

Online, text-only versions of cognitive interviewing are good complements for in-person or video interviews.

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# 3 & 4: Convergent and Divergent validity

Does the item correlate and not correlate as expected to other, well-validated items?

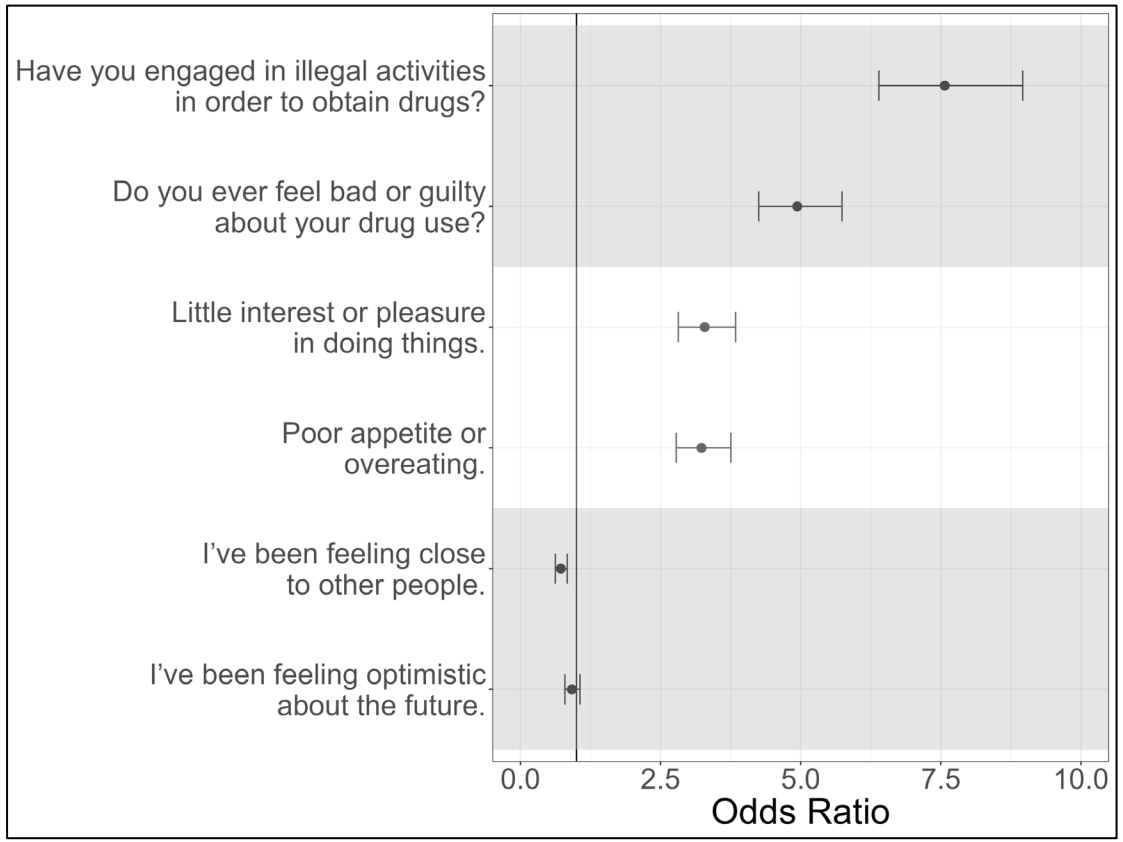
Validated Reference Scale

DAST-10 (Substance use)

PHQ-9 (Depression)

WEMWBS-7 (Wellbeing)

"When you used **<DRUG>** in a way that was not directed by your healthcare provider in the last 12 months, was it your own prescription that you used?" Answered: NO




## Simultaneous measurement

Tests within-person correlations (and non-correlations) to items expected to be similar and dissimilar.

Want to see a discrimination effect across different items.

Correlation to validated scales is strong evidence for validity

## Sounds familiar…

Analogous to sensitivity and specificity in diagnostic testing. Here, the validated scales are the gold standard measurements.

# 5: Concurrent validity

Does the item align with similar measurements from other contexts?

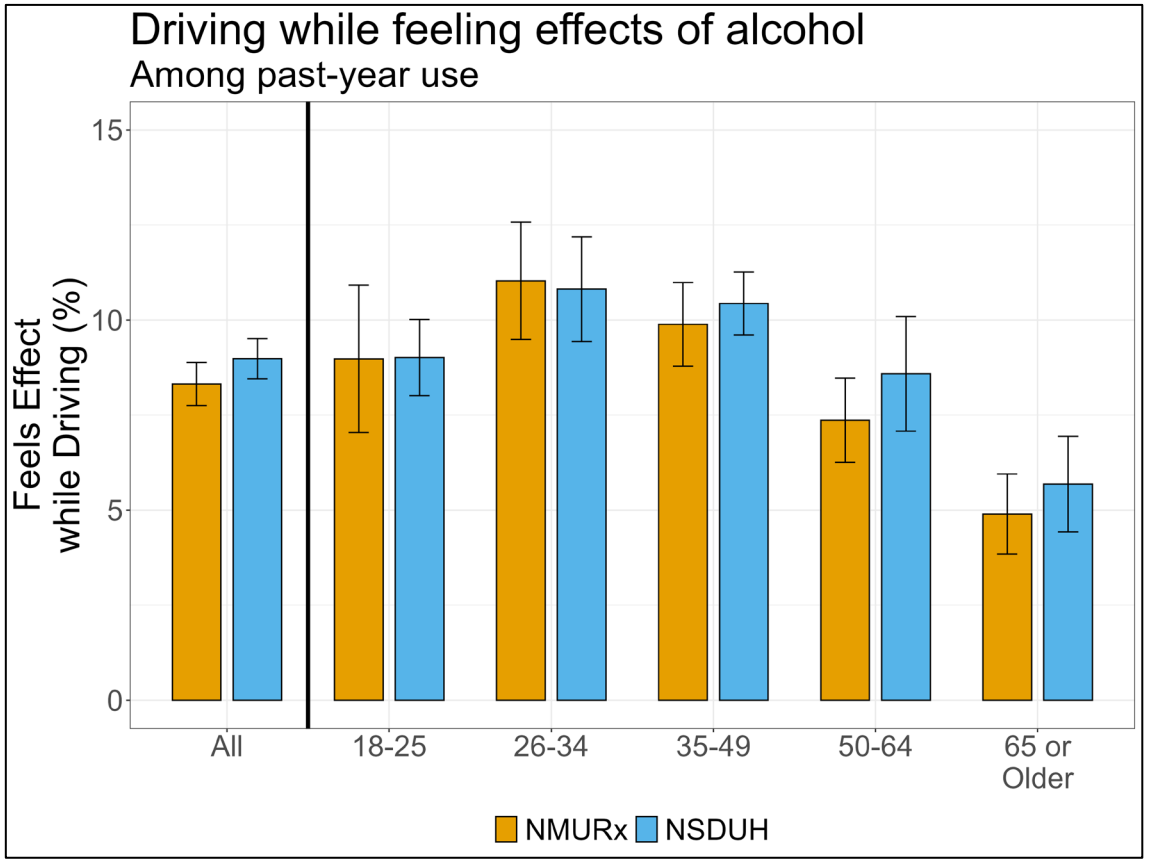
## New data confirmation

- New data, new setting

- Certain differences are desirable:
  - Sampling mechanisms (but same target pop)
  - Bias mitigation methods
  - Fielding contexts (e.g., online vs in-person)

Concurrent validity demonstrates that an item is not setting-specific and aggregates to the same conclusion as other data

"Have you ever driven a car after you have drunk too much alcohol in the last 12 months? "



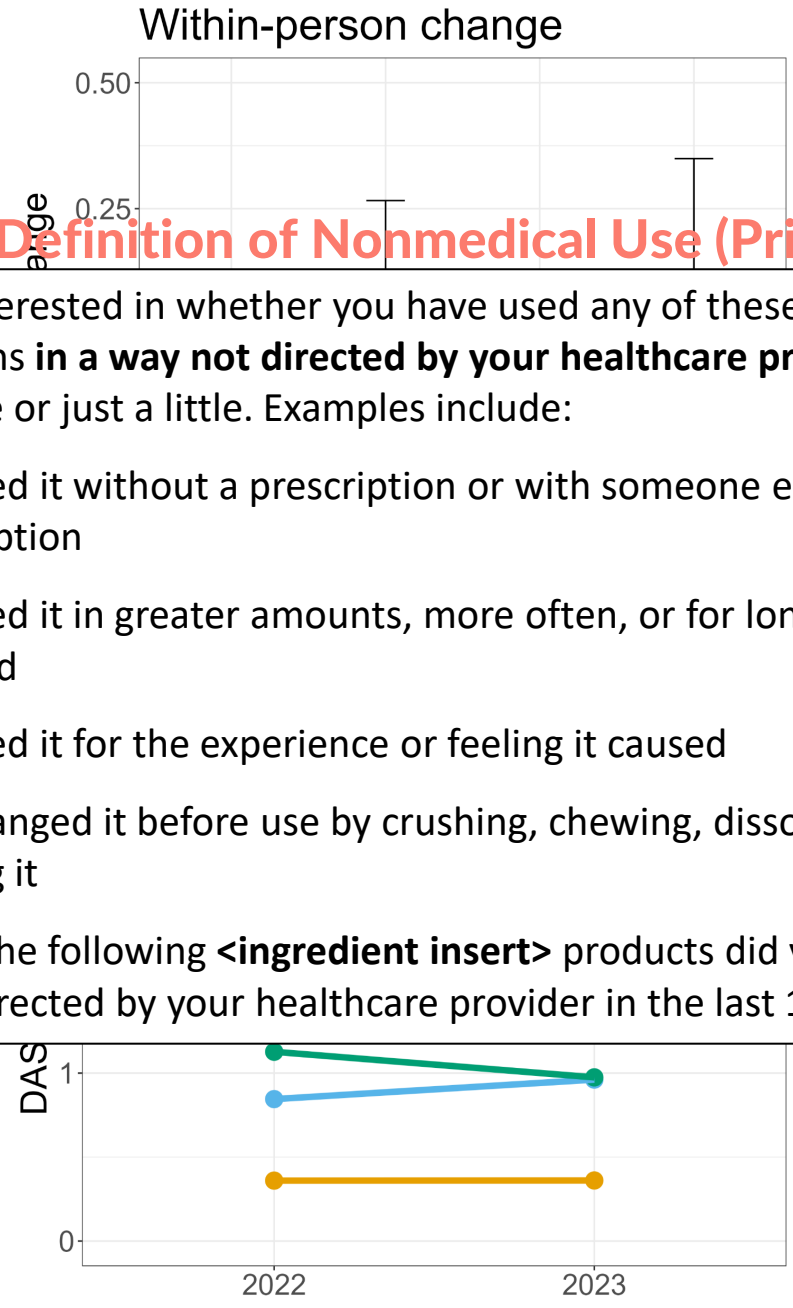
# 6: Predictive validity

Does the item predict future outcomes?

## Prospective strength

- Validation of the item against future measurements that are meaningful outcomes
- Longitudinal if the intent is to predict individual trajectories
- Repeated cross-sections if the intent is for population-level assessment

Predictive validity prospectively supports both the item's validity and the theory underlying the item's usefulness




## RMPDS Definition of Nonmedical Use (Primary measure)

We are interested in whether you have used any of these prescription medications **in a way not directed by your healthcare provider**, even if just once or just a little. Examples include:

- You used it without a prescription or with someone else's prescription
- You used it in greater amounts, more often, or for longer than directed
- You used it for the experience or feeling it caused
- You changed it before use by crushing, chewing, dissolving, or heating it

Which of the following **<ingredient insert>** products did you use in a way not directed by your healthcare provider in the last 12 months?



# Conclusions

- We validate items with cumulative evidence across many different approaches
  - Iron-clad, “smoking gun” validation is rare
- How comprehensive can we be?  Is it feasible to do all validation on all items?
- It is common for items to only be face validated
  - Risk of misinterpretation without more rigorous methods
  - Monitoring research has responsibility to do more
- Must thoughtfully manage resources to ensure the right amount of validation is conducted for low- to high-impact items

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# Thank you

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Acknowledge the full RMPDS Staff.

## Disclosure

This work was conducted by the staff at Rocky Mountain Poison and Drug Safety (RMPDS). RMPDS is a division of nonprofit Denver Health and Hospital Authority, a political subdivision of the State of Colorado, USA. Outside of this work, RMPDS provides independent surveillance, research, and reporting services to pharmaceutical manufacturers, government, and non-government agencies. No manufacturer or agency participated in the conception, analysis, drafting, or review of this presentation.

Cartoon images were generated with DALL-E 3.

## Funding

The methods work for this presentation was funded through multiple federal grants from the Food and Drug Administration (FDA, PI: Black, #75F40121D00033), Substance Abuse and Mental Health Services Administration (SAMHSA, PI: Monte, #75S20124P00003), and the National Institute of Health (NIH, PI: Rockhill. #R36DA057413).

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