



Gridlocked:

The impact of adapting survey grids for smartphones

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What is a grid?

1. During the past 30 days, about how often did you feel ...

	All of the time	Most of the time	Some of the time	None of the time
a. ...nervous?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. ...hopeless?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. ...restless or fidgety?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. ...so depressed that nothing could cheer you up?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. ...that everything was an effort?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. ...worthless?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Grids avoid repetition.

1. During the past 30 days, about how often did you feel nervous?

- All of the time
- Most of the time
- Some of the time
- None of the time

4. During the past 30 days, about how often did you feel so depressed that nothing could cheer you up?

- All of the time
- Most of the time
- Some of the time
- None of the time

2. During the past 30 days, about how often did you feel hopeless?

- All of the time
- Most of the time
- Some of the time
- None of the time

5. During the past 30 days, about how often did you feel that everything was an effort?

- All of the time
- Most of the time
- Some of the time
- None of the time

3. During the past 30 days, about how often did you feel restless or fidgety?

- All of the time
- Most of the time
- Some of the time
- None of the time

6. During the past 30 days, about how often did you feel worthless?

- All of the time
- Most of the time
- Some of the time
- None of the time

Grids display poorly on small screens, esp. smartphones.

1. During the past 30 days, about how often did you feel ...

	All of the time	Most of the time	Some of the time	None of the time
a. ... nervous?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. ... hopeless?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. ... restless or fidgety?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. ... so depressed that nothing could cheer you up?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. ... that everything was an effort?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. ... worthless?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Presentation Outline

- Summarize the literature on grids
- Suggest a modified grid format that displays better on small screens
- Review findings from comparison of modified versus traditional grid format
 - Indicators of data quality: missing data, straight-lining, etc.

What do we know about grids? (1/2)

- **Inter-item correlations / straight-lining**
 - Higher in grids
 - Significantly higher (Tourangeau, Couper, & Conrad, 2004)
 - Modest effect (Couper, Traugott, & Lamias, 2001; Toepoel, Das, & Van Soest, 2009)
 - No effect (Yan, 2005; Callegaro, Shand-Lubbers, & Dennis, 2009)
- **Missing data**
 - Higher in grids (Iglesias, Bir, & Torgerson, 2001; Toepoel, Das, & van Soest, 2009)
 - Lower in grids (Couper, Traugott, & Lamias, 2001)

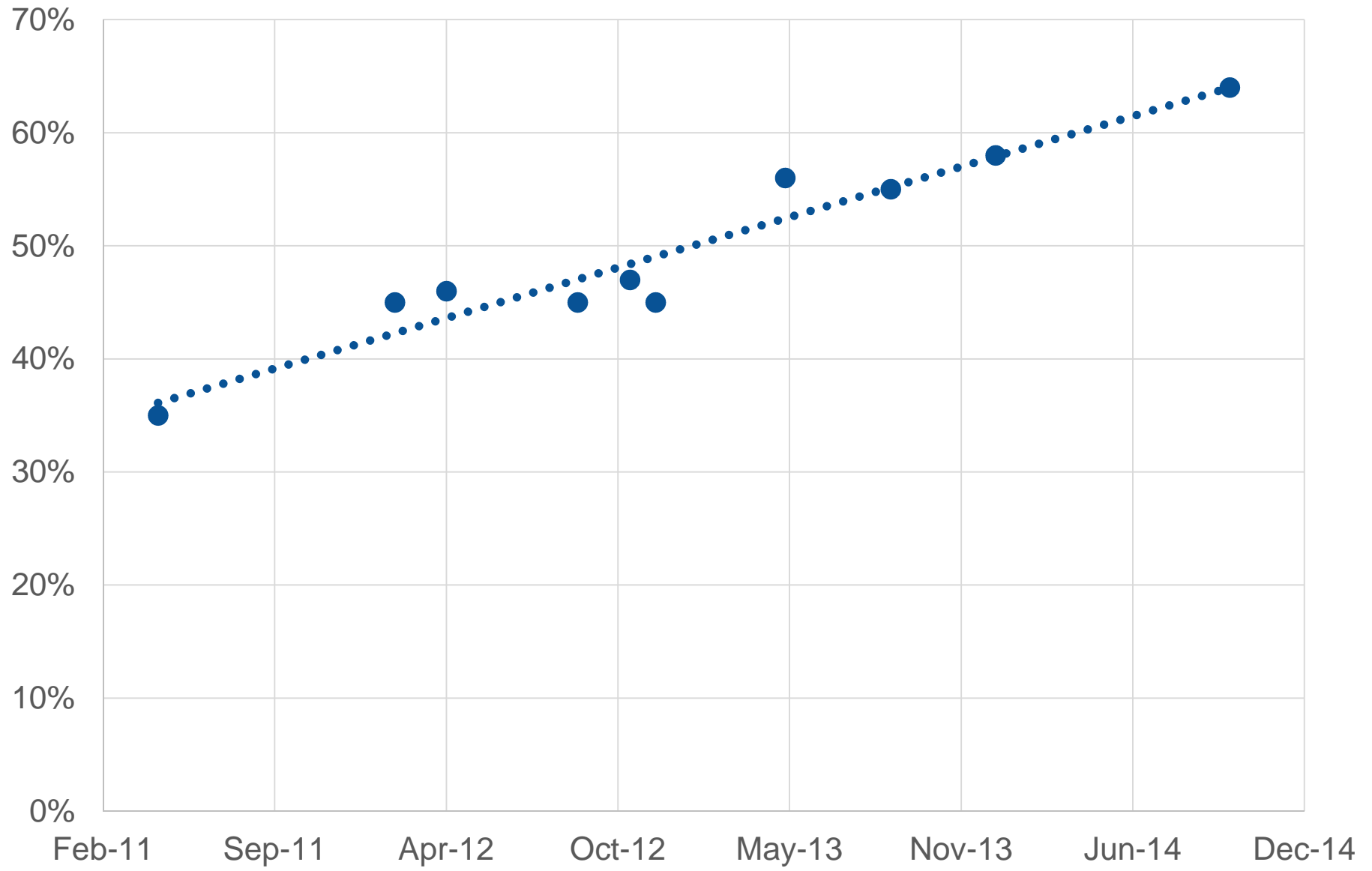
What do we know about grids? (2/2)

- **Survey completion time**
 - **Faster in grids** (Couper, Tourangeau, Conrad, & Zhang, 2013; Couper, Traugott, & Lamias, 2001; Tourangeau, Couper, & Conrad, 2004)
 - Seems to be due to an increase in measurement error (Peytchev, 2005)
- **Respondents' evaluation of the questionnaire**
 - **Less favorable when grids are used** (Toepoel, Das, & van Soest, 2009)
- **Display**
 - **Poor on small screens** (e.g. Link et al., 2014)

*If you are conducting online surveys,
you are conducting mobile surveys.*

-Link, Murphy, Schober, et al. (2014)

Smartphone Ownership Over Time



By choosing to use [grid] question formats, the survey designers trade data quality for space efficiency.

-Dillman, Smyth, & Christian (2014)

Justifying the use of Grids

- Sometimes grids cannot be avoided:
 - Longitudinal studies (compare data to earlier waves)
 - Mail surveys (space constraints)
 - Multi-mode surveys (compare findings across modes)

World Trade Center Health Registry

- Established 2002
 - Monitor long-term physical and mental health of people exposed to 9/11
 - Assess post-disaster needs
- Wave 4 survey: launched April 2015

	Wave 1	Wave 2	Wave 3	Wave 4
Year(s)	2003-2004	2006-2007	2011-2012	2015
Sample Size	71,437	68,959	67,670	67,480
Modes	CATI CAPI	CATI Web Mail	CATI Web Mail	Web Mail
Response Rate	59%	68%	63%	TBD

- Retained 5 grids for better comparison to Wave 3 grid data and to save space in the mail mode

Modifying grids for mobile respondents

- Used responsive web design
 - Screen width automatically detected
 - If < 760 px, display stacked format
 - If ≥ 760 px, display traditional format
- Stacked format displays each item above the response options to save space

Traditional vs. Stacked Format

World Trade Center Health Registry
2015 Health Survey

22% Complete

Q30. Have you ever been told by a doctor or other health professional that you had any of these conditions? Note: Cancer is covered later in this survey.

	Yes	No
Hypertension, or high blood pressure	<input type="radio"/>	<input type="radio"/>
High cholesterol	<input type="radio"/>	<input type="radio"/>
Angina, or angina pectoris	<input type="radio"/>	<input type="radio"/>
Heart attack, or myocardial infarction	<input type="radio"/>	<input type="radio"/>
Coronary heart disease	<input type="radio"/>	<input type="radio"/>
Stroke	<input type="radio"/>	<input type="radio"/>
Diabetes, or sugar diabetes	<input type="radio"/>	<input type="radio"/>
Asthma	<input type="radio"/>	<input type="radio"/>
Chronic bronchitis	<input type="radio"/>	<input type="radio"/>
Emphysema, or COPD	<input type="radio"/>	<input type="radio"/>
Reactive airways dysfunction syndrome, or RADS	<input type="radio"/>	<input type="radio"/>
Sarcoidosis	<input type="radio"/>	<input type="radio"/>
Pulmonary fibrosis	<input type="radio"/>	<input type="radio"/>
Asbestosis	<input type="radio"/>	<input type="radio"/>

Traditional

World Trade Center Health Registry
2015 Health Survey

Q30. Have you ever been told by a doctor or other health professional that you had any of these conditions? Note: Cancer is covered later in this survey.

Hypertension, or high blood pressure:

Yes	No
<input type="radio"/>	<input type="radio"/>

High cholesterol:

Yes	No
<input type="radio"/>	<input type="radio"/>

Angina, or angina pectoris:

Yes	No
<input type="radio"/>	<input type="radio"/>

Stacked

Research Purpose

- Do the stacked and traditional formats result in differences in data quality?
- We examined:
 - Response distributions
 - Missing data
 - Straight-lining
 - Inconsistent responses

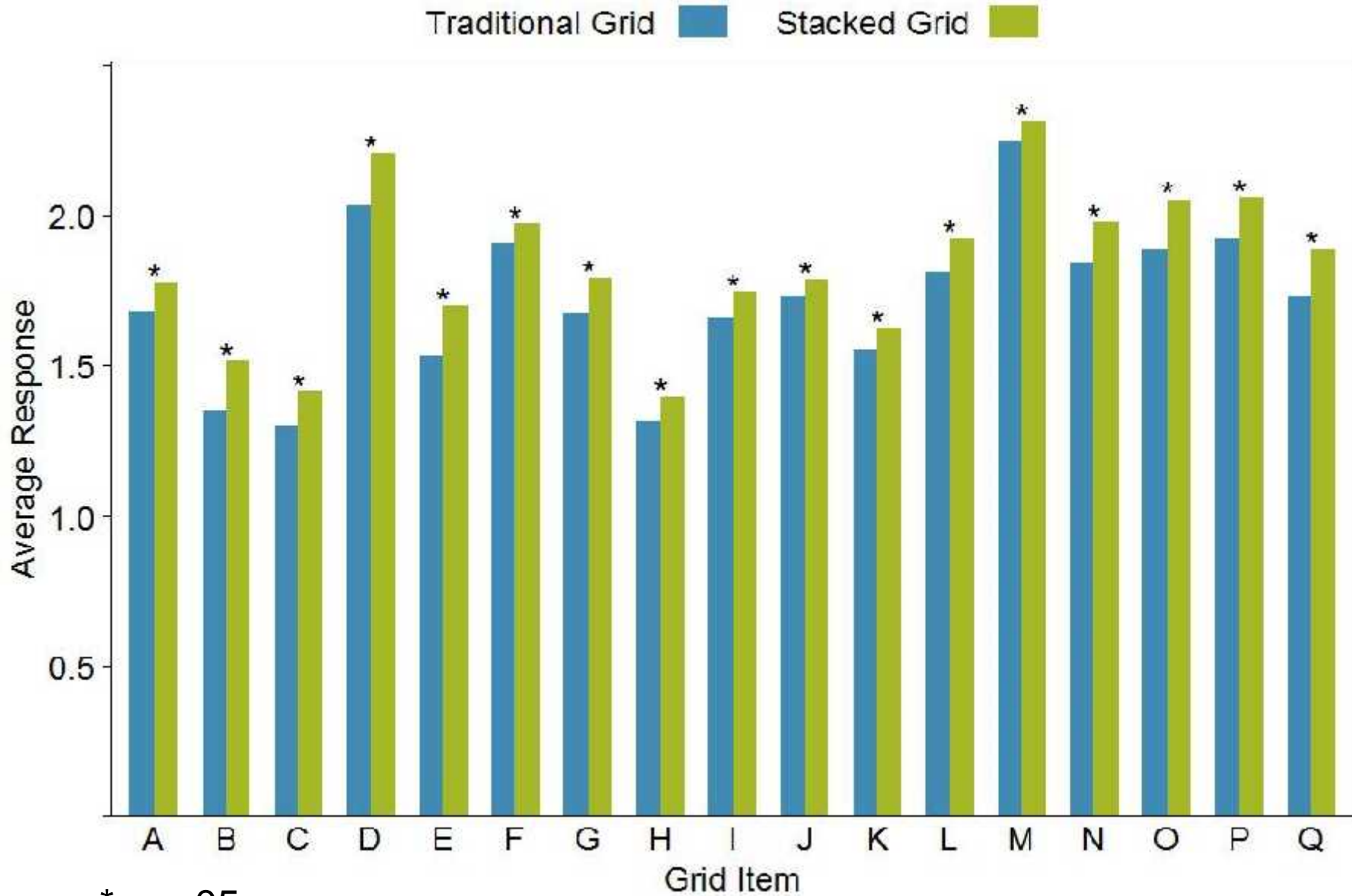
Methods

- Used preliminary data: 4,358 Web respondents through first 4 weeks of data collection
- 92% completed survey on large screen (computer or large tablet); 8% on small screen (smartphone)
- Respondent characteristics:
 - Avg. age 55
 - 63% male
 - 62% Bachelor's degree or higher
- Smartphone respondents:
 - Slightly younger
 - Less educated
 - Both differences statistically significant
- Used predicted probabilities from models that controlled for age, sex, education

Response Distributions

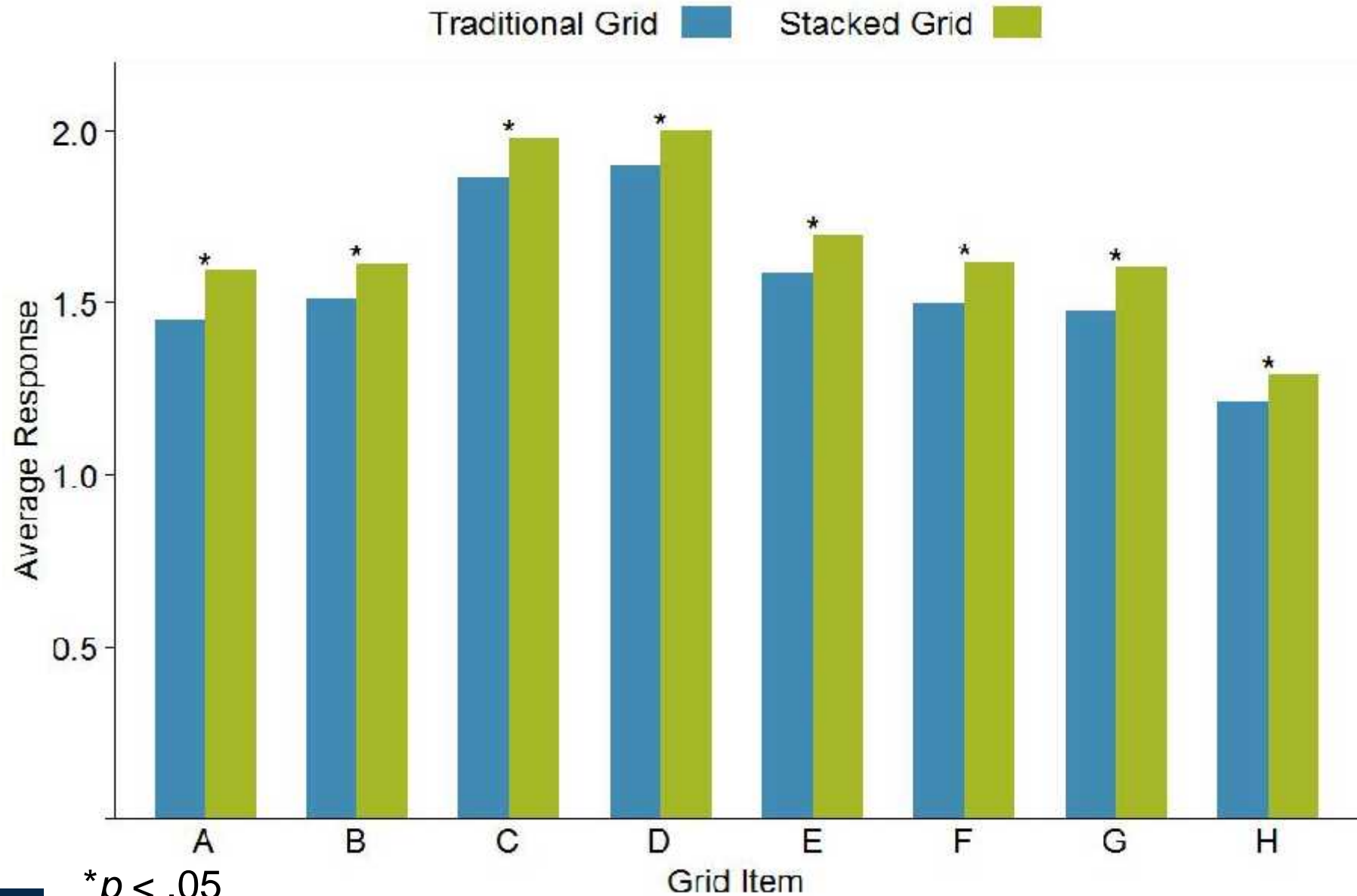
- Clear pattern of stacked respondents choosing more negative response in 4 of 5 grids
- No discernible pattern in 5th grid

PTSD – Average Response Selected by Item & Format

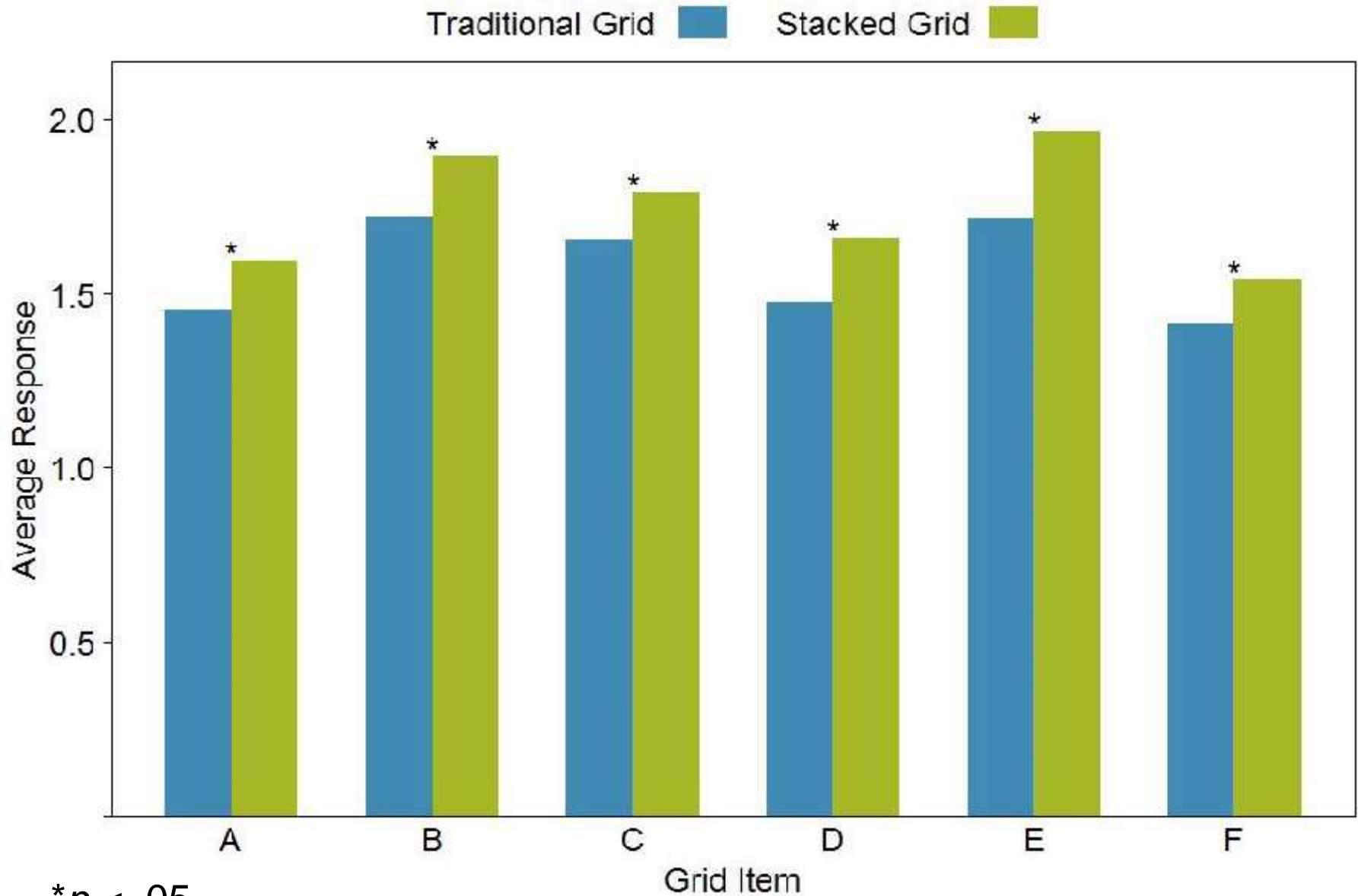


* $p < .05$

Depression Symptoms – Average Response Selected by Item & Format

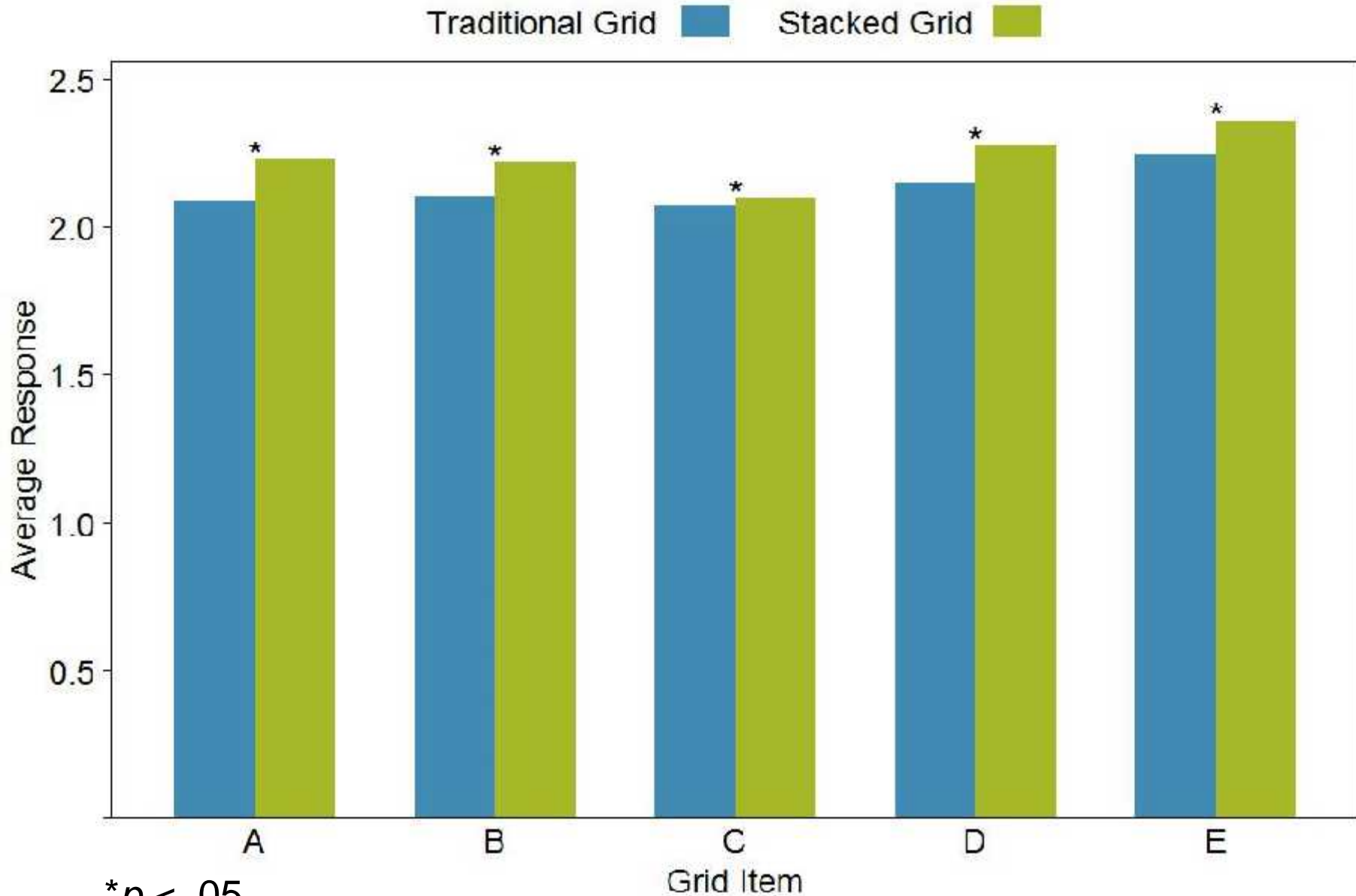


Psychological Distress Symptoms – Average Response Selected by Item & Format

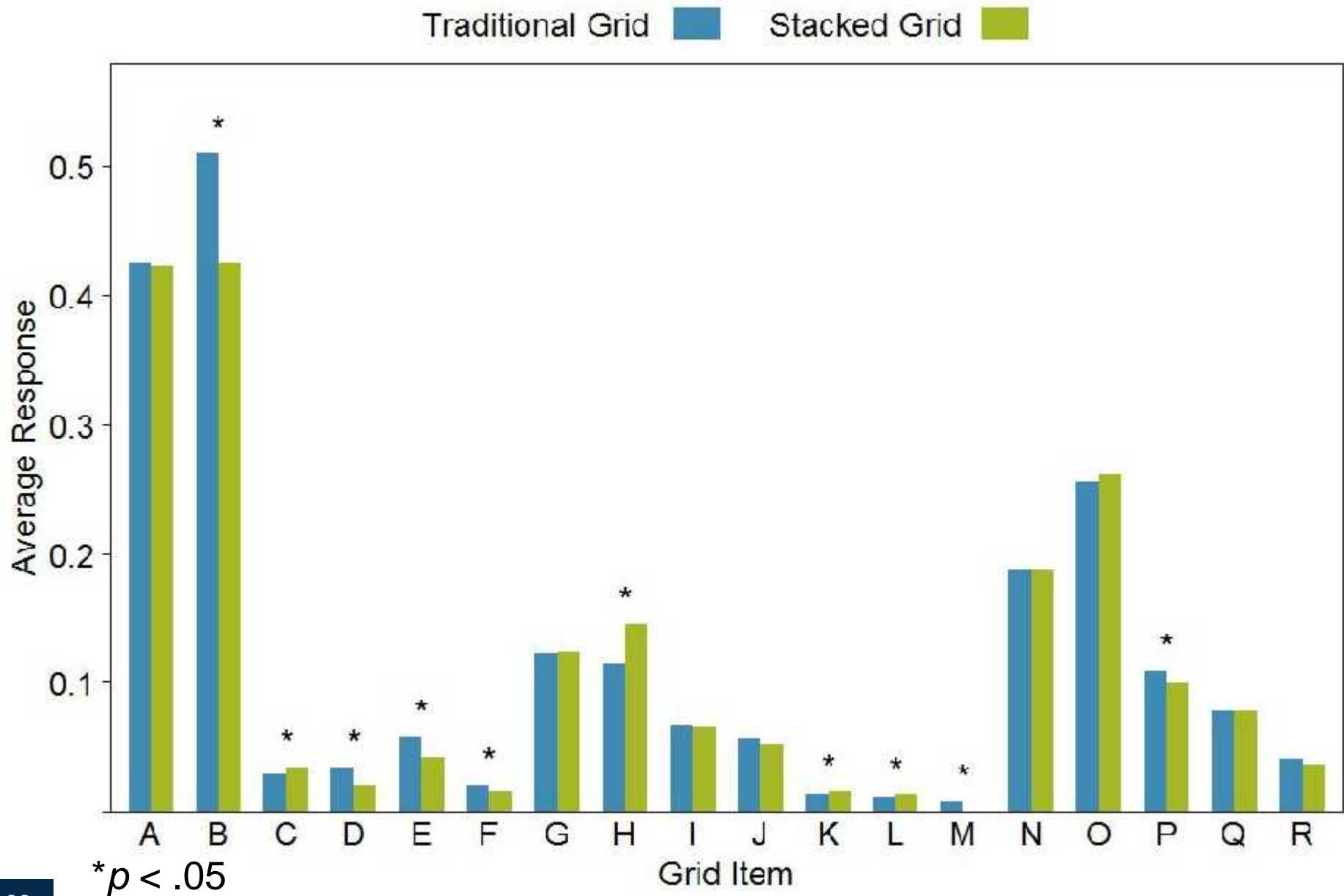


* $p < .05$

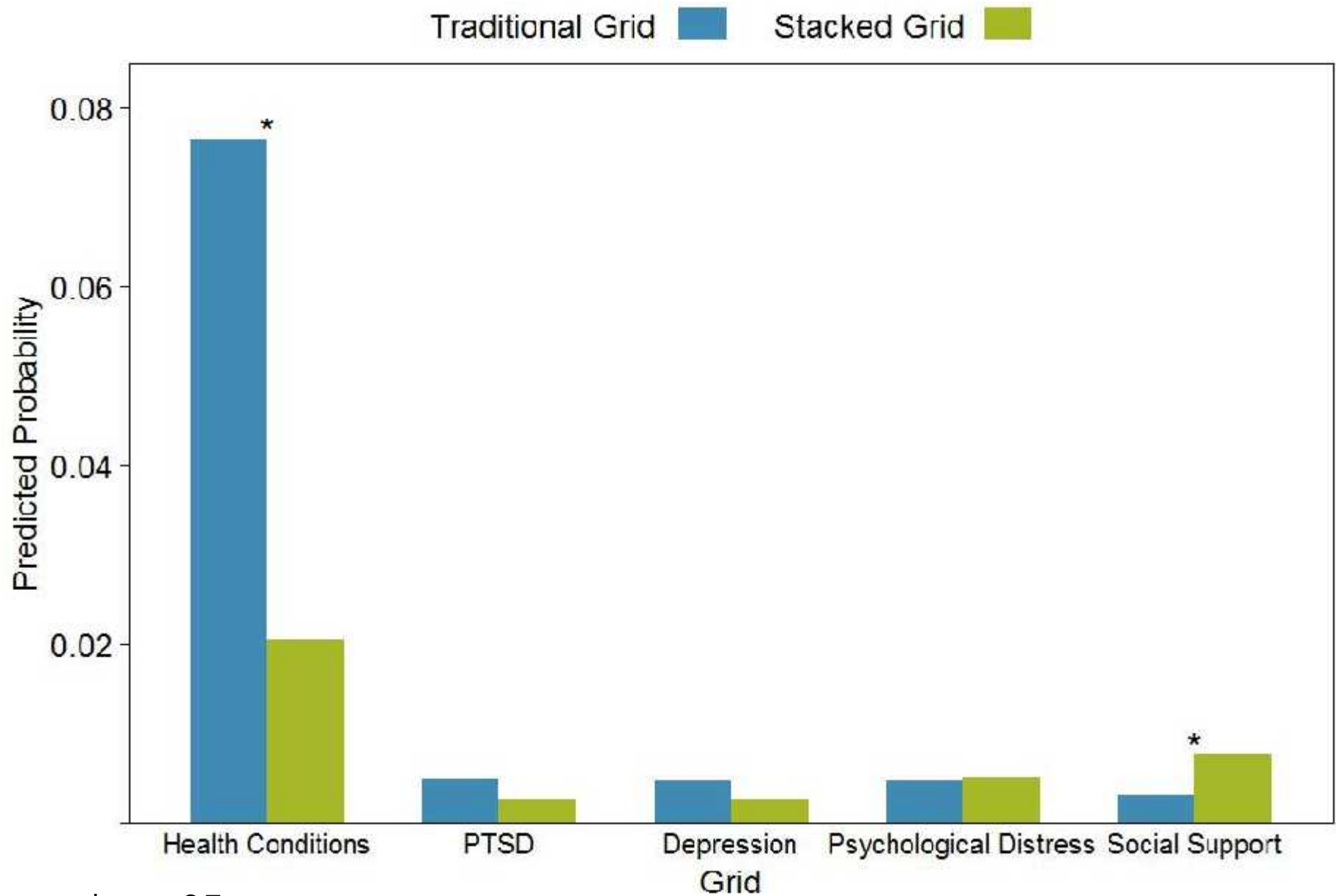
Availability of Social Support– Average Response Selected by Item & Format



Diagnosed Health Conditions– Average Response Selected by Item & Format

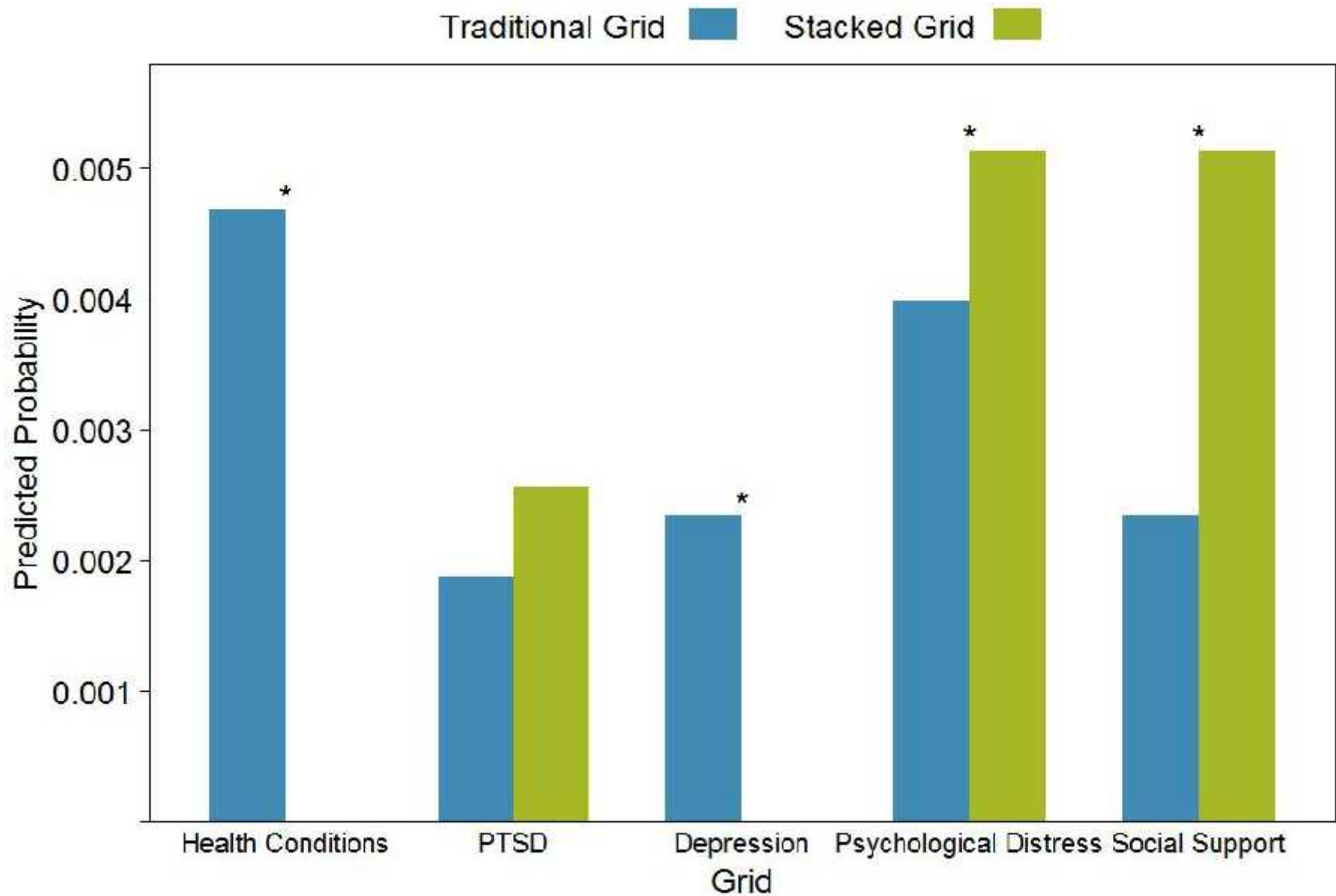


Skipping 1+ Items: Predicted Probability by Grid & Format



* $p < .05$

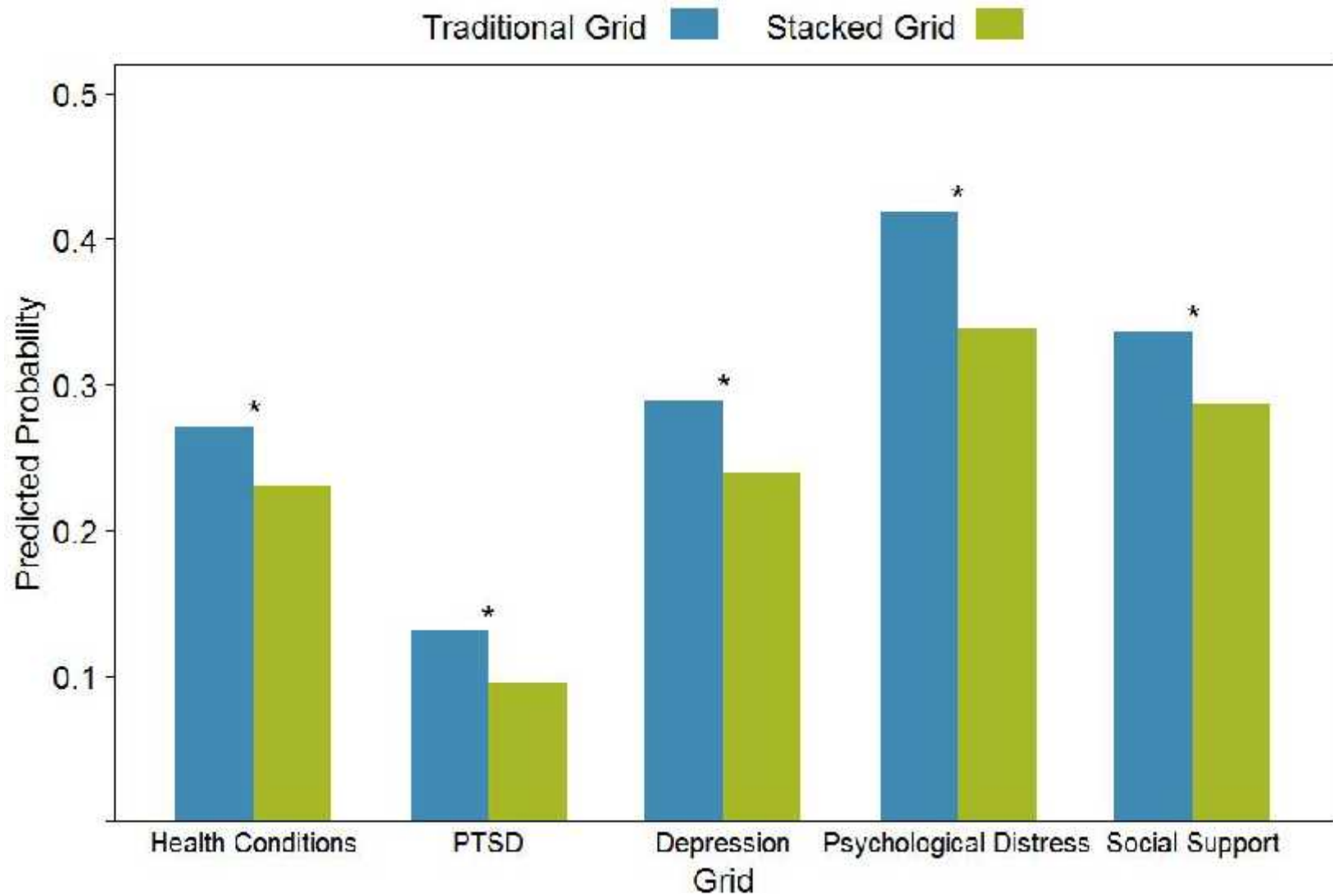
Skipping Entire Grid: Predicted Probability by Grid & Format



* $p < .05$

Straight-Lining: Predicted Probability by Grid & Format

- Straight-lining: selecting same response for all items



* $p < .05$

Inconsistent Responses

- Wave 3 and Wave 4 surveys both contained a grid asking about lifetime diagnosis of medical conditions.
 - Respondents who indicated they had a condition were then asked for year of diagnosis
- Any condition diagnosed in 2010 or earlier should have been reported in Wave 3 and Wave 4.
- Looked at average # of conditions with discrepancies across waves
 - Average: ~1.5 discrepancies per respondent
 - No statistically significant differences for stacked vs. traditional grid formats

Summary

- Grids have both advantages and disadvantages
- We kept grids in our survey to make longitudinal comparisons
- Respondents will utilize option to respond via smartphone
 - Must modify grids to work on small screens
 - ...But must do so without introducing mode/device effects
- Stacked format: good compromise
 - No consistent evidence of decreased data quality
 - Some evidence of increased data quality
- Stacked format may be a good option for all devices

More Information

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References (1/2)

- Callegaro, M., Shand-Lubbers, J., & Dennis, J. M. (2009). Presentation of a single item versus a grid: Effects on the vitality and mental health subscales of the sf-36v2 health surveys. Paper presented at the annual meeting of the American Association for Public Opinion Research, Hollywood, FL.
- Couper, M. P., Tourangeau, R., Conrad, F.G., & Zhang, C. (2013). The design of grids in web surveys. *Social Science Computer Review*, 31, 322-345.
- Couper, M. P., Traugott, M., & Lamias, M. (2001). Web survey design and administration. *Public Opinion Quarterly*, 65, 230-253.
- Dillman, D.A., Smyth, J. D., & Christian, L. M. (2014). *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. Hoboken, NJ: John Wiley & Sons.
- Iglesias, C. P., Birks, Y. F., & Torgerson, D. J. (2001). Improving the measurement of quality of life in older people: The York SF-12. *Quarterly Journal of Medicine*, 94, 695-698.

References (2/2)

- Link, M. W., Murphy, J., Schober, M. F., Buskirk, T. D., Childs, J. H., Tesfaye, C. L. (2014). Mobile technologies for conducting, augmenting, and potentially replacing surveys: Report of the AAPOR Task Force on Emerging Technologies in Public Opinion Research. Available at https://www.aapor.org/AAPORKentico/AAPOR_Main/media/MainSiteFiles/REVISED_Mobile_Technology_Report_Final_revised10June14.pdf
- Pew Research Center (2015). Device ownership over time. Retrieved April 26, 2015 from <http://www.pewinternet.org/data-trend/mobile/device-ownership/>
- Toepoel, Das, & Van Soest (2009). Design of web questionnaires: The effects of the number of items per screen. *Field Methods*, 21, 200-213.
- Tourangeau, R., Couper, M. P., & Conrad, F. G. (2004). Spacing, position, and order: Interpretive heuristics for visual features of survey questions. *Public Opinion Quarterly*, 68, 368-393.
- Yan, T. (2005). *Gricean effects in self-administered surveys*. College Park, MD: University of Maryland, unpublished doctoral dissertation.