Numeracy, Pseudocertainty, and the 100% Effect

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INTRODUCTION

Past research has found that people with low objective numeracy (low math ability) have difficulty in understanding numeric information such as risk (Peters et al., 2006).

People overweight certainty relative to near-certainty (Tversky & Kahneman, 1981). This is known as the certainty effect. This overweighting extends to risky decisions framed as certain, known as pseudocertainty (e.g. a 70% chance of moving onto a sure bet).

More recent research has suggested that any option with 100% in it is similarly overweighed (e.g. 100% chance of moving onto a 70% bet; Lee & Chapman, 2009).

Current research examines the relation of objective numeracy to the pseudocertainty bias and 100% effect and evaluates interventions (i.e. presenting net efficacy and pictographs).

HYPOTHESES

1. Numeracy moderates the pseudocertainty effect in vaccine ratings because more numerate people are more likely than the less numerate to calculate net efficacy and, thus, avoid the pseudocertainty bias.
2. When given the overall effectiveness of the vaccine statements, all participants will better understand the information and rate the vaccines more equally, thus reducing the pseudocertainty bias.
3. Providing a pictograph will reduce the pseudocertainty bias regardless of numeric ability.

METHOD

Study	Size	Source	Net Efficacies	Intervention
1	227	College Students	70%	N/A
2	435	mTurk	70%	Net Efficacy
3	285	College Students	70% or 55%	Pictograph

Design:

- All participants first read a statement about a cancer-causing virus from the *Centers for Disease Control and Prevention*
  - Study 2: Participants were then randomized to see percent information only or the percent information with the net efficacy and rated their likelihood to get the vaccination
  - Study 3: Participants were then randomized to see percent information only or the percent information with a pictograph and rated their likelihood to get the vaccination

VACCINE RATING SAMPLE

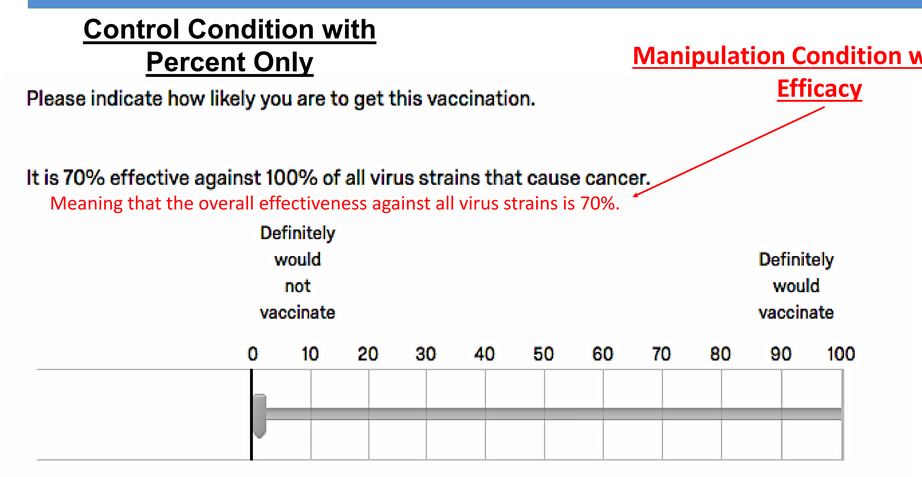

Figure 1. Vaccine likelihood question.

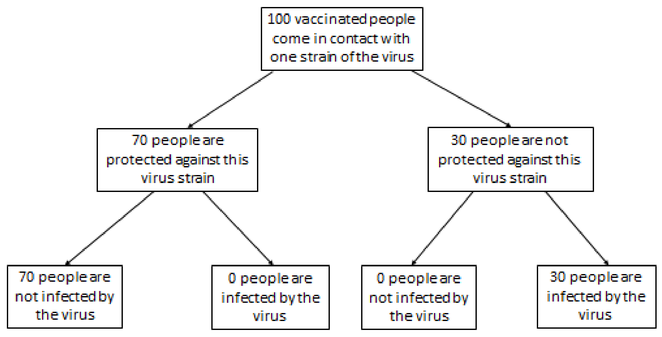

Figure 2. Pictograph example.

RESULTS

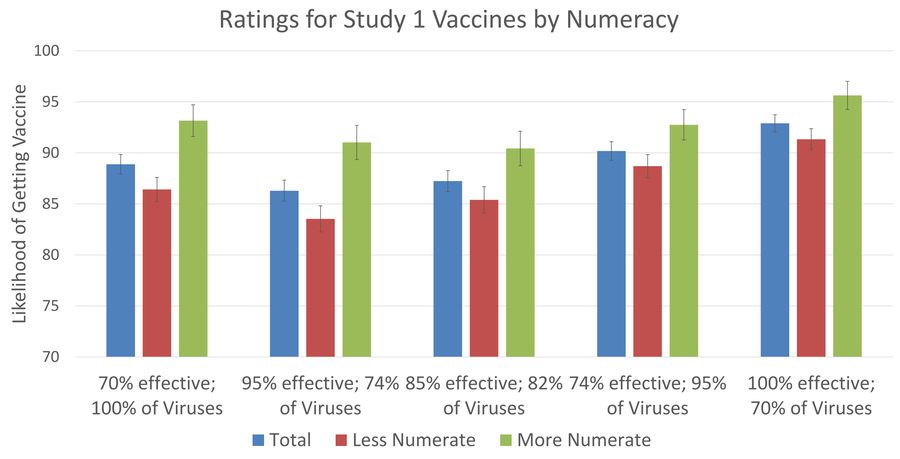

Figure 3. There were no differences in the size of the pseudocertainty effect for innumerate and highly numerate participants

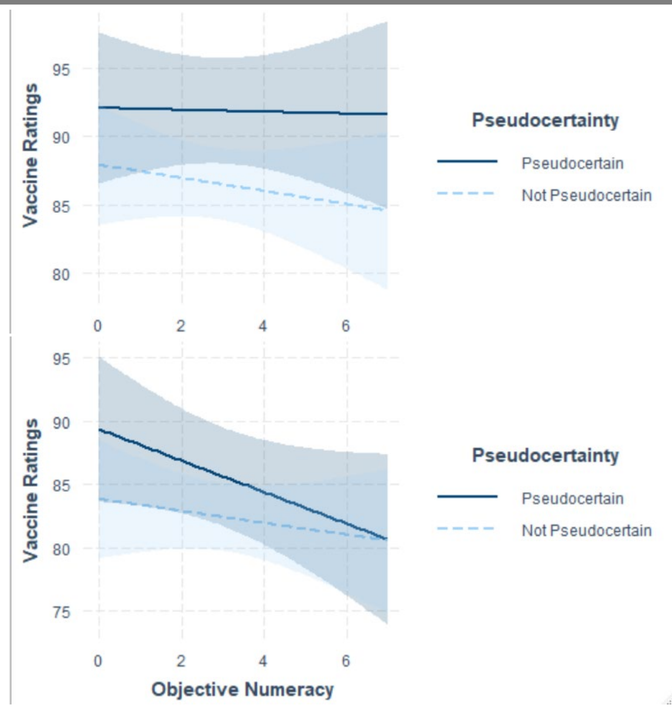

Figure 4. Interaction of Numeracy and Pseudocertainty for Percent only (top) and the Net Efficacy calculated (bottom; Study 2)

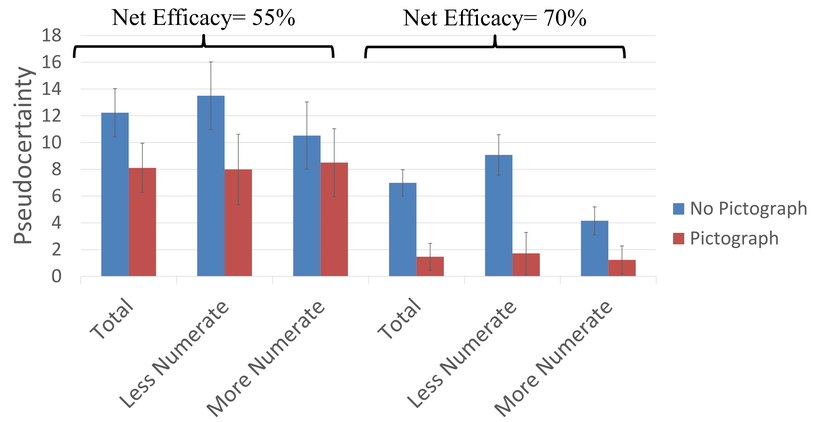

Figure 5. Regardless of numeric ability, pictographs reduced the pseudocertainty effect (Study 3)

DISCUSSION

- The effect of numeracy on the pseudocertainty effect was mixed
- There was no evidence found for a 100% effect separate from the pseudocertainty effect
- Providing the net efficacy of the vaccines reduced the pseudocertainty effect among the more highly numerate
- Pictographs reduced the pseudocertainty effect regardless of numeracy

ACKNOWLEDGEMENTS

Thank you to all CAIDe Lab Members for their efforts on this project. Funding for this project was provided by The Ohio State University's Decision Sciences Collaborative.

FOR REFERENCES, SEE HANDOUT