The Effect of Efficacy and Side Effects on Vaccine Acceptance

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Introduction

- News has reported on COVID 19 vaccine efficacy and side effect severity a lot
- Studies have shown **side effect severity and efficacy impact vaccine acceptance**[1,2,3,4]
- **No studies we read looked at the interaction** between these factors

Hypothesis

- **Efficacy** impacts vaccine acceptance
- **Side effect severity** impacts vaccine acceptance
- There **is an interaction** between side effects and vaccine efficacy

Does efficacy and the severity of side effects impact vaccine acceptance?

Methods

Participants

- 107 participants
- 22.4% US, 75.7% China

Design

- Conditions

	60%	90%
mild	Condition 1	Condition 3
severe	Condition 2	Condition 4

- **Dependent variable**
  - Acceptance
    - Likert scale of 1-10
    - "On a scale of 1-10, how likely are you to accept the vaccine?"
- All conditions were **within-subject**
  - Randomized 4 versions
  - Inside each version, we match 4 conditions with 4 diseases using latin square and present them randomly

Methods

	Condition 1	Condition 2	Condition 3	Condition 4
Version A	Disease 1	Disease 2	Disease 3	Disease 4
Version B	Disease 3	Disease 1	Disease 4	Disease 2
Version C	Disease 2	Disease 4	Disease 1	Disease 3
Version D	Disease 4	Disease 3	Disease 2	Disease 1

Example

"There is a new parasitic disease called Linguinosis. Common symptoms include fever, itchiness, headaches and joint pain followed by confusion, poor coordination, numbness and trouble sleeping."

"Imagine a new vaccine has been developed to combat this infectious disease, Its clinical trial suggests that it is **90%** effective at preventing the disease in people after 14 days of receiving the vaccine. **A rare side effect of flu-like symptoms that persist for no longer than 48 hrs after injection was discovered**."

Results

- **Linear Mixed Model** was conducted on effect of efficacy and side effect severity on acceptance of vaccines

Main Effect

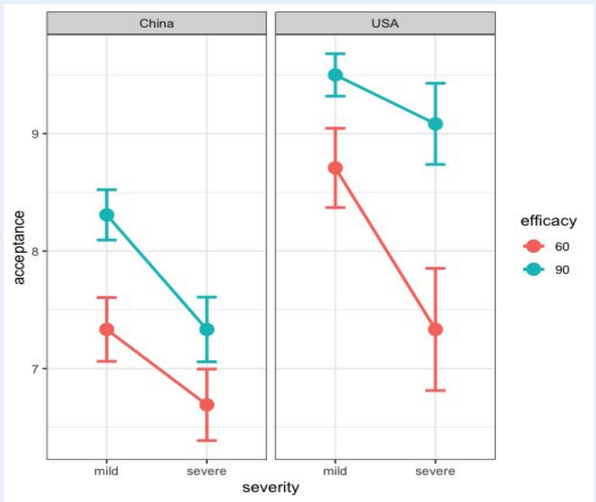
- **Main effect** for side effect severity ($F(1, 114) = 35.07$, $p < 0.0001$) and efficacy($F(1,114) = 37.54$, $p < 0.0001$)

Interaction

- **No interaction** ($F(1,114) = 0.079$, $p = 0.779$)

Exploratory Analysis

The Interaction Effect of Efficacy and Severity Between Country on Vaccine Acceptance



Country

- Analyzed country using **emmeans**
- On average **people from China** (sd = 2.47, *Mean* = 7.42) were **less accepting** of vaccines than people from USA (sd = 1.95, *Mean* = *8.66*)
- For both countries, there are **main effects** in both efficacy and severity.
- **No interaction** in China ($F(1,103) = 1.927$, $p > 0.05$), **interaction** for USA($F(1,103) = 4.720$, $p < 0.05$)

Knowledge

- Knowledge **predicted acceptance**, more knowledge had more acceptance ($F(1,104) = 5.215$, $p < 0.05$))
- No three way interaction ($F(1,104) = 0.017$, $p = 0.896$)

Discussion

Main Effect

- There is **significant main effect** of side effect severity and vaccine efficacy on people's willingness to get vaccinated
  - Severity and efficacy do effect vaccine acceptance
- On average, **USA had higher acceptability** compared to China
  - People in China see it as trust in the government
  - People is the US see it as herd immunity
  - COVID is worse in USA

Interaction

- **No interaction** between the two factors
  - The effect of efficacy on acceptance is not dependent on the effect of side effect severity
- **In China**, the effect of side effect severity on vaccine acceptance does not vary across different levels of vaccine efficacy
- **In USA**, there is a larger effect of side effect severity on vaccine acceptance when the efficacy is low
  - Most people want the vaccine
  - Acceptance drops only under the condition of low efficacy and severe side effects that

Limitations

- Observed a **ceiling effect** in the samples from US, acceptance accumulated around 9/10.
- **Imbalance of sample size**
  - 81 participants from China, and 24 were from USA; did not collect information about current location
- **Convenient sampling**
  - Might not be representative of the population

References

1. Chapman, G. B., & Coups, E. J. (1999). Predictors of Influenza Vaccine Acceptance among Healthy Adults. Preventive Medicine, 29(4), 249-262. doi:10.1006/pmed.1999.0535
2. Renner, B., & Reuter, T. (2012). Predicting vaccination using numerical and affective risk perceptions: The case of A/H1N1 influenza. Vaccine, 30(49), 7019-7026. doi:10.1016/j.vaccine.2012.09.064
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