

# Mitigating the Effect of Uncertainty in Consumer Adoption of Medical Artificial Intelligence

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## Introduction

In this study, we investigate the potential of explicit uncertainty quantification information in mitigating people's reluctance to follow recommendations from artificial intelligence medical diagnostic systems in high-stakes decisions.

## Background

Medical decisions are typically associated with greater risks when it comes to assessments and treatments, which leads to a reluctance in people's minds to follow recommendations from computerized medical systems (as the case with AI).

Explicit uncertainty quantification information, i.e. about the level of confidence of the prediction, is hypothesized to mitigate uncertainty in high-stakes decisions and facilitate people's reliance on recommendations from medical AI.

This intervention is expected to be more effective for artificial intelligence medical diagnostic system than for doctors.

## Method

Nine-hundred twenty-six participants (age:  $M = 38.05$ ,  $SD = 12.84$ ; 55.0% females, 0.2% others) were recruited from an online panel and instructed to read and answer a short hypothetical decision scenario.

## Stimuli

The scenario places decision-makers in a hospital where they seek medical assistance over symptoms of chest pain. Their case is examined by a medical agent who then recommends to proceed with heart surgery at a certain level of confidence.

## Design

The medical agent and level of confidence of the respective recommendation were manipulated between-subjects:

- » medical agent (AI vs. Doctor supported by AI vs. Doctor)
- » uncertainty quantification information (High vs. Low vs. No)

## Measures

- » choice to follow recommendation (dichotomous: yes, no)
- » trust propensity in AI (3-item 5-point agreement scale;  $CR = .72$ )
- » personal innovativeness (5-item 5-point agreement scale;  $CR = .88$ )
- » familiarity with AI (4-item 5-point agreement scale;  $CR = .94$ )

## Results

### Manipulation check

The manipulation of perceived uncertainty about the agent's recommendation was successful,  $F(8,917) = 14.34$ ,  $p < .001$ .

### Main effects and interactions

People are much less likely to follow the recommendation by the AI ( $OR = 0.17$ , 95%  $CI$ : [0.09, 0.30]) relative to the doctor. Yet, uncertainty quantification information increases acceptance of certain predictions ( $OR = 2.31$ , 95%  $CI$ : [1.30, 4.23]) and does so seemingly more for medical AI ( $OR = 2.03$ , 95%  $CI$ : [0.86, 4.81]).

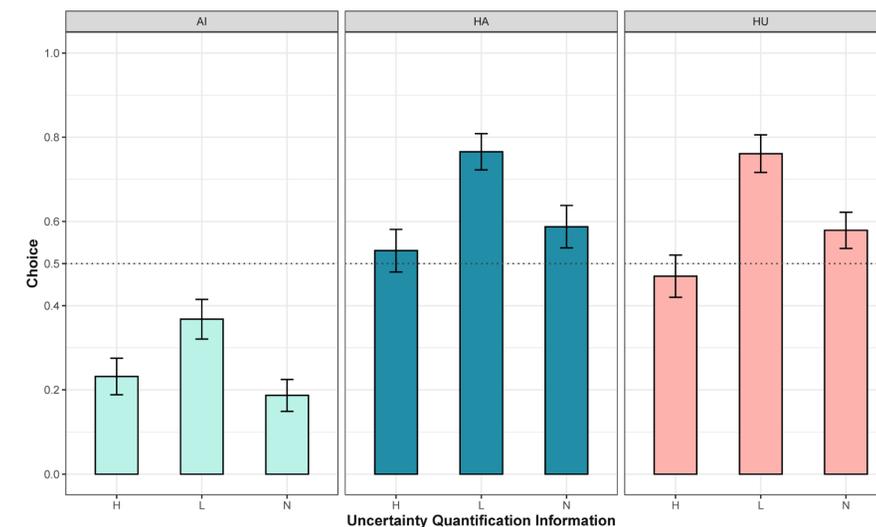


Fig.1 Percentage of people following the recommendation by medical agent and uncertainty quantification information

## Discussion

Recommendations from highly accurate artificial intelligence medical diagnostic systems (level of confidence = 99.9%) are still falling behind those from doctors in terms of acceptance.

While the effect of uncertainty in high-stakes decisions can be mitigated by explicit information about the level of confidence to some degree, it seems much more realistic that medical AI is accepted when introduced as support systems for doctors.

## References

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