# Exploring preferences for Lyme Disease Vaccines in the United States: a latent class approach

PCR155

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## INTRODUCTION

- Approximately 476,000 people are diagnosed and treated with Lyme Disease (LD) in the United States (US) annually and the geographical distribution is expanding.[1]
- Currently, treatment options for LD primarily involve antibiotics that are generally effective, yet 5-10% of patients continue to have persistent symptoms even after treatment[2], highlighting the need for effective preventive measures.
- To gauge public acceptance and adoption of a potential LD vaccine, it is necessary to understand the extent to which potential vaccine recipients weigh vaccine attributes such as benefits, risks, and costs.
- However, to date, there is limited published research exploring the preferences of at-risk individuals regarding LD vaccines.

## OBJECTIVES

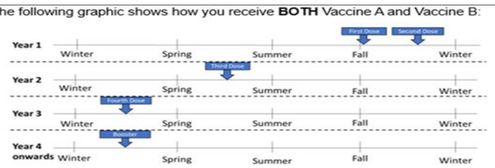
- This research aimed to quantify the relative importance of factors driving decisions around LD vaccination by eliciting preferences for vaccine characteristics and evaluating preference heterogeneity among potential US vaccine recipients.

## METHODS

- A web-based discrete-choice experiment (DCE) was administered to 2,000 adults living in 17 high LD incidence states and 10 neighboring states.
- Each respondent answered a series of 12 DCE tasks (72 questions total split into 6 blocks of 12), each consisting of two hypothetical vaccines and a no vaccine alternative (opt-out). Figure 1 presents an example choice task from the DCE

### Figure 1. Example Choice Task

Please remember, the following graphic shows how you receive **BOTH** Vaccine A and Vaccine B:




| Vaccine Feature | Vaccine A | Vaccine B | No Vaccine |
|---|---|---|---|
| Protection after the 4th dose, maintained with booster | 75% of infections prevented | 90% of infections prevented | 0% of infections prevented |
| Risk of mild side effects when getting the vaccine | 30% (30 out of 100 people) | 15% (15 out of 100 people) | No risk (0%) |
| Risk of skin reaction where the vaccine is injected | 30% (30 out of 100 people) | 50% (50 out of 100 people) | No risk (0%) |
| Risk of severe side effects requiring hospitalization | No risk<br>0 in 10,000 people | 1 in 10,000 people<br>(0.01%) | No risk<br>(0 in 10,000 people) |
| Which Vaccine would you choose? | ☐ | ☐ | ☐ |

- DCE data were first analyzed using a random-parameters logit (RPL) model, which provides estimates of the extent to which preferences differ among respondents.
- RPL results included statistically significant standard deviation estimates on all attributes, indicating substantial preference heterogeneity in the data.
- To further explore the magnitude and form of preference heterogeneity, latent class (LC) models were estimated.
- Due to RPL results showing a strong preference for a vaccine, each LC model included a "constrained class" in which only the opt-out alternative-specific constant (ASC) was estimated, and all other attribute parameters were fixed at zero.
  - This class aims to account for preferences of those who do not base their choices on specific vaccine attributes and only chose between a vaccine and no vaccine (captured by the sign on the ASC).
- LC models of 2 to 6 classes were estimated and evaluated using a combination of information criterion, such as BIC and AIC[3], and a qualitative assessment of the preference information gained with each additional class
- Attribute levels were effect-coded so that the mean utility of all possible vaccine profiles equals zero
- Conditional relative importance weights were calculated by taking the difference between the most preferred level and least preferred level for each attribute
- The probability of a respondent being in each class was regressed on a constant and respondent characteristics as covariates using a three-step adjusted approach[4].
- Respondent characteristics were effect-coded so that the constant represents the average respondent.

## RESULTS

- Nearly **two-thirds of the sample (66.1%)** chose a vaccine alternative (did not select the Optout option) in **all 12 of the DCE questions.**
- Table 1 presents respondent answers to survey questions.

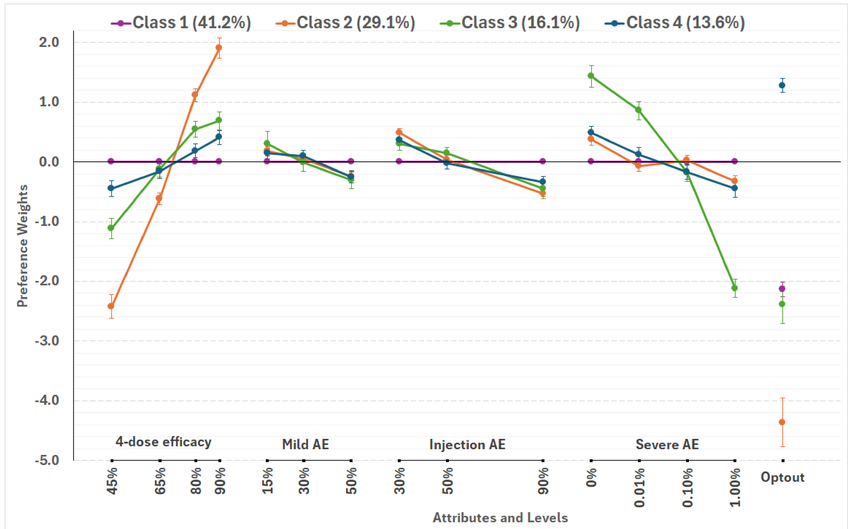
## RESULTS, cont'd

### Table 1. Respondent characteristics

| Category | N (%) or Mean (SD) |
|---|---|
| Age in years | 45.6 (13.6%) |
| Male | 1127 (56.4%) |
| Decided not to get a vaccine that was recommended by healthcare provider | 614 (30.7%) |
| Plan to get some recommended vaccines in the next 5 years | 445 (22.3%) |
| Had LD or family/friend had LD | 1029 (51.5%) |
| Outdoors due to primary occupation | 654 (32.7%) |
| Not gotten all recommended vaccines | 614 (30.7%) |
| Live in suburb, small town, or rural area | 1018 (50.9%) |
| 2 or more days outdoors per week | 1198 (59.9%) |
| Aged 44 or older | 938 (46.9%) |
| Have outdoor pet | 1152 (57.6%) |

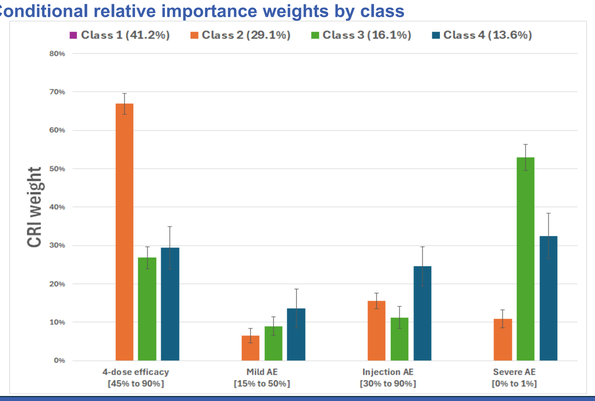
- A 4-class model was selected as the best fit for the data.
- Figure 2 shows the relative preference weights for each class alongside class membership probabilities:
  - The largest class is the class constraining all attributes other than the opt-out ASC to be zero (Class 1). This class strongly prefers to get a vaccine, without differentiating between vaccine attributes or levels
  - Class 2 strongly prefers getting a vaccine, placing the largest relative importance on 4-dose efficacy compared to other attributes.
  - Class 3 strongly prefers getting a vaccine, placing the largest relative importance on avoiding severe AE risks
  - Class 4 prefers the no vaccine option but place some importance to efficacy and risks of AE.

### Figure 2. Relative preference weights by class




- Figure 3 details the conditional relative importance weights that facilitate comparisons of attribute importance across classes. Class 1 has no estimates for attribute levels and cannot provide CRI weight estimates

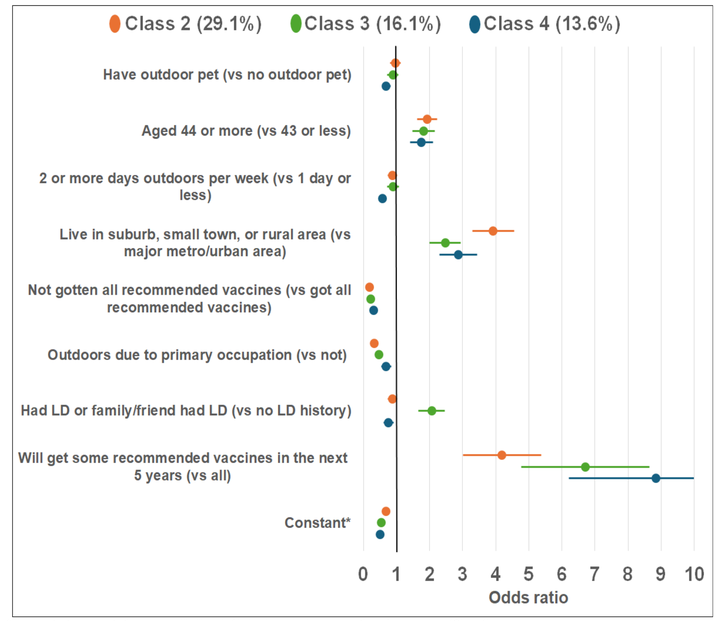
### Figure 3. Conditional relative importance weights by class




## RESULTS (cont.)

- Figure 4 presents covariates with significant associations to class membership as odds ratios
- Each covariate has a reference level (in parentheses) and Class 1 is the reference class
- Odds ratios above 1 can be interpreted as respondents with that covariate (vs the reference level) are more likely to be represented by a given class than class 1.
- Odds ratios below 1 can be interpreted as respondents with that covariate (vs the reference level) are less likely to be represented by a given class than class 1.

### Figure 4. Odds ratios of covariates on class membership




*The constant represents the average likelihood of being in each class versus the reference class (Class 1)

## DISCUSSION

- Overall, respondents showed a strong desire to be vaccinated to protect against LD; where the ASC opt-out only class in the LCA represented nearly half the sample
- Most common preference pattern placed largest relative importance on efficacy
- There are multiple groups of respondents with distinctly differing preferences: a share of respondents concerned most with severe AE risks and another share of respondents that require a safe and efficacious vaccine to opt-in

## CONCLUSIONS AND LIMITATIONS

- **Overall, demand for a LD vaccine was high among people in the sample (66.1% of the sample always chose a vaccine alternative in the DCE)**
- **Preference patterns are distinct indicating not all populations want the same vaccine profiles**
- **Different potential vaccine recipients may tradeoff between vaccine characteristics differently**
- **The survey excluded those who reported being opposed to all vaccines**

### REFERENCES

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### DISCLOSURES

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