Comparing Seasonal Influenza & COVID-19 Immunization in Oregon

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Overview

COVID-19 immunization patterns in Oregon are remarkably similar to season influenza immunization patterns, just larger.

- About half of Oregon adults get a seasonal influenza immunization each year.
- Roughly 70% of Oregon adults are immunized against COVID-19
- Some people get a flu shot each year- but most are less consistent
- Over 70% of Oregon adults have gotten at least one flu shot in the last three seasons
- Flu immunizations each year follow predictable patterns, across counties, age groups, and for ramping up & declines.
- COVID-19 immunization follows similar patterns across counties, age groups, and in decline.
- A difference is that ALERT IIS is capturing ~95% of adult COVID-19 immunizations, vs ~80% capture for adult seasonal influenza immunizations.

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General Model/Hypothesis

Hypothesis: the likelihood of getting any type of immunization can be simply modeled based on individual & community factors:

- Individual
  - Perception of personal risk/disease severity
  - Awareness of disease in referent community/social network
- Community
  - Community/social network sentiment toward immunizations
  - Access to immunizations

- In the simplest model, community factors are similar across recent flu seasons to COVID-19; what has changed is on the individual level.
- So COVID-19 immunization likelihood can be modeled/tested as a multiple of influenza immunization likelihood.

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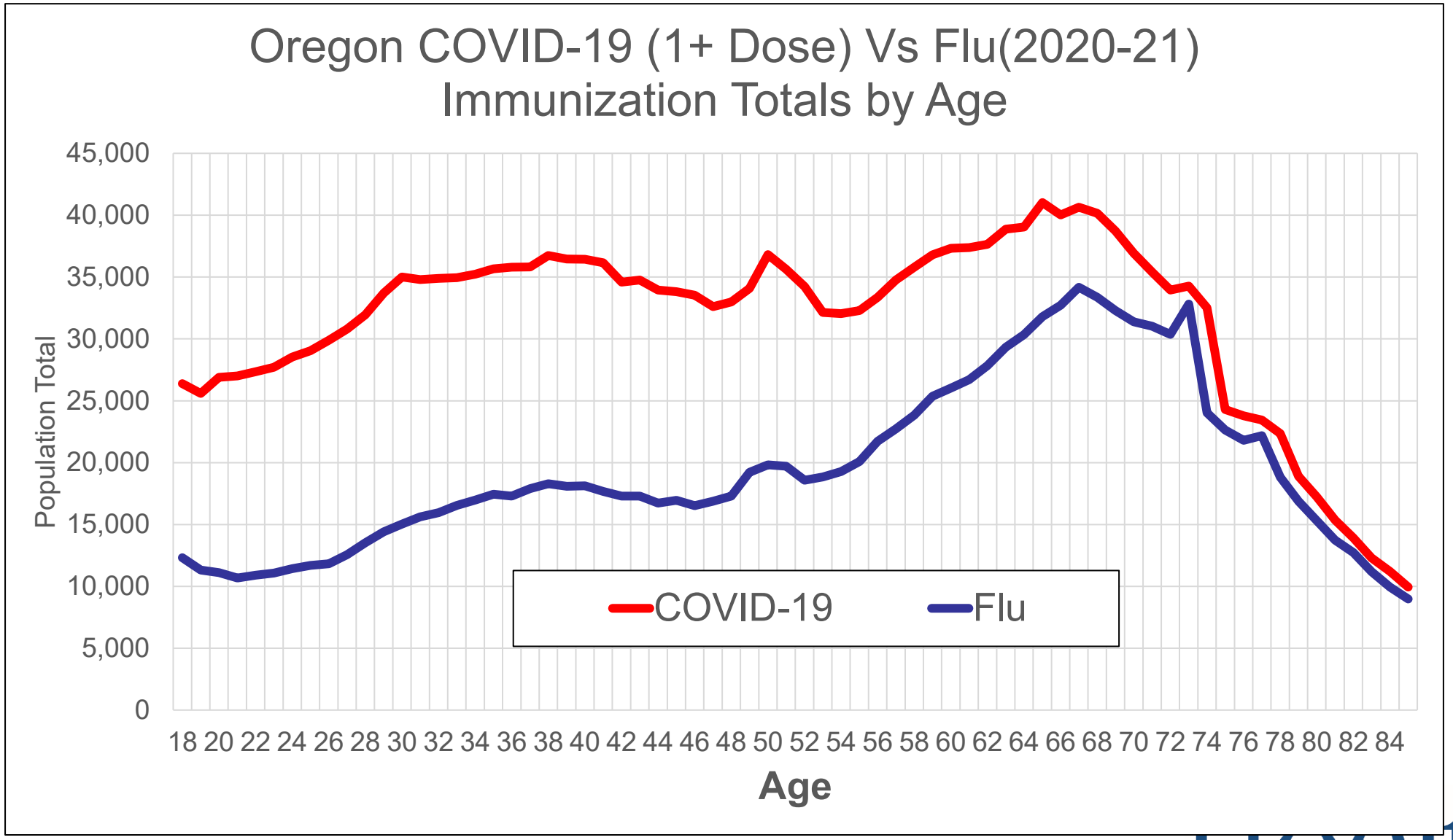
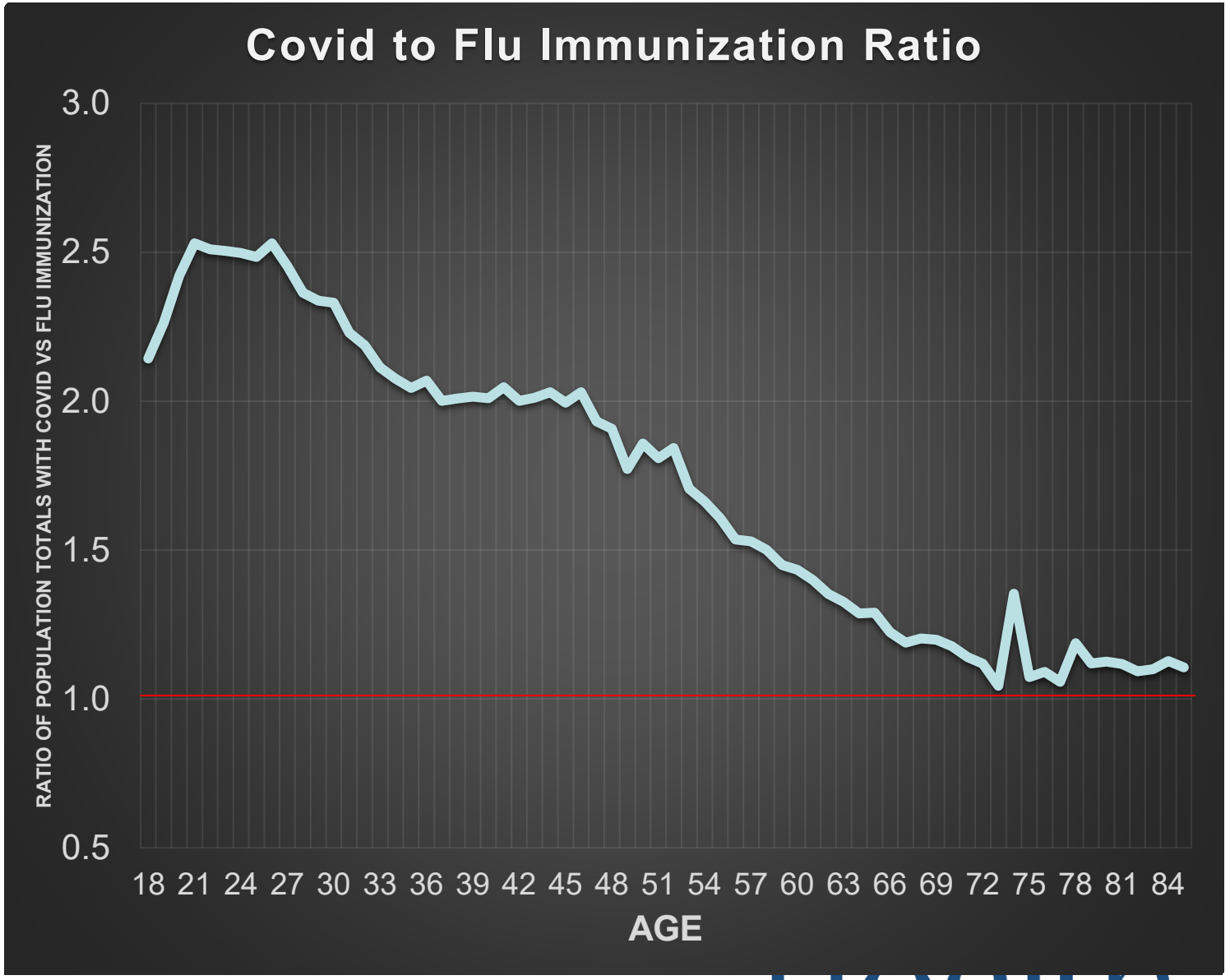
COVID-19 to Flu Immunization Totals by Age Group

- Both COVID-19 and flu immunization rates increase by age
- The shape of the age curve is slightly different for COVID-19 immunization
- This difference likely reflects that younger adults feel more threatened by COVID-19.


Oregon COVID-19 (1+ Dose) Vs Flu(2020-21)
Immunization Totals by Age
Population Total
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84
Age
COVID-19
Flu

- The ratio of COVID-19 to flu immunizations in a population is a potential measure of how much more COVID-19 is viewed as a risk than flu is.
- For older age groups, flu and COVID-19 are both potential end of life events.
- Younger adults view COVID-19 as a substantially greater threat than flu.



COVID-19 to Flu Immunization Comparisons- Gender

- In prior flu seasons, non-senior men had lower immunization rates than women.
- Men's flu shots also tend to be later in the season than women.
- Younger men lag behind women for flu shots more than middle-aged men.

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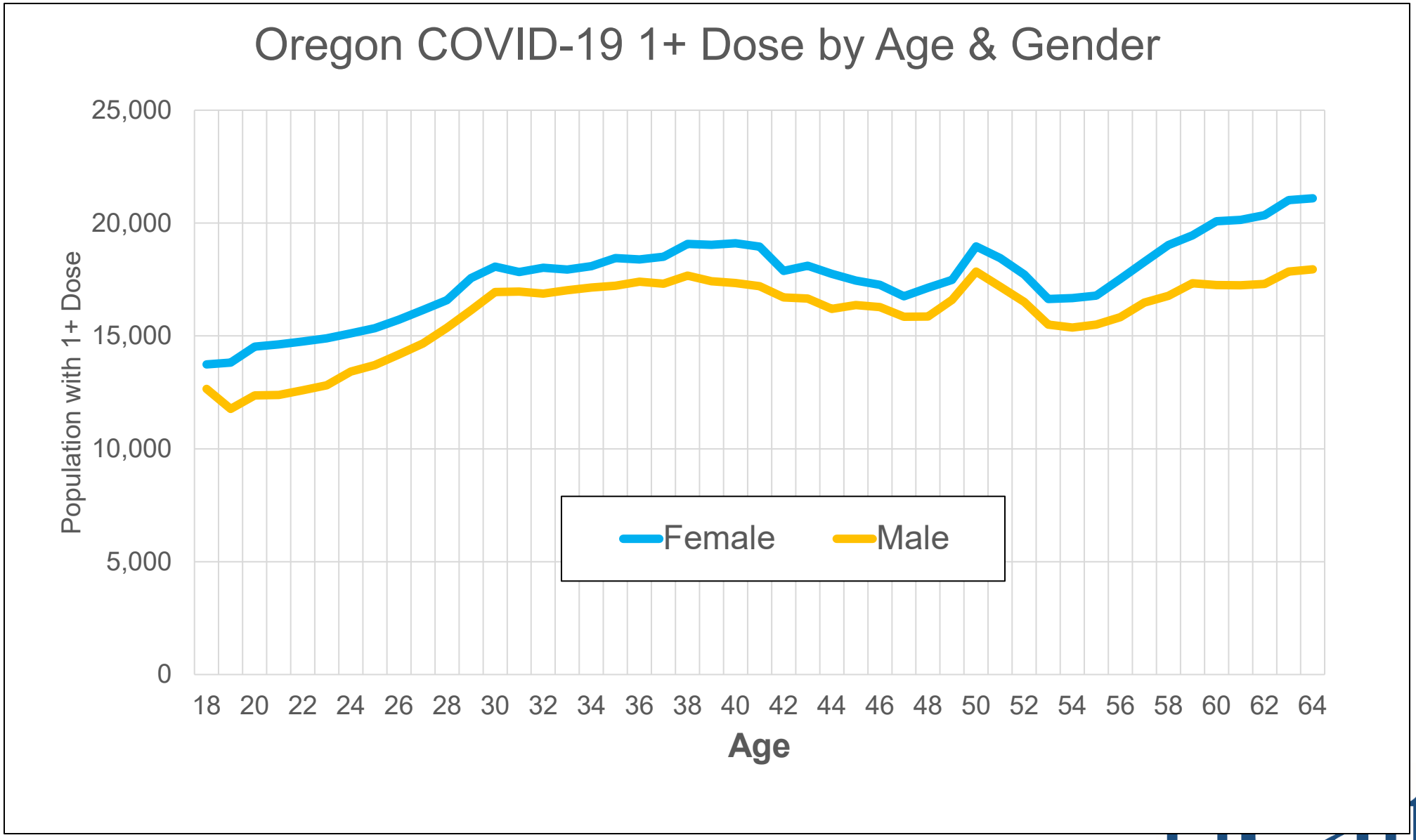
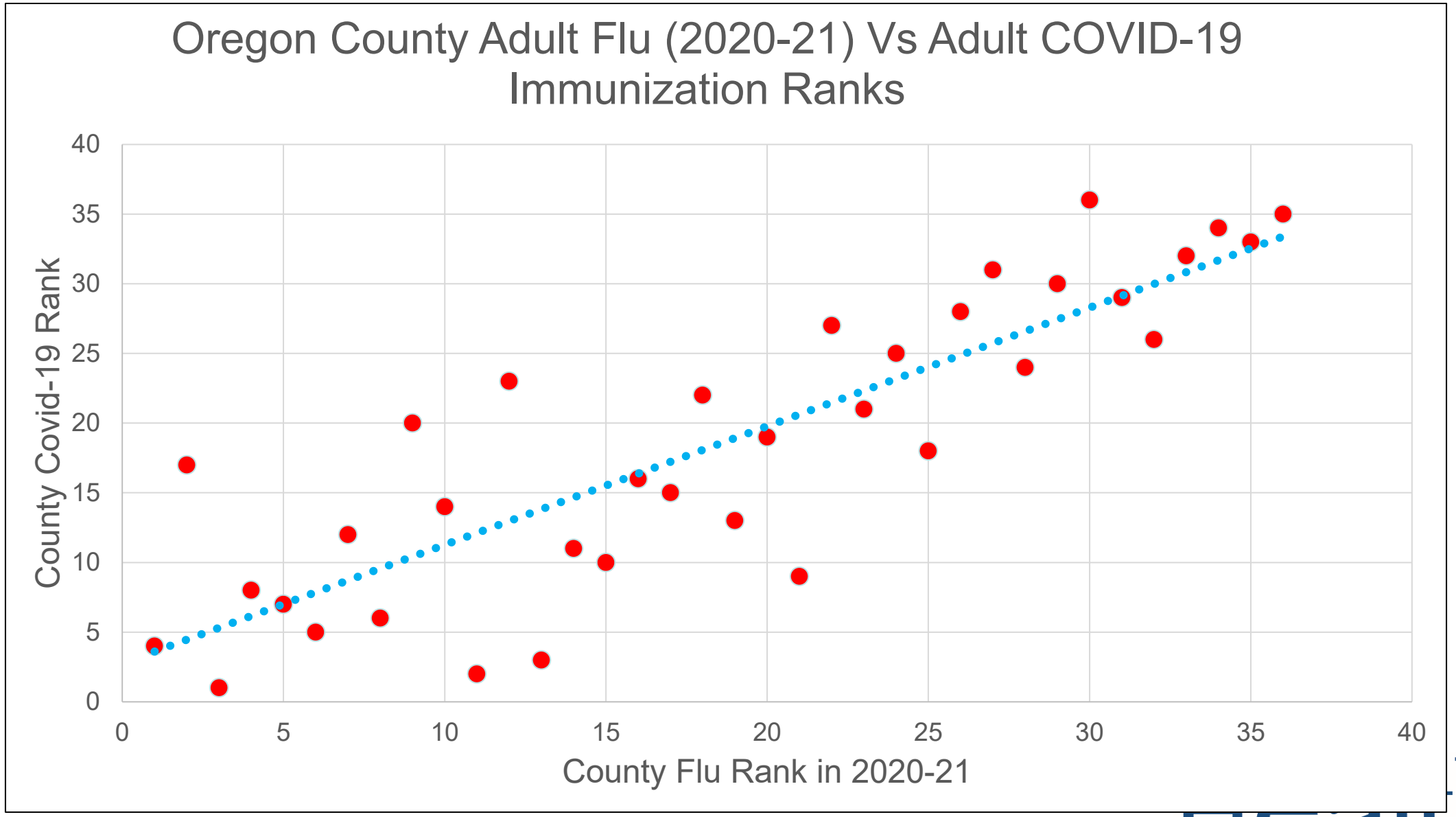

Oregon COVID-19 1+ Dose by Age & Gender
Population with 1+ Dose
25,000
20,000
15,000
10,000
5,000
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64
Age
Female
Male

COVID-19 to Flu Immunization Comparisons- County

- County differences reflect community sentiment and access for vaccination.
- Prior model prediction then is that these will be largely unchanged across flu to COVID.
- For 36 Oregon counties, a Spearman rank order correlation was calculated between COVID-19 adult immunization rates and flu immunization rates.
- The correlation between county adult flu immunization rank and adult COVID-19 immunization rank was $R^2 = .72$.


Oregon County Adult Flu (2020-21) Vs Adult COVID-19 Immunization Ranks
County Covid-19 Rank
County Flu Rank in 2020-21
0
5
10
15
20
25
30
35
40

COVID-19 to Flu Immunization Comparisons- Decline

Both flu immunizations and COVID-19 immunization (first dose) had steep declines per week when past their peaks.

This decline can be modeled as a Markov chain- where the number of new immunizations in each post-peak week is a multiple of the prior week (& less than 1.0)*

For adult flu in 2020-21, this multiplier was .81 per week

For COVID-19 in 2021, this multiplier was .79 per week.

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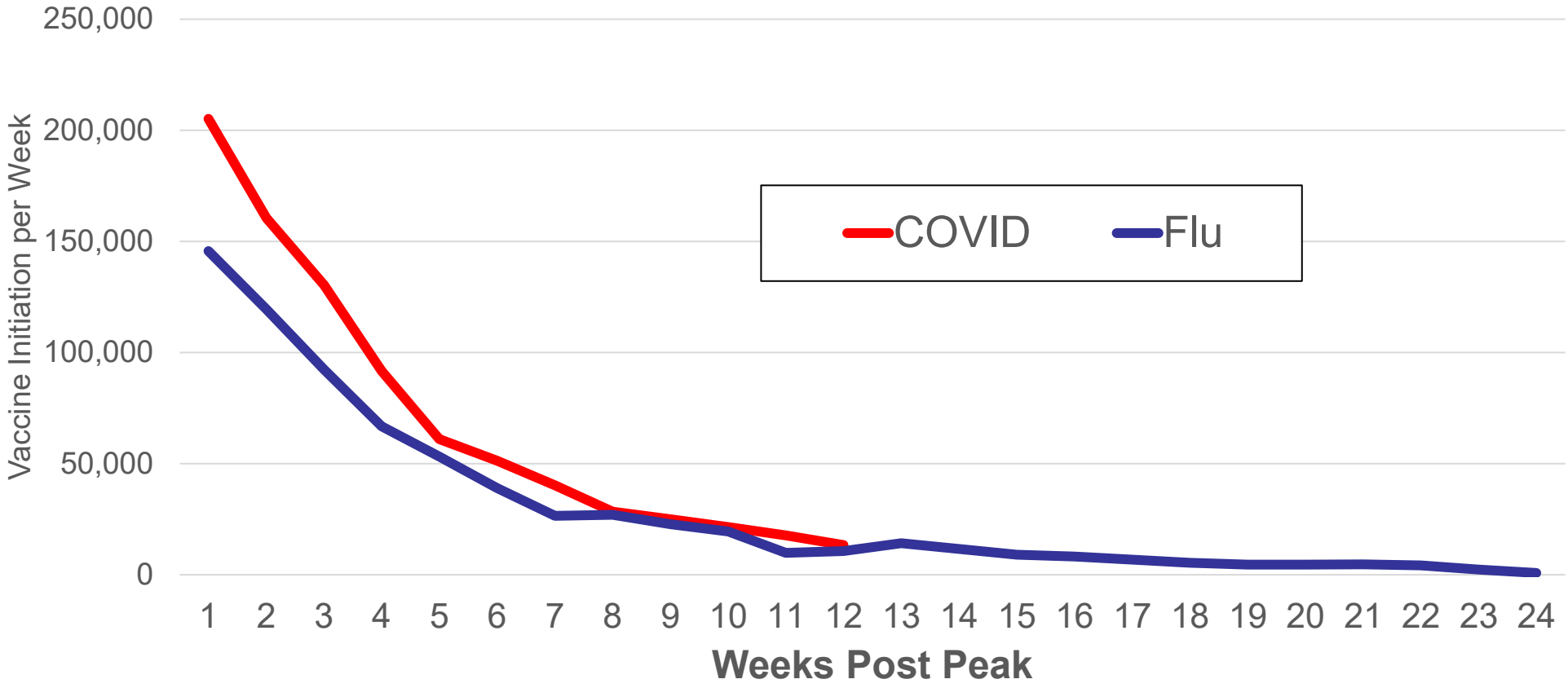
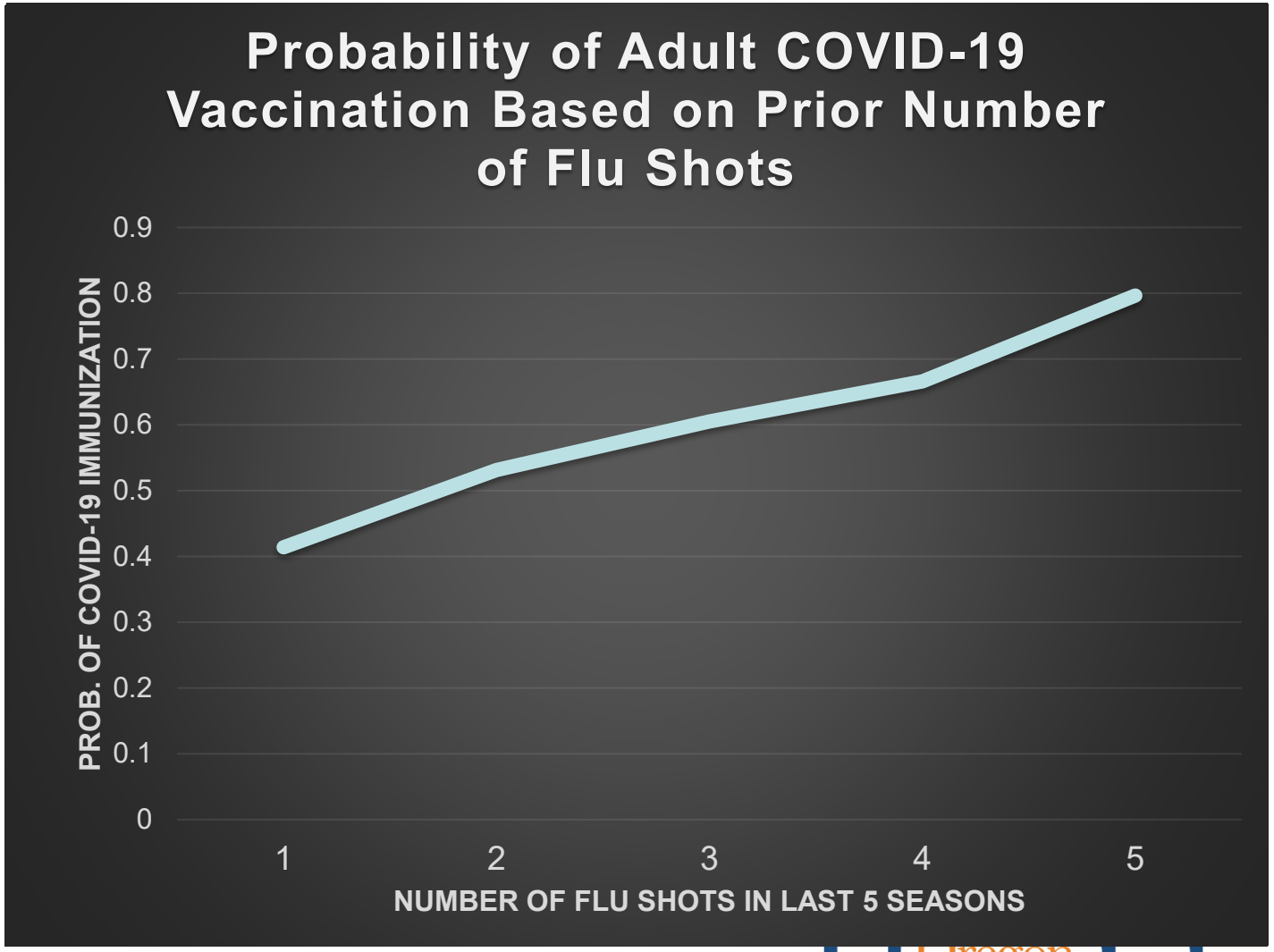
*for a simple Markov chain the next week totals only depends on the prior week and a constant multiplier

Oregon Adult Vaccine Initiations Post-Peak, Flu 2020-21 vs COVID-19 in 2021



- For adults, flu immunization in the last 5 seasons is correlated with COVID-19 immunization.



Conclusions

- It is reasonable to view adult immunizations as following a single pattern.
  - This pattern is modified by perceptions of increased prevalence and risk for COVID-19.
- In contrast, community sentiment toward immunization across flu to COVID-19 has not necessarily changed in this model.
- Vaccine hesitancy is nothing new- what we see for COVID-19 is what has been there all along.
- Strong similarities between flu and COVID shot-seeking decreases per week post-peak exist
- This similarity in decline should be considered in future vaccine uptake predictions and intervention design.

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Next Steps

- Modeling whether current COVID-19 immunization, with a reduced personal multiplier parameter, is a good predictor of 2021-22 flu immunization likelihood.
- Testing individual perceptions of disease risk, flu to COVID-19, by age groups in this model.
- Introducing race as a potential stratifier into flu to COVID-19 models- testing if the role of race has changed.

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