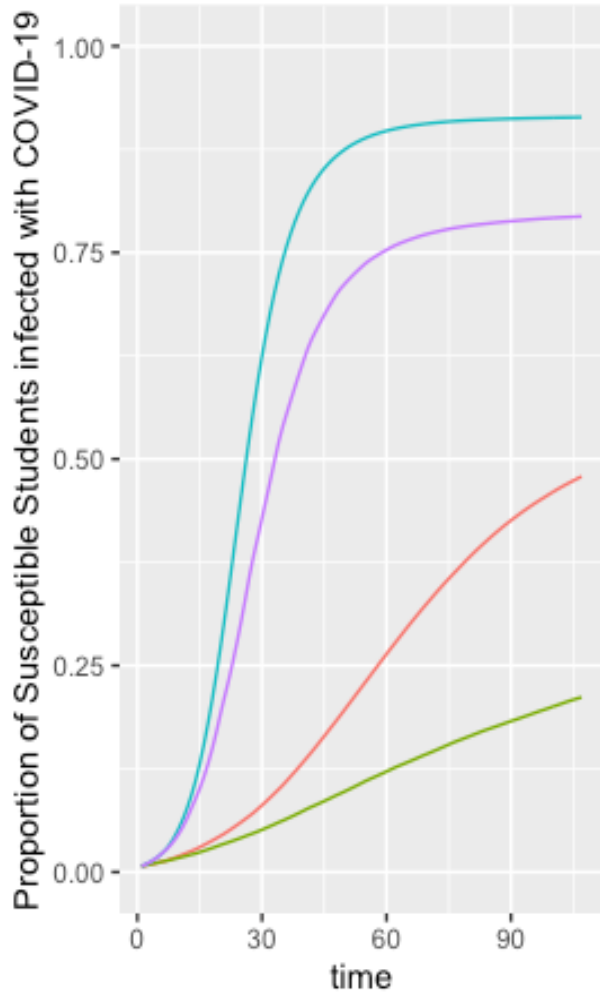


COVID-19 Simulation Integrated Model (*COVSIM*) to Inform Local Decision-Making

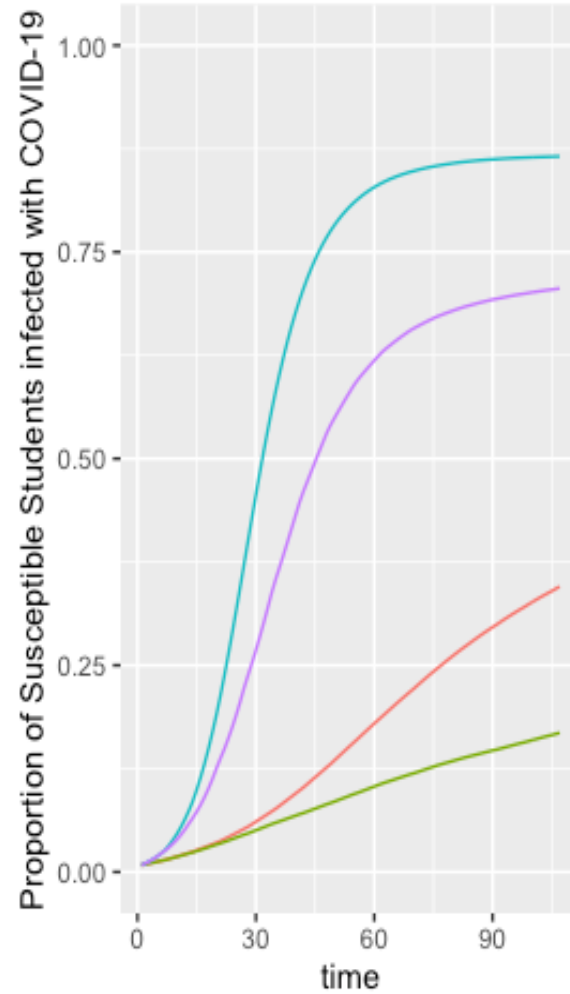
COVID-19 Modeling Projections for Schools Part 2: Model Results



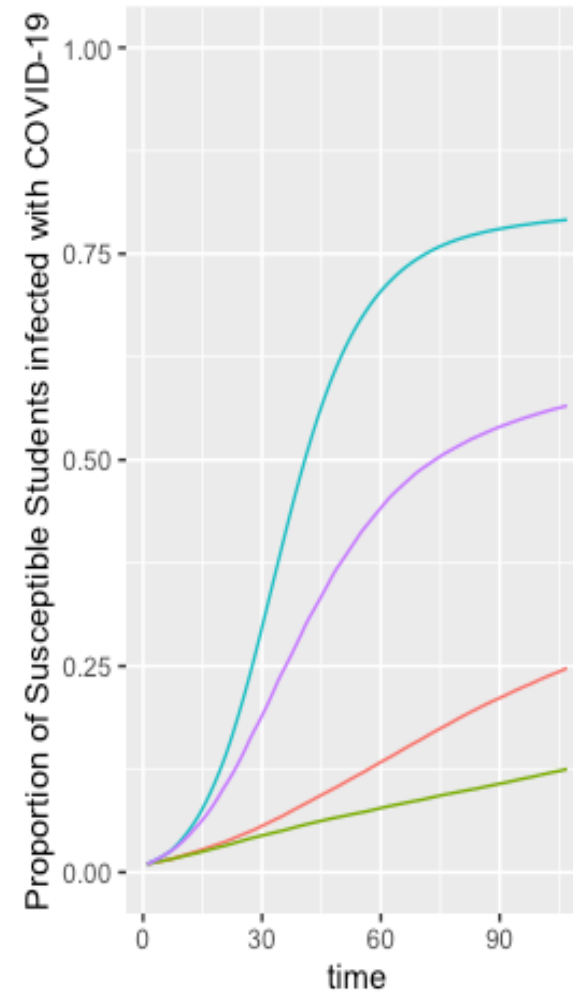
Elementary School Setting
(incoming protection = 30%)



Middle School Setting
(incoming protection = 40%)



High School Setting
(incoming protection = 50%)

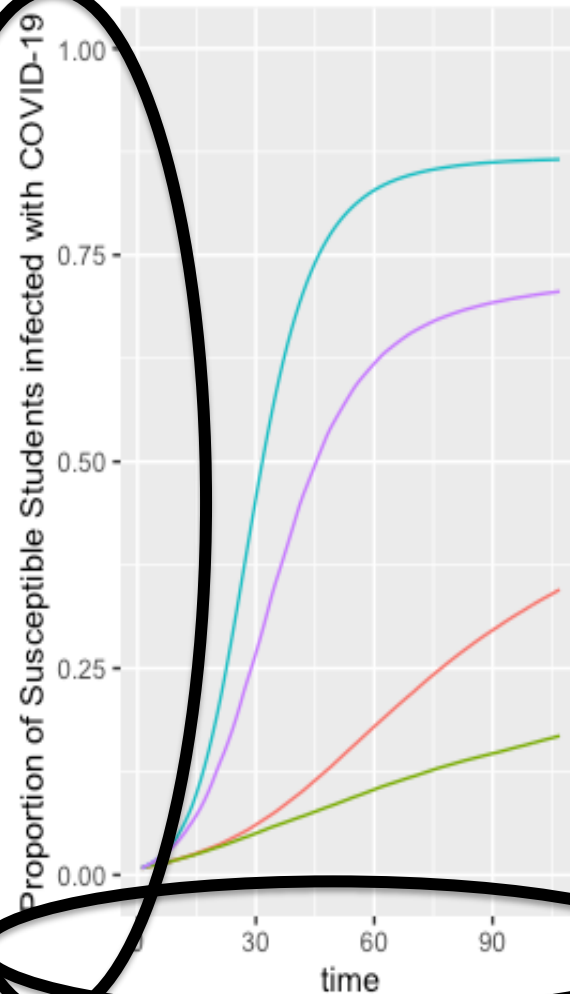


scenarios

- Universal masking: Baseline
- Universal masking: PCR_50
- No masking: Baseline
- No masking: PCR_50

Y axis = Percent of
Susceptible Students
who have become
infected

Middle School Setting
(incoming protection = 40%)

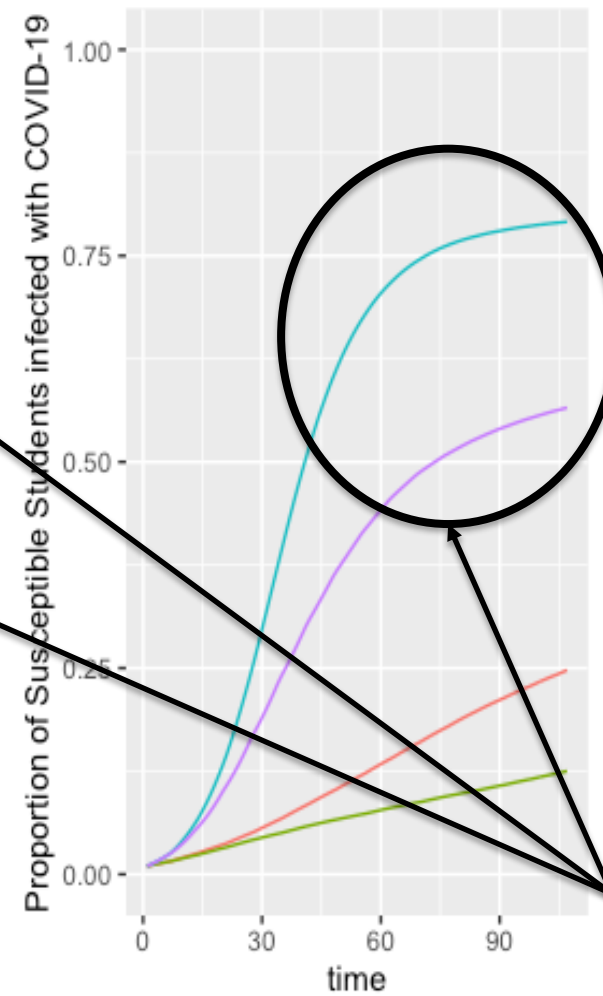
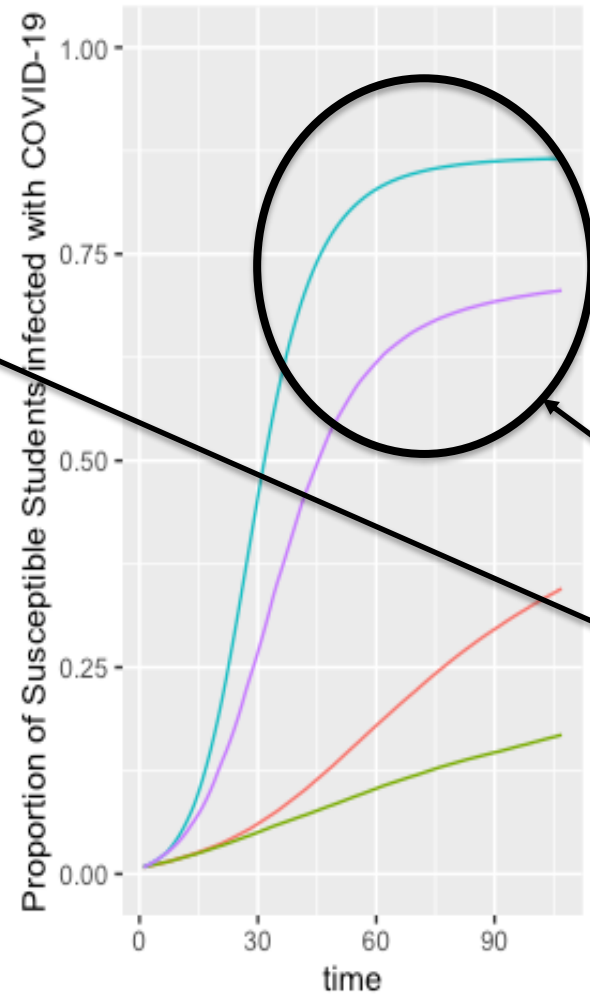
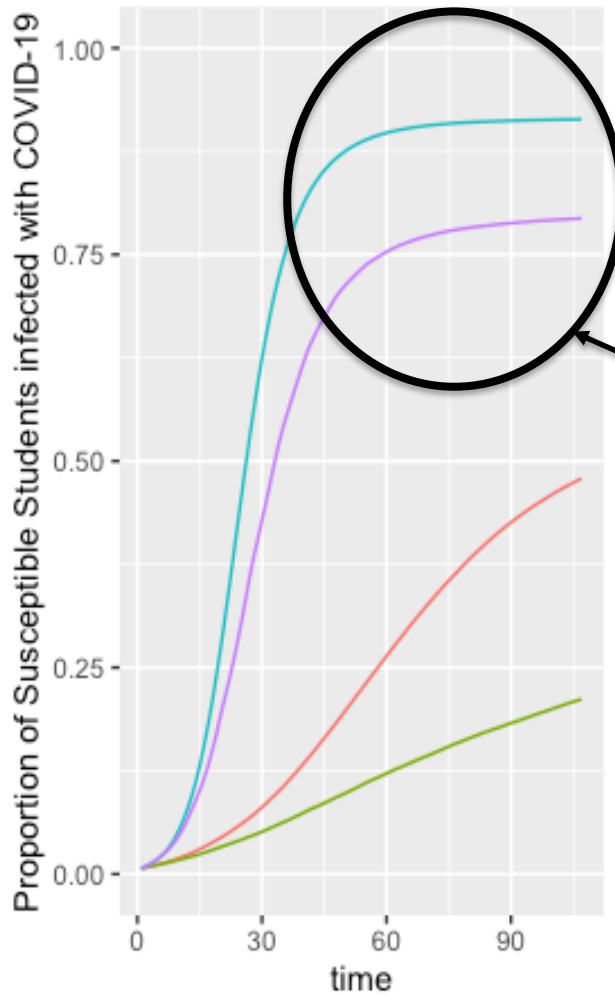


X axis = days since the
school semester began
(107 total days)

Elementary School Setting
(incoming protection = 30%)

Middle School Setting
(incoming protection = 40%)

High School Setting
(incoming protection = 50%)



scenarios

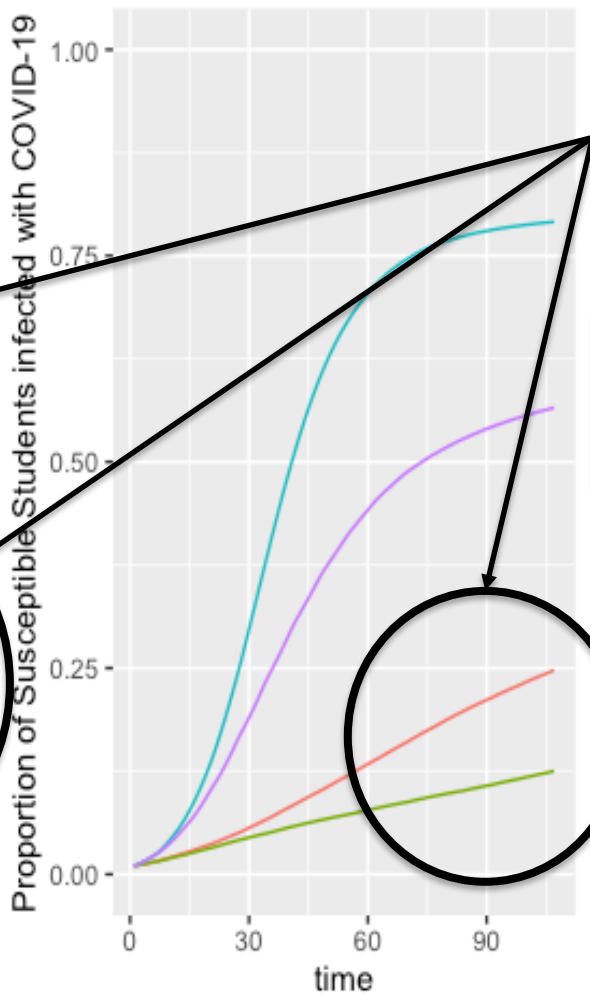
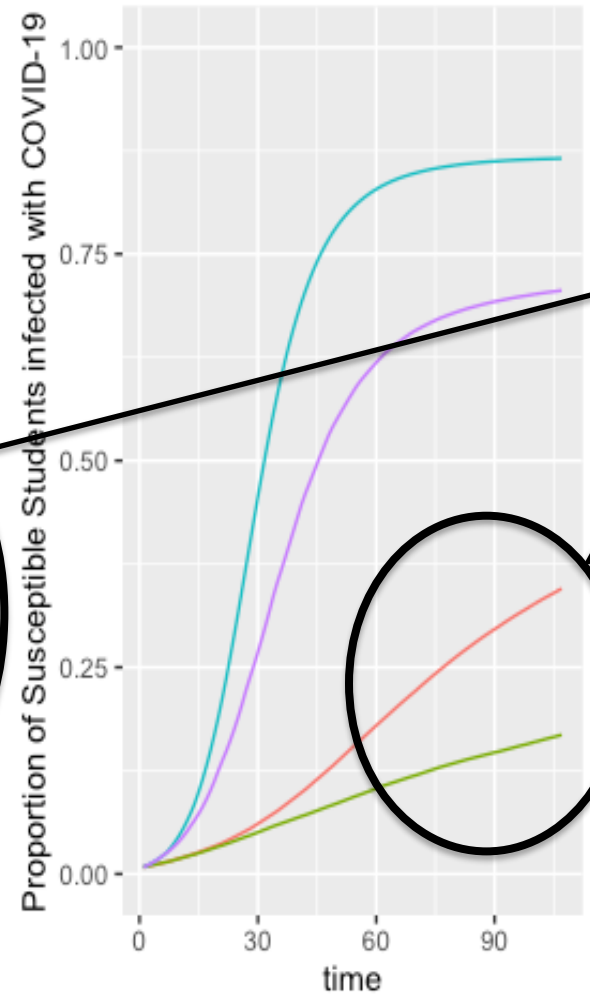
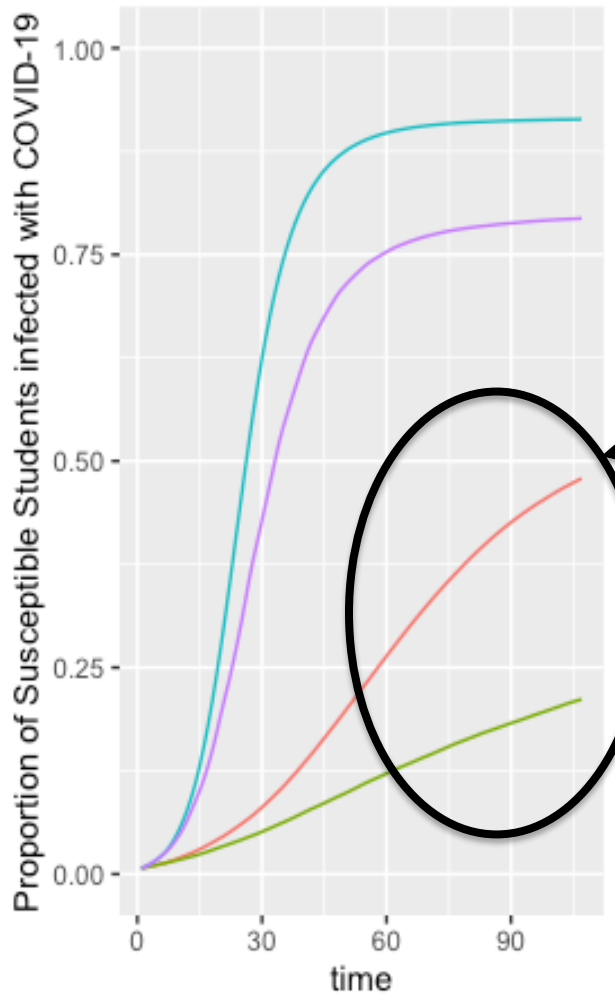
- Universal masking: Baseline
- Universal masking: PCR_50
- No masking: Baseline
- No masking: PCR_50

“No Masking” scenarios:
effective reproductive rate = 4.0
(for every 1 person infected, 4 other students become infected)

Elementary School Setting
(incoming protection = 30%)

Middle School Setting
(incoming protection = 40%)

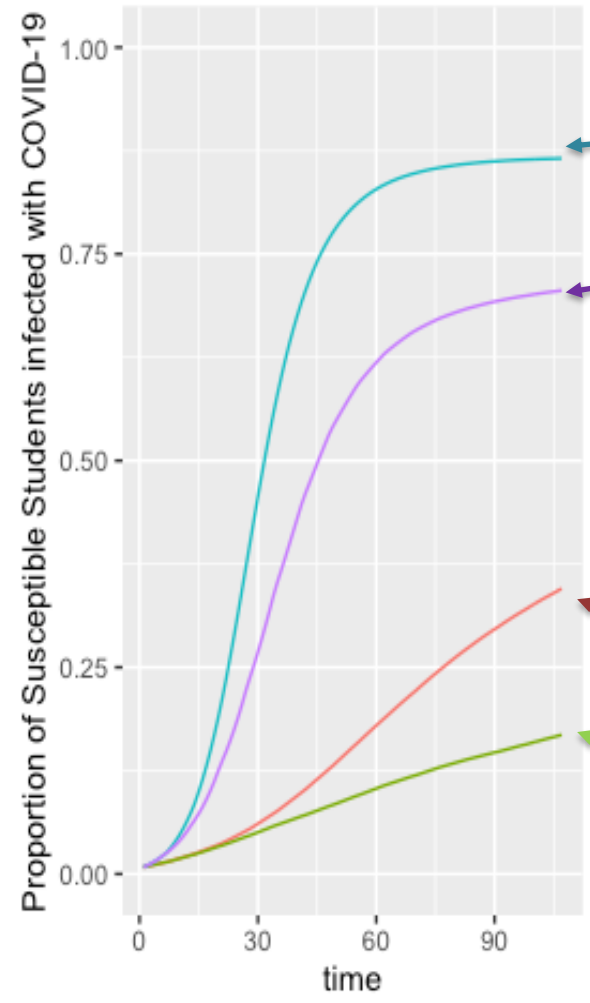
High School Setting
(incoming protection = 50%)



“Universal Masking”
scenarios: **effective reproductive rate = 2.0**
(50% reduction in viral reproducibility from masking)

- scenarios
- Universal masking: Baseline
 - Universal masking: PCR_50
 - No masking: Baseline
 - No masking: PCR_50

Middle School Setting
(incoming protection = 40%)



No Masks

No testing

Testing 1/2 of students

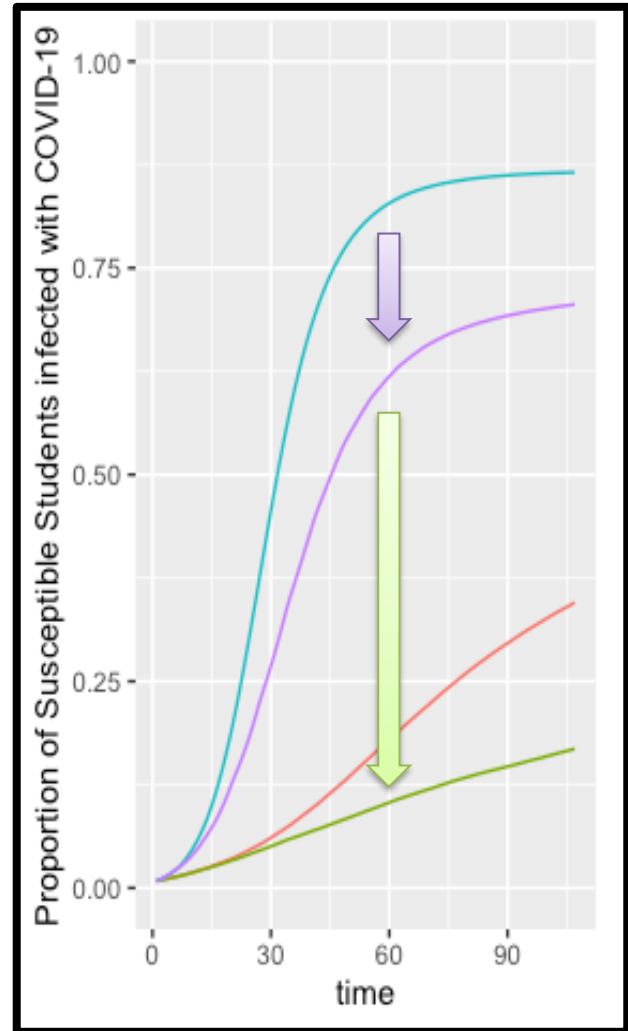
2 Levels of Testing for either masking policy
(no testing OR testing 1/2 of students every week)

Universal Masking

No testing

Testing 1/2 of students

Middle School Setting
(incoming protection = 40%)



after 60 days....

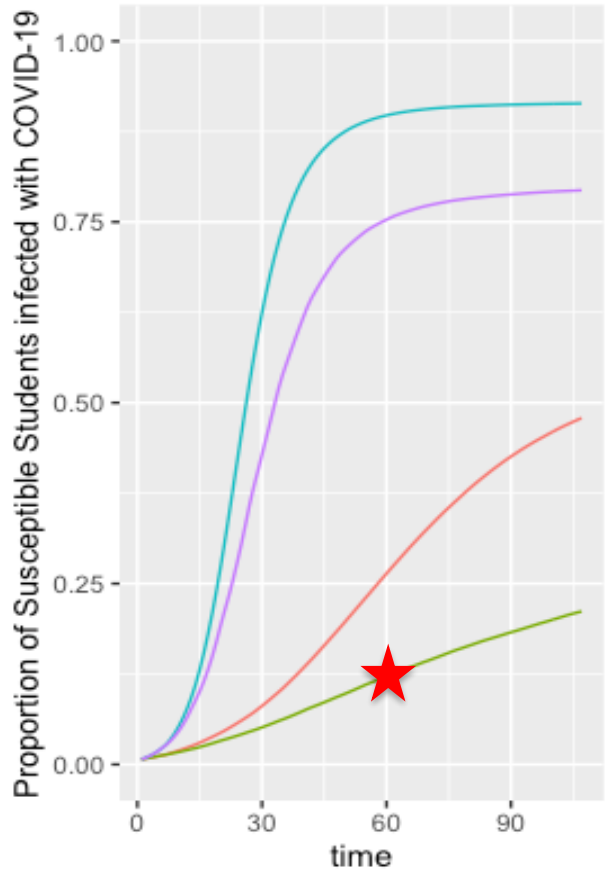
No testing, No masking = ~80% of susceptible students have become infected

Testing students, no masking = ~60% of susceptible students have become infected

Testing students + universal masking = ~10% of susceptible students have become infected

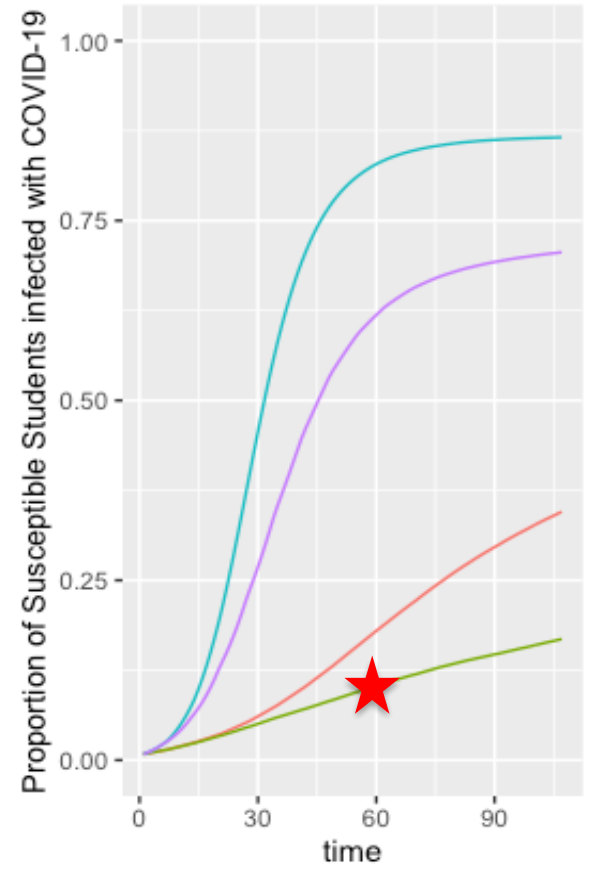


Elementary School Setting
(incoming protection = 30%)



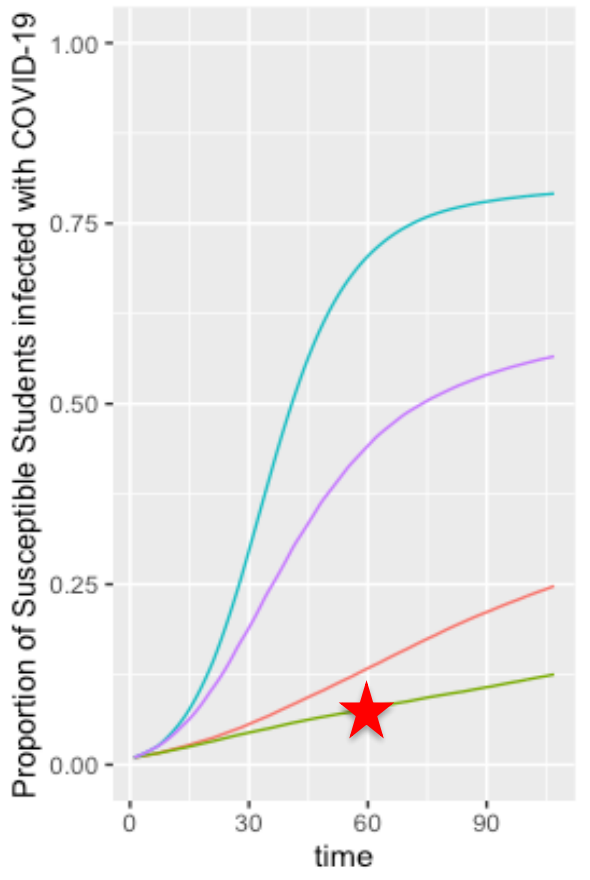
~15% of susceptible students have become infected (30% protection)

Middle School Setting
(incoming protection = 40%)



~10% of susceptible students have become infected (40% protection)

High School Setting
(incoming protection = 50%)



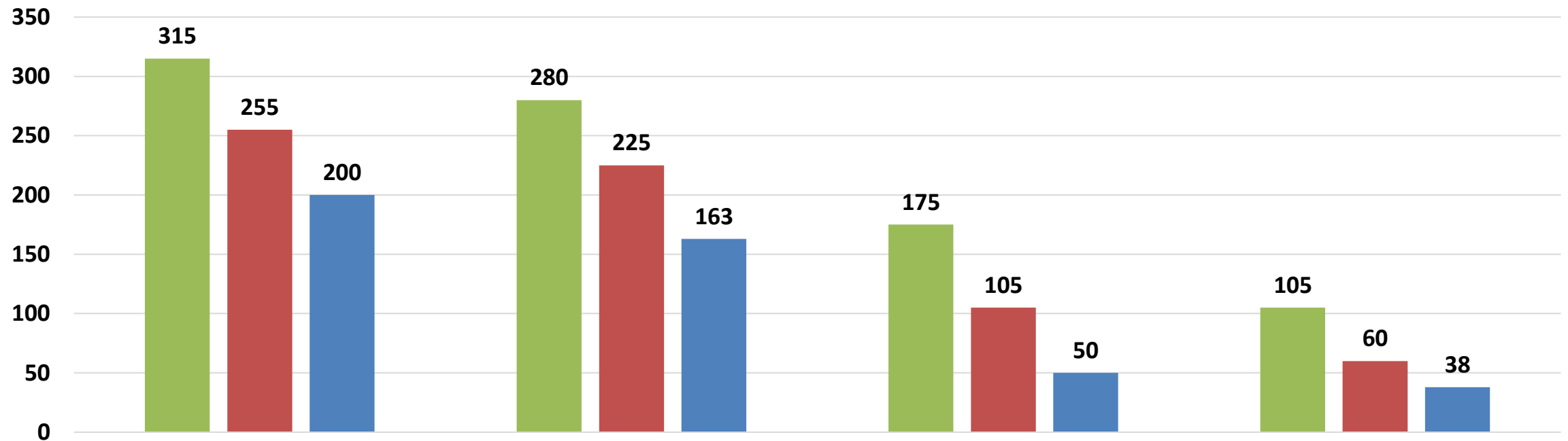
~7% of susceptible students have become infected (50% protection)

- scenarios
- Universal masking: Baseline
 - Universal masking: PCR_50
 - No masking: Baseline
 - No masking: PCR_50

after 60 days....

New Infections among 500 Students after 1 semester

- Elementary School Setting (incoming protection = 30%)
- Middle School Setting (incoming protection = 40%)
- High School Setting (incoming protection = 50%)



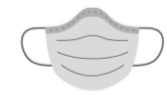
No Masking, No Testing



No Masking, Testing



Masking, No Testing

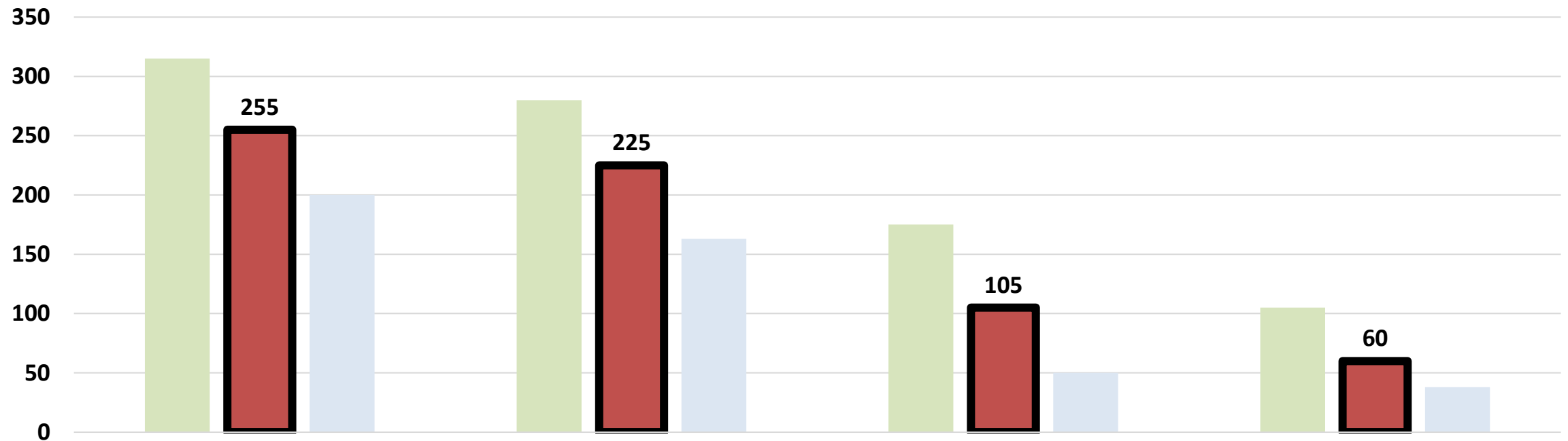


Masking and Testing



New Infections among 500 Students after 1 semester

- Elementary School Setting (incoming protection = 30%)
- Middle School Setting (incoming protection = 40%)
- High School Setting (incoming protection = 50%)



No Masking, No Testing



No Masking, Testing



Masking, No Testing

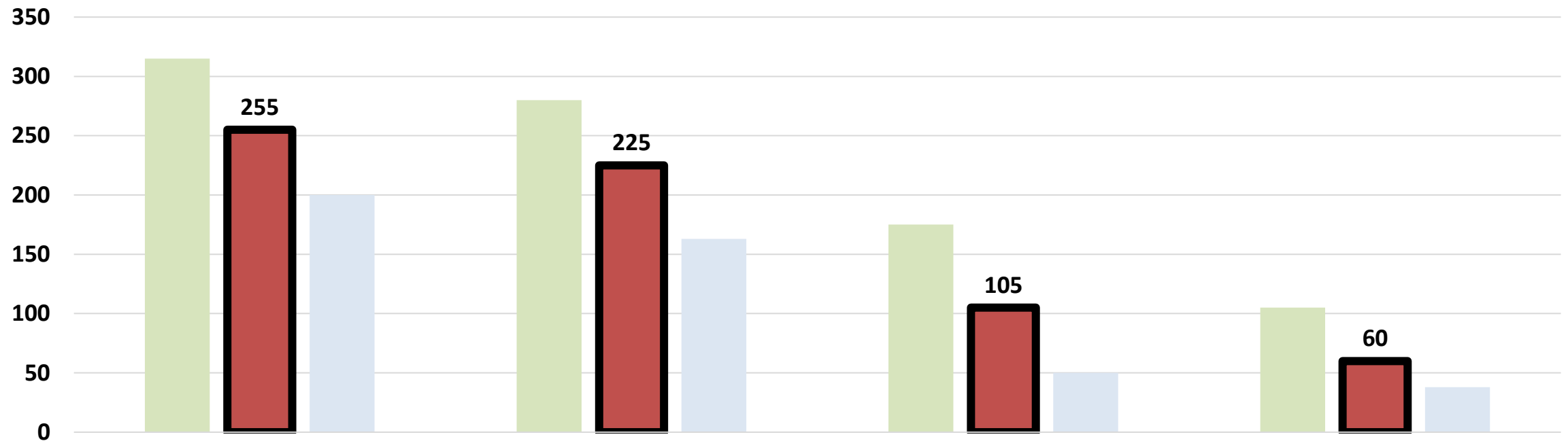


Masking and Testing



New Infections among 500 Students after 1 semester

- Elementary School Setting (incoming protection = 30%)
- Middle School Setting (incoming protection = 40%)
- High School Setting (incoming protection = 50%)



No Masking, No Testing



No Masking, Testing



Masking, No Testing

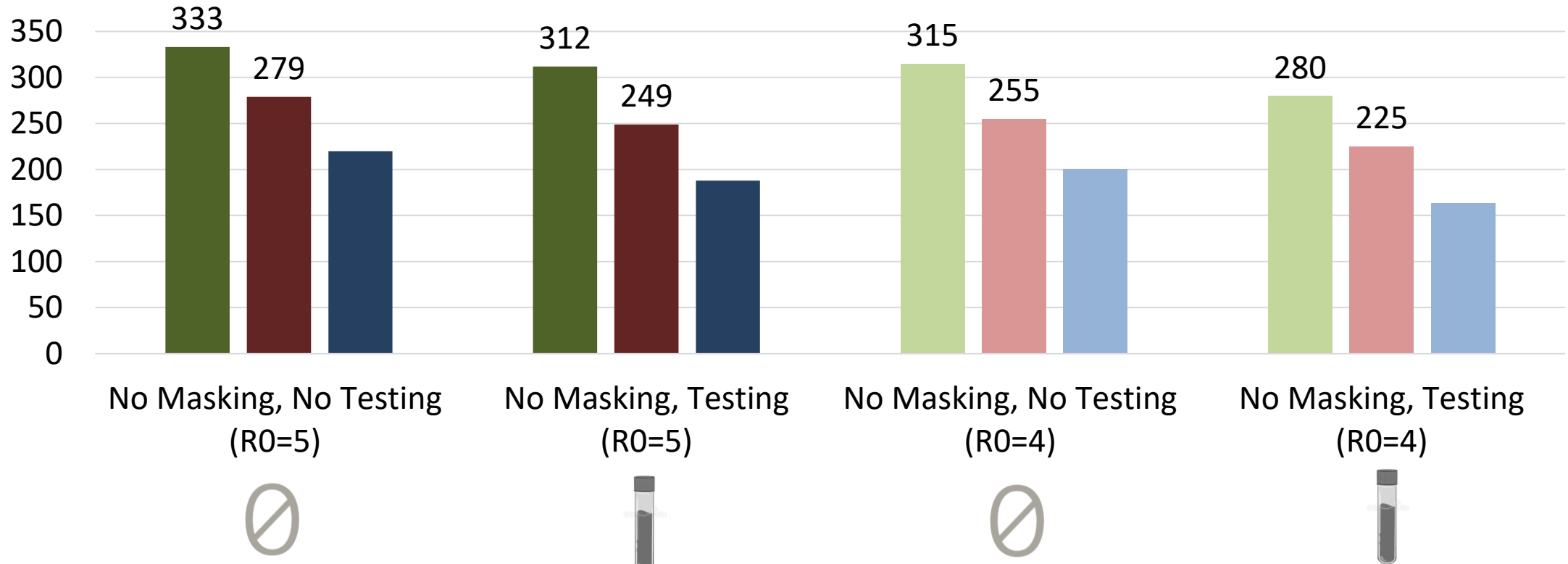


Masking and Testing



New Infections among 500 Students after 1 semester ($R_0 = 5$ vs $R_0 = 4$)

- Elementary School Setting (incoming protection = 30%)
- Middle School Setting (incoming protection = 40%)
- High School Setting (incoming protection = 50%)



What does this all mean?

1. The Delta variant is *very* infectious; kids under 12 years old are not yet eligible for vaccines and therefore remain unprotected
2. Without masks or testing, up to 90% of susceptible students may become infected by the end of the semester (if only 30% have incoming protection)
3. Masks and testing, in combination, can prevent 40-70% of new infections (or more with high-quality, well-fitting masks)

Consequences may extend beyond the classroom and after the semester...

- Additional cases in the community--including among elderly grandparents and other family members--especially when community rates are already increasing ([Goldhaber, 2021](#))
- More infected students leads to more days of school absences, forcing caregivers to take time off work
- Multi-inflammatory syndrome or Long-Covid, which occurs among nearly half of students and can last up to 8 months ([Buonsenso, 2021a](#), [Buonsenso 2021b](#))

...and if school-based infections become too great, a return to virtual learning may follow

- Virtual learning is associated with...
 - Prolonged mental health concerns among students ([Golberstein, 2020](#))
 - Minimal or no learning gains ([Engzell, 2021](#))
- Recall: the risk of severe disease for COVID-19 *remains reduced* for those of younger ages, in the event they do become infected within school

The best place for K12 children this fall is the classroom: universal masking and routine testing can ensure that they and their families remain safe and that their learning journey can continue smoothly

For additional information, please visit covsim.hosted-wordpress.oit.ncsu.edu/ or write to us at covsim-team@ncsu.edu