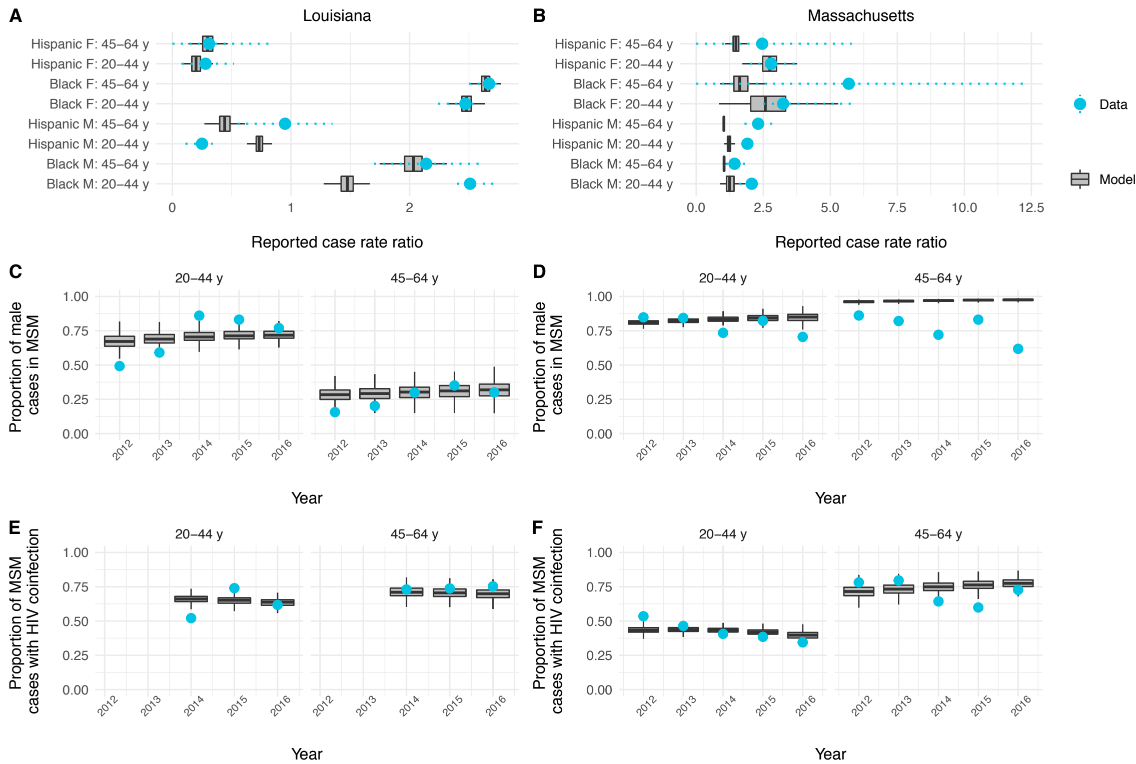
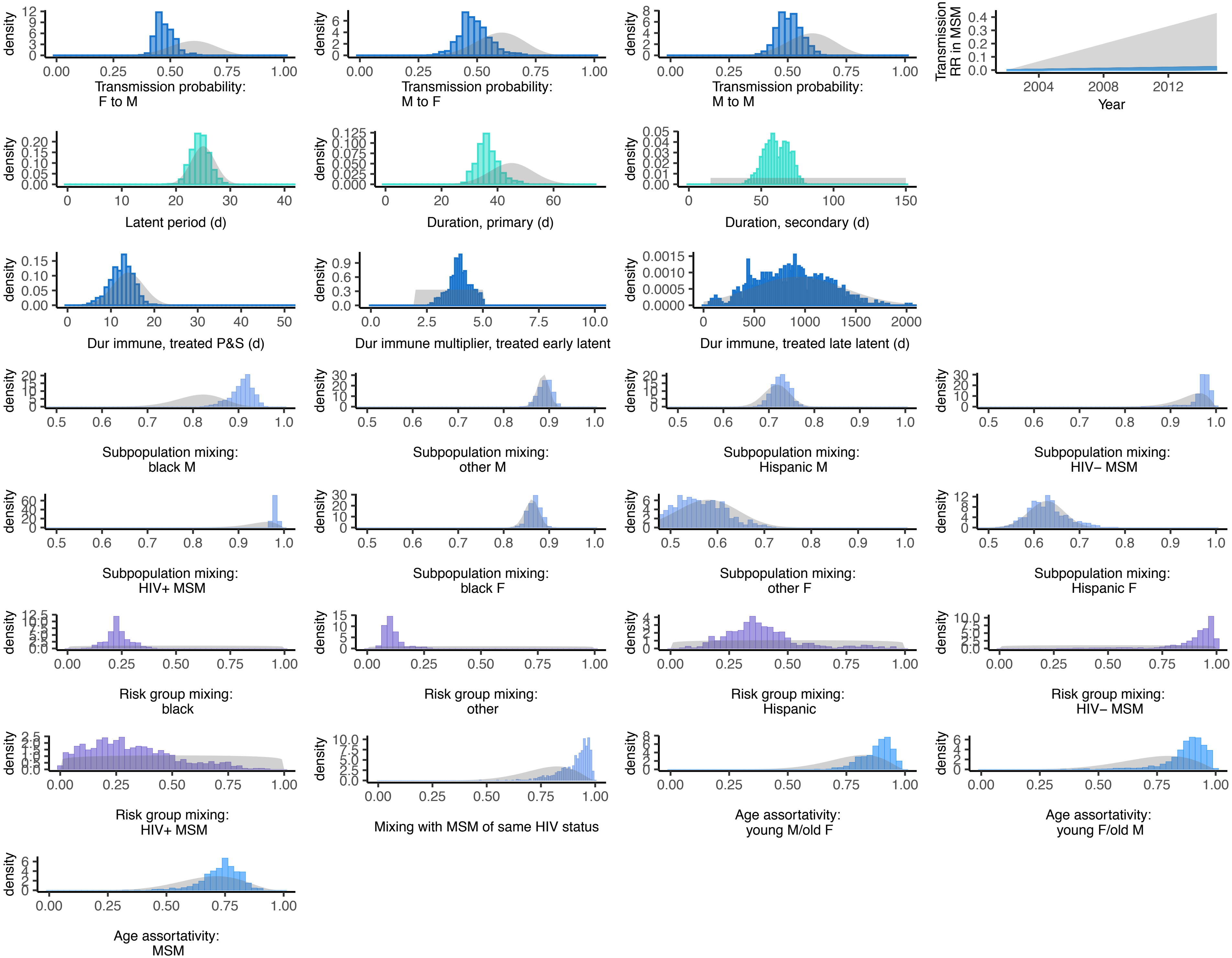
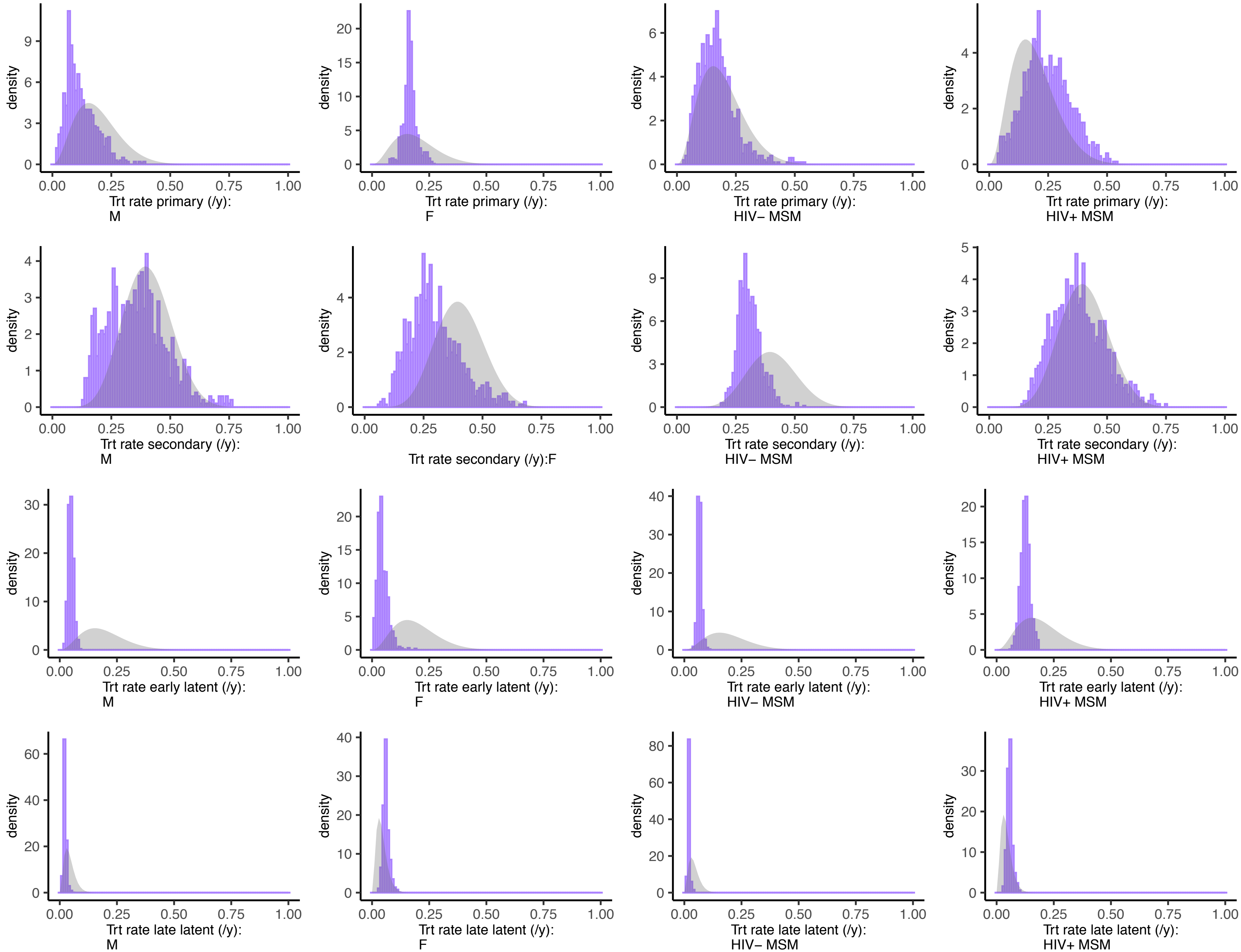


Supplementary Figure 1. Comparison of model fits to additional calibration data for Louisiana (A, C, E) and Massachusetts (B, D, F). (A, B) Rate of reported early syphilis, by subpopulation, relative to the non-Hispanic non-Black population for a given age group and sex. For the data, the mean values of the annual estimates are shown and ranges represent 95% confidence intervals. (C, D) Proportion of male reported early syphilis cases in MSM, by age group. (E, F) Proportion of early syphilis cases occurring in MSM who have HIV coinfection, by age group. Outputs from 1000 model simulations are shown. For model estimates, the lower, middle, and upper hinges of the boxes correspond to the 25th, 50th, and 75th percentiles, with the whiskers extending to the largest and smallest values up to 1.5 times the interquartile range.

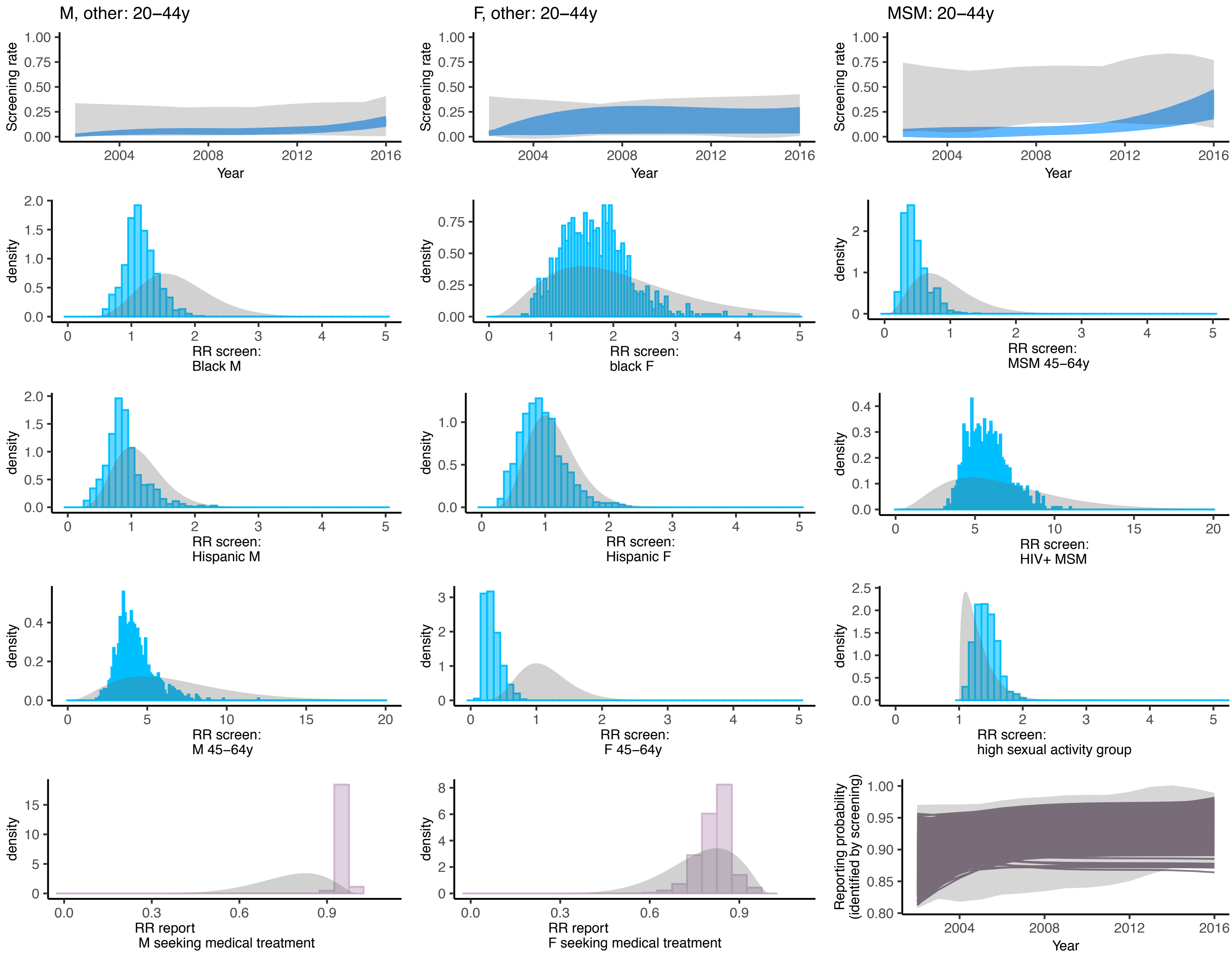
Supplementary Figure 2. Model posteriors for Louisiana.



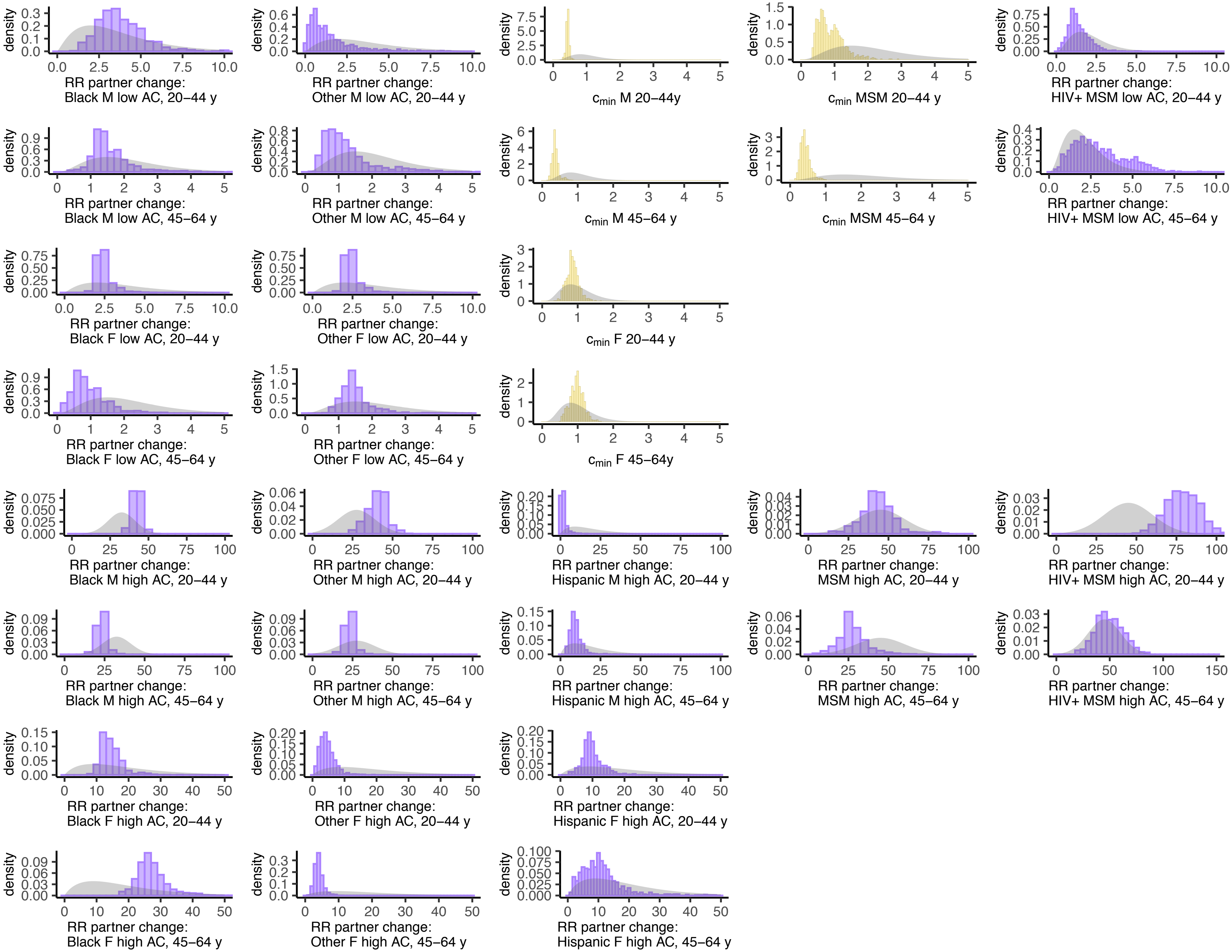
Priors/posteriors (1/4)



Priors/posteriors (2/4)

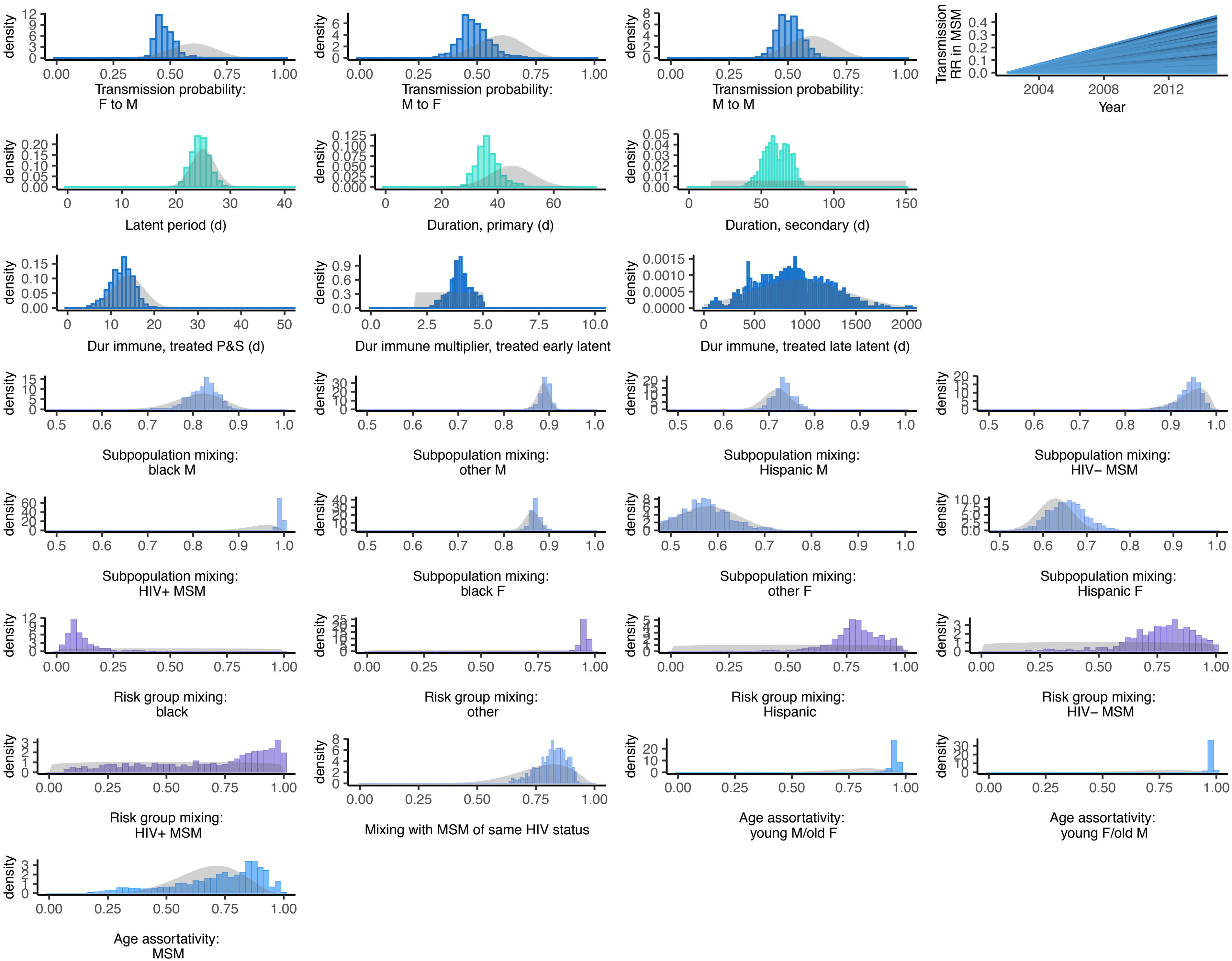


Priors/posteriors (3/4)

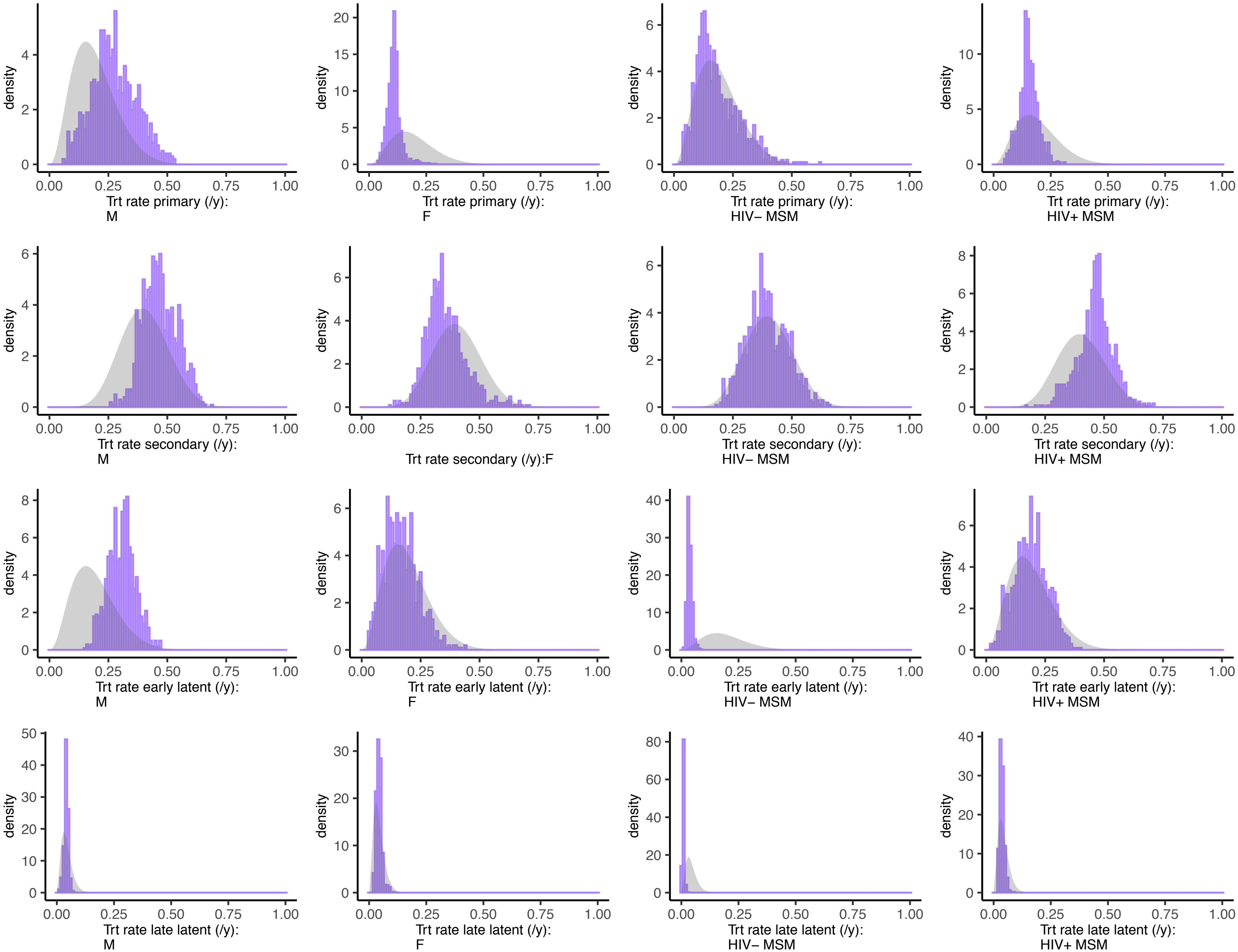


Priors/posteriors (4/4)

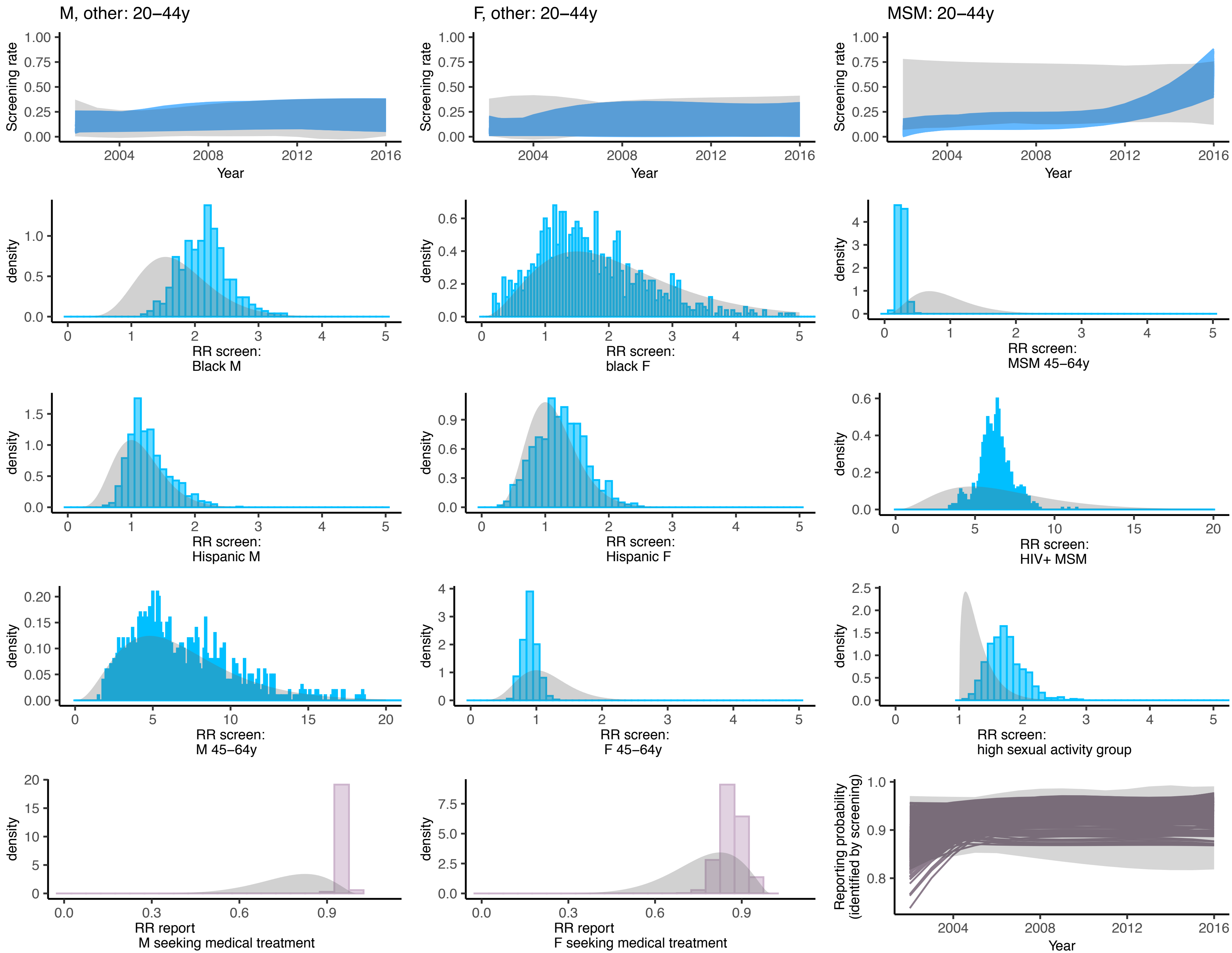
Supplementary Figure 3. Model posteriors for Massachusetts



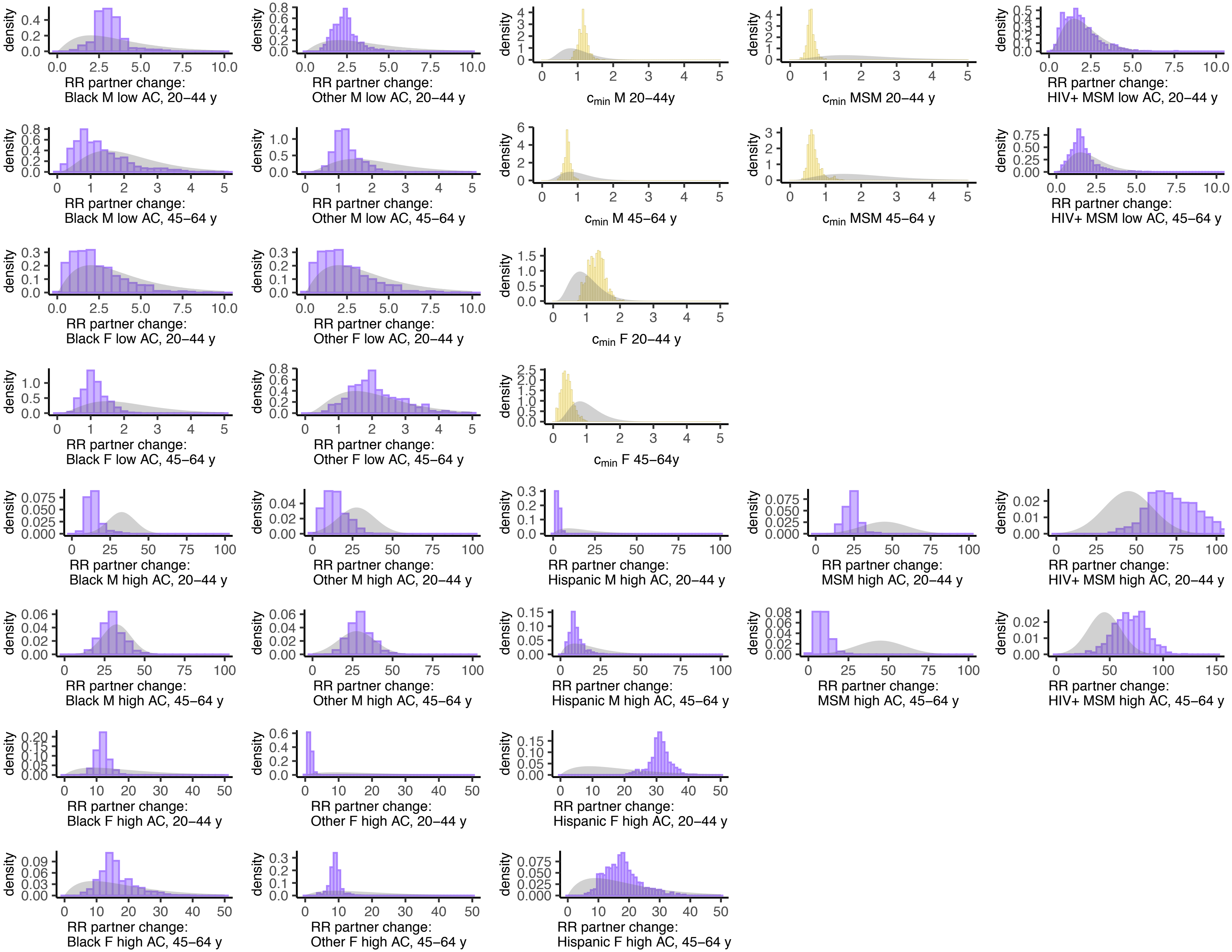
Priors/posteriors (1/4)



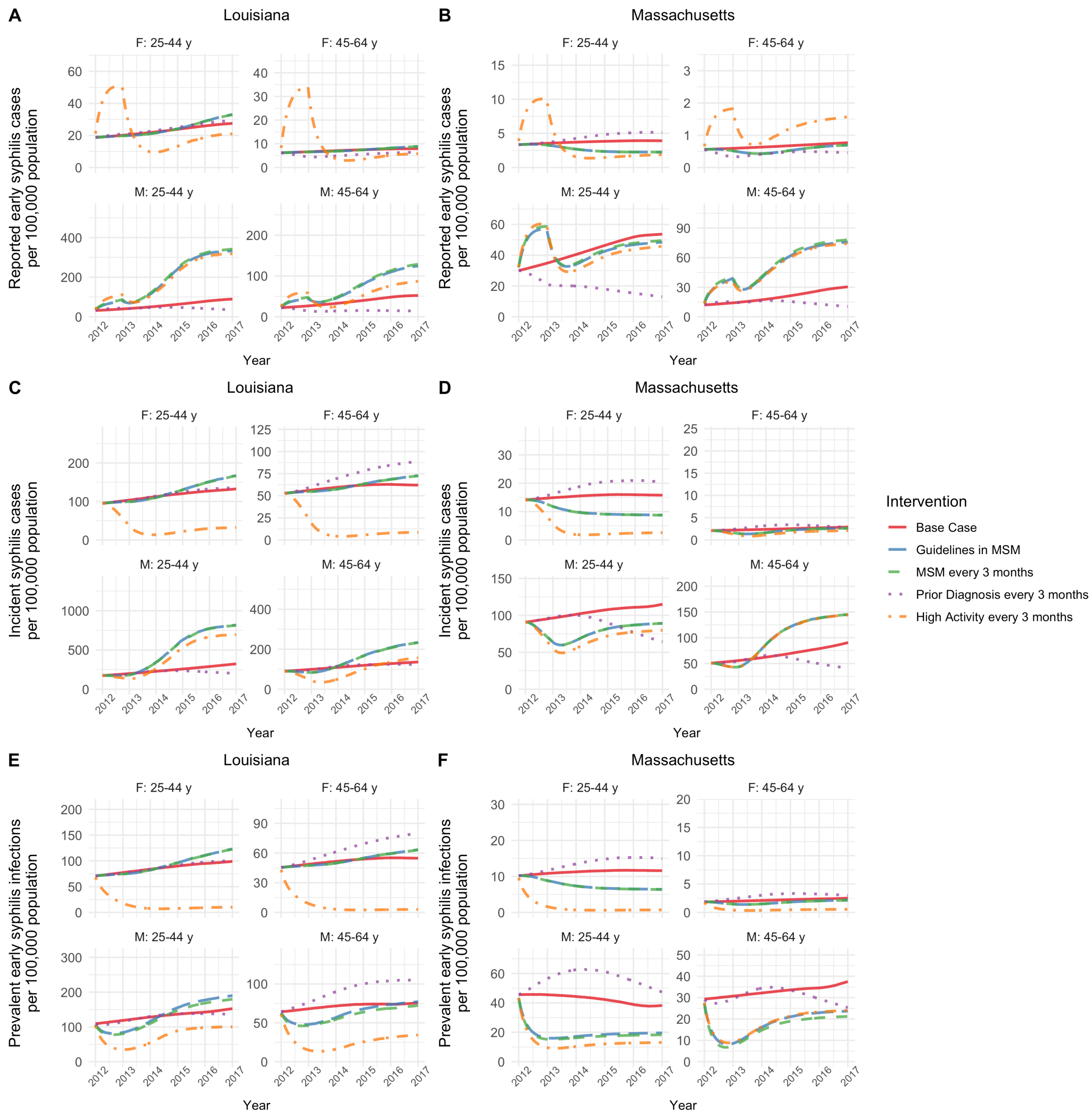
Priors/posteriors (2/4)



Priors/posteriors (3/4)



Priors/posteriors (4/4)



Supplementary Figure 4. Comparison of base case (best-fit) model to alternate screening approaches. Outcomes are shown for models calibrated to data from (A, C, E) Louisiana and (B, D, F) Massachusetts. Model projections are shown for (A, B) reported early syphilis cases, (C, D) incident syphilis cases, and (E, F) prevalent early syphilis cases per 100,000 population, stratified by age group and sex. Median values only are shown here, for the sake of interpretability. Details of each scenario are provided in the Methods. Refer to **Figure 5** in the main text for measures of uncertainty associated with these outcomes. Note that, due to large differences in outcome values, the y-axes have different scales.