ABSTRACT
Vaccine scares can prevent individuals from complying with a vaccination program. When compliance is high, the critical vaccination proportion is close to being met, and herd immunity occurs, bringing the disease incidence to extremely low levels. Thus, the risk to vaccinate may seem greater than the risk of contracting the disease, inciting vaccine noncompliance. A previous behavior-incidence ordinary differential equation model shows both social learning and feedback contributing to changes in vaccinating behavior, where social learning is the perceived risk of vaccinating and feedback represents new cases of the disease. In our study, we compared several candidate models to more simply illustrate both vaccination coverage and incidence through social learning and feedback. The behavior model uses logistic growth and exponential decay to describe the social learning aspect as well as different functional forms of the disease prevalence to represent feedback. Each candidate model was tested by fitting it to data from the pertussis vaccine scare in England and Wales in the 1970s. Our most parsimonious model shows a superior fit to the vaccine coverage curve during the scare.