The ultimate goal of integrating host behavior and disease transmission is to define what an infectious contact is and how to measure such contacts. The frequency, distribution, and relation to host density of those contacts (exposure) make up one of the fundamental mechanisms of disease transmission (the other key mechanism is susceptibility). Social behaviors that promote stable group structure and philopatry can have large impact on disease transmission by structuring infectious contacts on the same axis of variation as social contacts. When such behaviors are based on kinship, genetic relationships can be used to infer the social and infectious structures. Alternatively, social behaviors that promote less structured mixing of individuals, such as seasonal migrations and transient grouping, can decouple social behaviors from infectious contacts and genetic patterns. In addition, making the link among behaviors that structure infectious contacts also requires properly defining an infectious contact based on the transmission route of a pathogen. Since chronic wasting disease (CWD) can be transmitted directly and through the environment, the relative importance of each route in an infected population has an impact on how strongly social behaviors structure infectious contacts and how to interpret the empirical patterns of genetic relatedness and infection.

The social structuring of white-tailed deer in eastern North America remains the clearest example of where the overlap in social structuring, host genetics, and disease has revealed insights into CWD transmission heterogeneities. The matrilineal structure of white-tailed deer behavior is well-described and the emergence of CWD, as well as other diseases such as bovine tuberculosis, in high-density populations in the last 20 years have provided empirical evidence of how strong structuring of social groups along familial lines can influence disease patterns. Here, I present a synthesis of how the range of social behaviors in North American CWD host species may generate heterogeneities in transmission, when social behaviors are likely to be less important to transmission relative to competing factors, and what characteristics of social behaviors can be examined using genetic techniques.