Abstract: In this paper we investigate the survival probability, $\theta_n$, in high-dimensional statistical physical models, where $\theta_n$ denotes the probability that the model survives up to time $n$. We prove that if the $r$-point functions scale to those of the canonical measure of super-Brownian motion, and if certain self-repellence and total-population tail-bound conditions are satisfied, then $n\theta_n \to 2/(AV)$, where $A$ is the asymptotic expected number of particles alive at time $n$, and $V$ is the vertex factor of the model. Our results apply to spread-out lattice trees above 8 dimensions, spread-out oriented percolation above $4 + 1$ dimensions, and the spread-out contact process above $4 + 1$ dimensions. In the case of oriented percolation, this reproves a result by the first author, den Hollander and Slade (that was proved using heavy lace expansion arguments), at the cost of losing explicit error estimates. We further derive several consequences of our result involving the scaling limit of the number of particles alive at time proportional to $n$. Our proofs are based on simple weak convergence arguments.