We will discuss a stochastic homogenization result for a class of \emph{nonlinear} and \emph{nonlocal} variational problems in domains with many small randomly distributed (bilateral) obstacles. Our model case is a Dirichlet problem for the \emph{fractional} p-Laplacian, $p>1$, where a pinning condition $u=0$ is imposed on the solution in a \emph{random} collection of small balls whose centers and radii are generated by a \emph{stationary marked point process}. Such a general obstacle distribution allows for \emph{clustering effects} to appear with positive probability. Under suitable moment conditions on the obstacle radii, we identify a critical scaling regime in which the fractional p-capacity density of the obstacles is asymptotically additive \emph{almost surely}. In turn, this key property allows us to derive an effective homogenized problem which is formally analogous to the one obtained in the periodic setting or under the assumption of well-separation for the obstacles. The analysis also extends to the case of \emph{randomly shaped obstacles} and to a broad class of \emph{nonlocal interaction kernels}. This is joint work with Francesco Deangelis (U. M\"unster) and Caterina Zeppieri (U. M\"unster).