Freshly deposited or disturbed sands have a tendency to alter their mechanical properties. This is often seen after dynamic compaction of sand beds, where at first, the cone penetration resistance may not have increased, but in a matter of weeks and months the increase in resistance to penetration becomes evident. This time effect has been known for decades, but there is no universally accepted explanation as to what causes such time-delayed effects in sands. A hypothesis is postulated, which suggests that the predominant reason behind time effects in sands is the delayed fracturing of the micro-morphological features present on surfaces of sand grains in contact. Experimental tests performed as part of this research support this hypothesis, and the numerical simulations indicate that the hypothesis is plausible. Experiments were performed using two custom-designed laboratory devices for testing of inter-granular sand contacts, and also tests on sand specimens, dry and wet, were carried out. All experimental results are consistent with the hypothesis suggested. In addition, discrete element and finite element computations were performed as part of this study on aging of sand. Discrete element simulations were able to mimic the characteristics of the true (experimental) process when the static fatigue hypothesis was used. The model also predicted an increase in horizontal stress in sand subjected to sustained vertical load with restrained horizontal deformation, which is central to explaining the process of time-delayed increase in cone penetration resistance of sand after disturbance. Aging of sands under confined conditions leads to an increase in inter-granular contact stiffness, and thereby, in an increase in macroscopic elastic moduli, but the strength of sand remains nearly unchanged during aging.