With structural health monitoring techniques based on measuring transverse vibrations of beam-like components it can be difficult to provide transverse excitation, while longitudinal excitation can be easier. We experimentally investigate how transverse vibrations in a beam can be excited by a longitudinal hammer impact. We carry out a comparative study on the measured transverse natural frequencies and frequency response coherence for different input and output locations and directions. It is shown that transverse vibrations are excited regardless of the impact locations and directions. Theoretical explanation to this counter-intuitive phenomenon is provided in terms of various imperfections associated with beams and impacts.