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They all fall down? The slow development of children's understanding of physical causal mechanisms

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Three and four-year-olds can readily infer causal relationships from the covariation of interventions and outcomes. However, this kind of understanding has almost always been tested using arbitrary stimuli (e.g., blicket detectors). Thus, the relationship between children's understanding of covariation data and their understanding of the physical mechanisms that underlie causal relationships is poorly understood. We test children's understanding of physical mechanisms using a domino setup which can translate common cause, common effect, and causal chain structures into visible, physical arrays where the transmission of force is governed only by contact causality (a principle within young children's grasp). Using a novel online task battery, we test five different aspects of mechanism understanding and show that children's understanding of the physical mechanisms underlying causal relationships undergoes a surprisingly protracted development, with three-year-olds performing at chance on all items and even six-year-olds performing well below ceiling.