People walk and carry “stuff” all the time, whether it is a backpack over your shoulders, a briefcase in one hand, or a laundry basket blocking your view as you go down the stairs. Carrying is normal activity of daily living for most people. However, we really understand very little about how the act of carrying “something” affects the way one walks and controls balance, particularly when the object is carried in front using two hands, like a laundry basket. The act of carrying gets more complex when objects or obstacles are placed on the floor in the path of where you walk. The purpose of this study was to investigate and understand how carrying an object in front of one’s body affects the control of balance when stepping over an object on the floor.

We asked young healthy university students to walk within our lab under four different conditions: normally, without carrying a load; or while carrying a box that weighed 2, 5, or 10 kg. In each condition, there was an 8-inch tall obstacle placed in the person’s path. The main measure of interest was “toe clearance”, or the vertical distance between the foot and the top of the obstacle just as the foot passed over the obstacle. The results of this study showed that: a) people lifted their foot higher when stepping over the obstacle while carrying the box, compared to the normal walking condition, and b) as the weight of the box increased, so did the height to which they lifted their foot. These findings suggest that people adopt a “conservative” strategy when carrying and stepping over obstacles. Participants increased the safety margin between the foot and the obstacle, presumably to reduce the chances of tripping and falling. These findings highlight how important vision is when navigating through one’s environment, but also that our nervous systems are very good at combining, or integrating the memory of the object’s characteristics, such as location and size, into the movement plan for getting the foot and then the whole body safely over the obstacle.

Studies such as this are important because they provide new insight into why and how people trip and fall, which is critical information when, for example, trying to prevent falls in the workplace or in the home of an older person.

Perry CJ, Kiriella JB, Hawkins KM, Shanahan CJ, Moore AE, Gage WH. The effects of anterior load carriage on lower limb gait parameters during obstacle clearance. Gait Posture. 2010 May;32(1):57-61. Epub 2010 Apr 9.

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