The Importance of Motor Skills for Development

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Motor skills are important for development. Everything infants do involves motor skills – postural, locomotor, and manual actions; exploratory actions; social interactions; and actions with artifacts. Put another way, all behavior is motor behavior, and thus motor skill acquisition is synonymous with behavioral development. Age norms for basic motor skills provide useful diagnostics for “typical” development, but cultural differences in child-rearing practices influence skill onset ages. Whenever they emerge, motor skills lay the foundation for development by opening up new opportunities for learning. Postural control brings new parts of the environment into view and into reach; locomotion makes the larger world accessible; manual skills promote new forms of interactions with objects; and motor skills involving every part of the body enhance opportunities for social interaction. Thus, motor skills can instigate a cascade of developments in domains far afield from motor behavior – perception and cognition, language and communication, emotional expression and regulation, physical growth and health, and so on. Finally, motor skill acquisition makes behavior increasingly functional and flexible. Infants learn to tailor behavior to variations in their body and environment and to discover or construct new means to achieve their goals.

People typically think of motor development as the items on a standard milestone chart (Fig. 1). But milestone charts do not represent the scope of motor development. All behavior is motor behavior. Thus, to the extent that behavior is important, motor skills are important. Moreover, behavior develops. So, motor development is really behavioral development. From day to day, new skills enter and exit infants’ repertoires, and frequently used skills continually improve [for reviews, see 1, 2].

Motor skills provide a window into development. Generally, motor development is age related (Fig. 1). Thus, age norms for skill onset provide a useful diagnostic tool, and when infants’ onset ages fall beyond the normative range, clinicians and caregivers have cause for concern. The World Health Organization even published “standards” (prescriptive age
bands rather than descriptive norms) for infants’ postural and locomotor milestones [3].

However, age norms must be interpreted with caution. Motor skill acquisition is not a direct readout of neuromuscular maturation—experience trumps age as the key predictor of skill emergence and improvement [for reviews, see 1, 2]. Moreover, because cultural differences in child-rearing practices affect infants’ motor experiences, age norms should reflect worldwide diversity in child-rearing practices, but they do not. In cultures that consider motor development as the result of exercise, caregivers deliberately train skills such as sitting and walking (Fig. 2a), and infants achieve those milestones earlier than would be expected based on western age norms and the WHO standards [for reviews, see 1, 2, 4].
Conversely, in cultures where caregivers constrain infants’ movements (Fig. 2b), infants’ skills are delayed.

Motor skills lay the foundation for psychological development. Each motor achievement unlocks new parts of the environment for exploration and alters infants’ interactions with objects, people, and places [5]. New opportunities for learning, in turn, cascade into developments far afield from motor behavior [for reviews, see 1, 2, 4, 5]. For example, the transition from crawling to walking allows infants to see more, go farther, play more, and interact more (Fig. 2c). Accordingly, the onset of independent
walking is related to increases in infant joint engagement, autonomy, and improvements in receptive and productive language.

Perhaps most important, the development of motor skills makes behavior more functional and flexible [for reviews, see 1, 2, 4]. Function is critical for the activities of daily living, and behavioral flexibility is imperative because bodies and environments are continually in flux. For behavior to be functional and flexible, infants must tailor action to changes in local conditions [for reviews, see 1, 2, 4]. They must select, modify, and, in many instances, create appropriate actions on the fly. Perception and cognition are required to guide actions adaptively. Infants must perceive what is out there and decide what to do about it.

For example, when infants first begin crawling and walking, they do not perceive possibilities for locomotion. In laboratory experiments, they plunge headlong over the brink of impossibly steep slopes and high drop-offs. Over weeks of crawling and walking, infants learn to perceive possibilities for locomotion with impressive precision (Fig. 2d). Infants can even update their assessments to take experimentally induced changes in their bodies into account (e.g., lead-weighted shoulder packs and Teflon-soled shoes that decrease their ability to walk down slopes). Moreover, infants can create new means to cope with novel tasks – learning in the moment to slide down steep slopes in a sitting or backing position, and so on. How do they do it? Through massive amounts of everyday, time-distributed, variable practice, and by generating the requisite perceptual information through exploratory actions [for reviews, see 1, 2, 4].

References