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Leveraging cognitive science to foster children's persistence

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Persistence is crucial for overcoming academic and interpersonal challenges. However, there has been little progress in developing effective interventions to improve persistence in childhood. Here we outline how recent insights from cognitive science can be leveraged to promote young children's persistence and highlight future directions to bridge research with practice.

Picture a preschooler attempting to finish a puzzle. After two failed attempts, she moves on to play with a train set. Although quitting on a puzzle may seem trivial, decisions about when to persist and when to quit may accumulate, with consequences for what children learn and whether they achieve their goals [1]. How can we foster persistence in early childhood, a time of foundational skill development?

In the past decade, modern cognitive science has pulled back the curtain on how even the youngest minds make sophisticated, rational choices about effort allocation. Infants, for example, decide whether to persist based on expected utilities (costs and rewards) and their probability of success (by considering their own ability, the task's difficulty, etc.) [2,3]. Because children infer these values and their associated probabilities from experience, there is room for adults to influence this decision process. In particular, emerging insights from developmental cognitive science suggest three strategies to support persistence: intentional role modeling, praising the process, and enabling small wins (Box 1).

Model struggle and success

Young children watch those around them to learn whether and when effort is worthwhile. For instance, infants and preschoolers try harder after observing an adult persist and succeed than when an adult succeeds effortlessly [3–5]. Moreover, infants can generalize inferences about the utility of effort across tasks: after watching an adult demonstrate effort and success on two different tasks, infants will try harder on a third, novel task [4]. If the adult engages the child with child-directed speech and eye contact or speaks explicitly about the value of effort during these demonstrations, children are even more likely to persist [4,5]. Critically, children do not automatically mimic adult persistence. Instead, they make rational decisions; if the adult struggles and ultimately fails, infants and preschoolers (sensibly) elect not to persist on a similar task themselves [3,5].

Praise the process

Parents and other adults often praise children when they accomplish a challenging task. Although usually well intentioned, some forms of praise are ineffective or even detrimental to long-term motivation. In particular, several studies have found that process-based praise (i.e., praising a child for their effort on a task, as in 'You worked so hard!') is more motivating than person-based praise (i.e., praising a child for their ability, as in 'You're so smart!'). For example, children as young as 18 months old are more persistent on difficult motor tasks if their parents use more process-based than person-based praise [6]. In longitudinal research, toddlers whose parents use a higher proportion of process-based praise than person-based praise are more likely to adopt a growth mindset and perform well academically in elementary school [7,8]. Why? Researchers theorize that praising effort signals to children that effort is valued, whereas person-based praise inadvertently signals that abilities like intelligence are fixed [6–8].

Process-based praise is most effective when it is sincere and contingent on an outcome (learning or achievement). Otherwise, children may interpret praise as a consolation prize or mistakenly infer that sheer effort, not strategic effort, solves problems. Although research on inflated praise ('That is incredibly beautiful') in early childhood is lacking, research on older children suggests it may backfire. For example, one longitudinal study shows that the more lavish the praise parents heap on their school-age children, the lower their self-esteem 6, 12, and 18 months later [9].

Enable small wins

Some challenges are impossible, but others – although seemingly insurmountable at the start – eventually yield to sustained effort. When deciding whether to

Box 1. Cognitive science-inspired strategies to help children persist

- Model intentionally. Do not hide your mistakes. Instead, let children watch you struggle your way to success. While you do, speak out loud about the value of effort and not giving up.
- Praise the process. Celebrate children's hard work rather than their ability. Avoid overpraising. Instead, applaud authentic efforts to learn or improve.
- Enable small wins.
  - Support and point out growth. Give children challenges that are just a bit out of their comfort zone and help them notice their own progress.
  - Get out of the way. Children need to confront challenges on their own. If they ask for help, give hints, but do not swoop in and solve children's problems for them.
  - Promote self-distancing. Help children take an outsider's perspective by asking them what their favorite superhero would do in a tough situation.

For more cognitive-science-inspired strategies to help children thrive, visit https://characterlab.org/playbooks/.

shift course or to keep trying, a child's rate of progress over time may be a more meaningful cue than performance on any given day. In one study, 4–6-year-olds were more likely to persist with a challenging task when they saw clear evidence that their performance was improving [10]. Therefore, adults can encourage persistence by providing children with tasks that are just outside their comfort zone and pointing out their progress over time.

Adults can also enable small wins by giving young children time to wrestle with challenges on their own. In one study, when an adult repeatedly took over and solved challenging puzzles for preschoolers, children persisted less on an unrelated task [11]. Taking over for children can inadvertently send the message that adults will always complete difficult tasks for them or, relatedly, that their own capabilities are lacking.

Finally, adults can encourage hard work by helping children adopt a less egocentric view of their situation. Self-distancing, the act of shifting to an outsider's perspective, facilitates 4–6-year-olds' persistence by helping them mentally step away from immediate temptations and instead reflect on what a more effective behavior might look like [12]. For example, children who dressed up and pretended to be Batman or Dora the Explorer persisted longer on a tedious task than children in a control group [12].

Building a better science of persistence

How do we advance the scientific understanding of persistence in young children and make it more actionable? First, we need to venture outside the laboratory and into the real world. Little is known about how the strategies that encourage persistence on carefully designed tasks in highly controlled (and somewhat artificial) situations influence children's behavior in the messiness of everyday life. Relatedly, we need longitudinal randomized controlled intervention research to test whether repeated exposure to the strategies reviewed here promotes persistence across contexts and over time. In addition, we need to study how adults – including parents and educators – can learn to implement these strategies.

We also need a better understanding of which strategies work best for whom and when. For example, although process praise increases motivation in young children, it can backfire in adolescents, who might infer from being complimented on their hard work that they lack ability [13]. Likewise, cultural differences may influence what children learn from adult models of effort. For example, caregivers in Western societies, such as the USA, generally encourage children's learning through direct instruction and participation, while caregivers in less industrialized, more collectivist societies, such as Vanuatu, place a stronger emphasis on learning through observation [14]. The frequency and contingency of parent praise also vary by culture, which is likely to affect how children respond [15].

Finally, we can as a field do more to forge partnerships with the thousands of schools, museums, summer camps, and other places where young children learn and play. These partnerships can be mutually beneficial. Educators and caregivers have invaluable intuitions that should inform testable scientific hypotheses. Researchers, in turn, produce knowledge that can lead to practices that more reliably encourage children's healthy development. By embedding research in the community, we can create more equity, inclusion, and trust between those conducting research and those participating in and benefitting from research.

Concluding remarks

As a field, we now have evidence that adults can foster children's persistence by modeling, celebrating, and enabling hard work. However, it is also important to help children identify when not to persist. For instance, working harder at an impossible task makes no sense, nor does persisting with a suboptimal strategy when a more efficient approach has not been tried. Relatedly, children must learn that individual effort is not the only determinant of life outcomes. Circumstances outside the individual – including social and economic structures – matter enormously. We can teach children to persist through challenges, but we can only do so responsibly if we ourselves persist towards making the world a more equitable place.

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