

A Parent's Guide to the Kinedu Study

What 470 million observations of real children can tell you about your own.

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WHY YOU SHOULD CARE

Every parent asks the same question at 2am. Is she okay?

Most of what you have been handed to answer it rests on far less evidence than you would assume. The chart in the pediatrician's office. The list in the app. The other child at the birthday party. Much of it was built from small studies, in laboratories, on children who are not yours.

So we looked at millions of real ones instead.

WHAT THIS IS

For four years, parents using Kinedu answered questions at home about what they actually saw their child do. Not what a specialist observed in a clinic. What happened on a Tuesday, in a kitchen, in fifty countries.

That produced 470 million observations of 3.5 million children between January 2020 and December 2023. We used it to ask three things. Whether the ages we expect skills to appear match what children actually do. Whether a short assessment answered by a parent holds up at that scale. And whether an independent finding from Stanford reproduces on data a hundred times larger.

It does. This guide is what we learned, in five parts.

THE FIVE FEATURES OF EARLY DEVELOPMENT

- 1 **Interdependence.** Early on, every domain moves with every other one.
- 2 **Compounding sequence.** One thing enables the next. The order does not change.
- 3 **Variability.** The sequence is universal. The pace is individual.
- 4 **Sensitive windows.** Some periods are especially receptive. They narrow. They do not close.
- 5 **Unpredictability.** No model can tell you how one specific child will unfold.

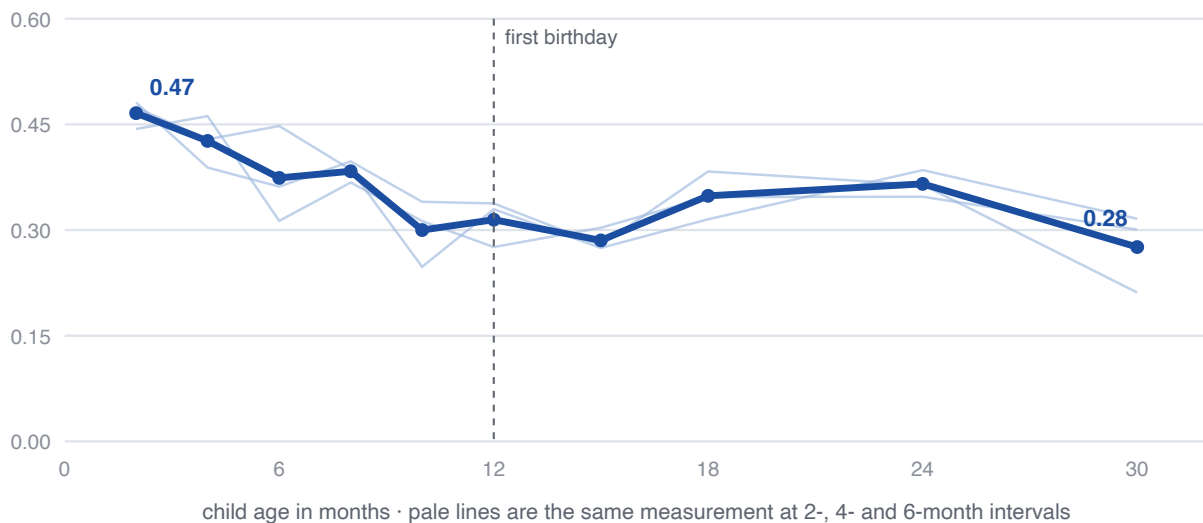
In the beginning, everything is one thing.

Pull one thread at two months and the whole web moves.

Physical, cognitive, language, social. We name them as four things because it is useful to. Early on they do not behave like four things. A baby who gains head control has not only gained head control. The head that lifts is the head that can now see across the room, turn toward a voice, and hold your gaze while you talk to her. The motor gain is never only a motor gain.

We can measure how tightly the domains move together. Through the first year, that coupling falls by 46%, from 0.49 to 0.27. The threads loosen. By the second year a child can be racing ahead in language and taking her time with balance, and neither fact says much about the other.

What it never does is fall to zero. At two and a half, the domains are still related. They have become distinct without becoming separate, which is a good description of a person.



How tightly a child's four domains move together, by age. The measure falls through the first year and then holds. It does not reach zero.

Why we trust this. A pattern like this can be manufactured by how often you measure. We re-ran it holding the interval fixed at two, four and six months. It held every time. The pale lines are those three runs.

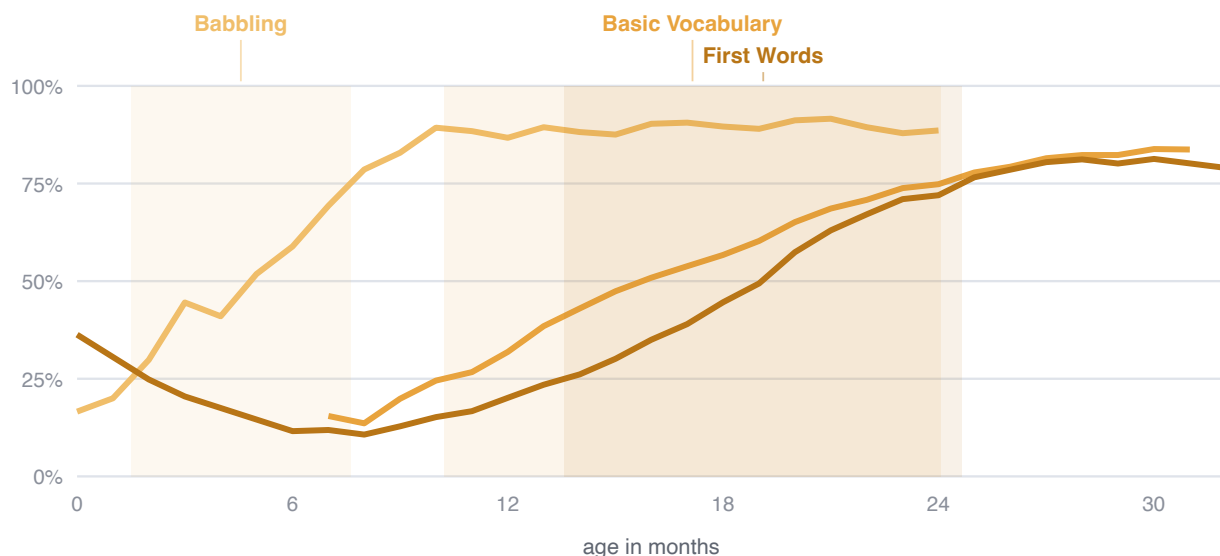
The order is not negotiable. The calendar is.

Every child builds in the same order. Almost none of them build on the same schedule.

Each skill rests on the one before it. Babbling is not a cute noise a baby makes on the way to words. It is the practice that makes words possible. The mouth learns the shapes first.

We assign every milestone an expected age. The obvious question is whether those ages are real or simply inherited from a textbook. So we checked each one against the age by which three quarters of children in the data had actually acquired it. The median error was zero months.

That matters more than it sounds. It means the sequence in this guide is not a framework we imposed on childhood. It is a description of what millions of children did.



The handoff inside language. Babbling arrives and settles. Vocabulary and first words build on top of it, in that order, in every population we can measure.

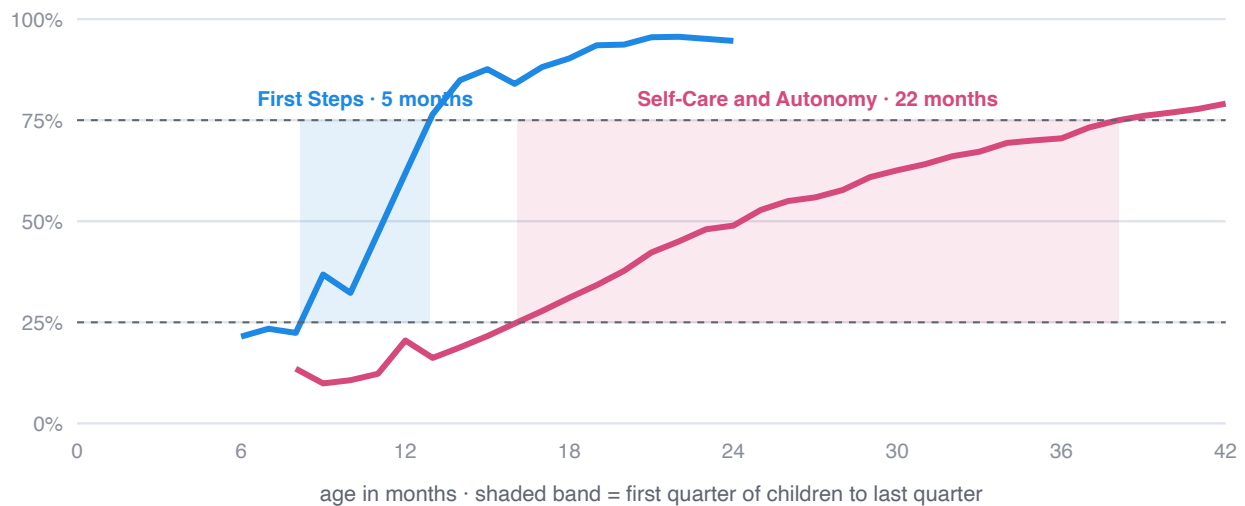
What we did not prove. We confirmed the order. We did not prove that one skill *causes* the next. That claim comes from other researchers doing other work, and it is well supported. Our data can tell you what came first. It cannot tell you why.

Normal is much wider than the chart on the wall.

And it gets wider as your child gets older.

Take first steps. Between the first quarter of children to walk and the last quarter, there are about five months. That is already a wide gate, and it is the narrow one. By the time a child is learning to dress and feed herself, the same gate is twenty-two months across.

This is why nobody panics about walking and everybody panics about talking. It is not that language matters more. It is that language, like everything that arrives later, has a far wider range of normal, and nobody told you.



Two skills, same axis. The shaded band runs from the first quarter of children to acquire the skill to the last quarter. Early skills arrive in a narrow window. Later ones do not.

Where your child stands today explains about 1.5% of how fast she moves next.

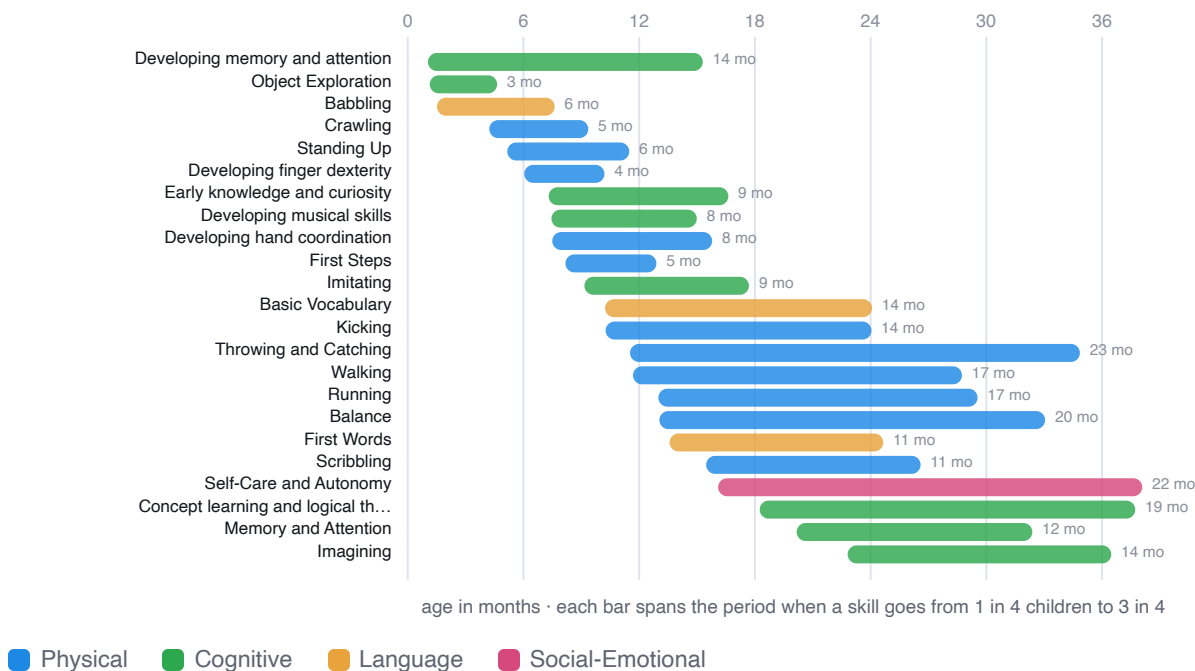
That number is the most useful thing in this guide. Standing and pace are two different measurements, and in this data they barely travel together. A child in the bottom quarter today is not, for that reason, a child who will grow slowly.

It is also why we changed what we show parents: not only where a child stands, but how fast she is moving. The second number is the one that stays open.

Now we can tell you when each window opens.

That windows exist is a finding from neuroscience. What our data adds is the timing: the stretch of months when a skill is arriving across a whole population of children. Until now, nobody could draw them all at once.

Object exploration opens at about one month and is largely done by five. First steps run from eight to thirteen. First words, fourteen to twenty-five. Read down the map and you are reading the first four years in the order they happen. The early windows are tight, three to five months. The later ones stretch past twenty, and they overlap constantly.



They narrow. They do not slam.

The curves keep climbing after the steep stretch is over, to about nine in ten children. If these were hard deadlines, the data would show a permanent shelf of children who missed and never caught up. There is no shelf.

What we did not prove. We can show you *when* a window is open. We cannot show you *why* the brain is more receptive during it. That comes from neuroscience, not from us: our records hold what a child did, never what was done with her.

We built the model. Most of your daughter is not in it.

We had more children than anyone has ever had for a question like this. Here is how much of her future we could see.

About a third. At the very best, with a recent check-in on an older child, knowing where she stands today accounts for roughly a third of where she will stand months from now. Usually much less than that. The other two thirds is everything we cannot measure and she has not done yet.

The reading also fades, and it fades faster the younger she is. A picture taken at three months is mostly stale by the time she is a year old. A picture taken at eighteen months still holds reasonably well at two.



How much a check-in still tells you as time passes. Higher is more predictive. Younger children's readings fade faster, which is the argument for checking in more often early on.

One more number worth knowing. About 11% of what looks like a child's standing turns out to be the parent's answering style rather than the child. Some of us say yes more readily than others. That is not a flaw in you. It is a reason to treat any single reading gently.

An assessment is a photograph, not a prophecy.

Worth taking. Worth taking again.

What this data cannot say.

A study this large can mislead precisely because it is large. Here is what ours does not know.

It does not know what you did. Our records contain what a child did, never what was done with her. There is no measure of input anywhere in them. So when this guide says a window is open, that is an observation about timing, not a finding about what happens if you fill it. Every claim about cause belongs to other researchers, and we say so where it appears.

It is not a diagnosis. This is a surveillance instrument. It can tell you what is worth watching and what is worth mentioning at your next appointment. It cannot tell you that something is wrong, and it should never be the reason you decide something is.

The families are not a random sample. They chose to use an app, and the ones who stayed for years are different from the ones who did not. Our numbers describe them accurately. Whether they describe every family everywhere is a fair question and the honest answer is partly.

We measure in months. Anything that happens on a finer timescale is invisible to us.

And a child's position is not a verdict. Not at three months, not at three years. The single most robust finding in this work is that where a child stands says almost nothing about how fast she is about to move.

Five things worth changing.

1. **Replace “is she on time?” with “what is she building next?”** The calendar compares her to an average that describes no actual child. The sequence tells you what she is reaching for.
2. **Check in more often before the first birthday.** Not because something is wrong. Because the picture genuinely fades in months at that age, and holds far longer after eighteen months.
3. **Judge a slower month against her, not against the average.** Standing and pace are different measurements. Hers is the only pace that matters.
4. **Expect the domains to pull apart after the first year.** A child speaking in sentences who still falls when she runs is not unbalanced. She is differentiating, exactly on schedule.
5. **Watch the window that is open now, not the one that closed.** There is always one open. That is the whole point of the map.

And the one that took us a decade to learn.

The question that matters is not where your child ranks. It is what she is ready for this week. Everything in this guide points the same direction: position is largely given, pace is largely open, and the open part is the part you share with her.

[See it for your own child · 5 minutes](#)

[Read the full technical report](#)

Where these numbers come from.

Data	Kinedu production records, January 2020 – December 2023.
Scale	470 million observations across 3.5 million children.
Instruments	The Kinedu Initial Assessment, answered once, and milestone questions asked after activities, answered repeatedly as a child grows.
Scope	The 48 validated skills with an established developmental-area mapping, and milestones expected by 48 months — the range over which the instrument was validated.
Coupling	How much a child's four areas move together. Reported after correcting for the reliability of the measure itself, and replicated at fixed two-, four- and six-month intervals.
Standing	Where a child sits relative to other children the same age, on the same questions.
Pace	How fast that standing changes between two check-ins. A different measurement from standing, and the one this work found to be open.
Replication	Reproduces Stenhaug, Ram & Frank, <i>The Structure of Developmental Variation in Early Childhood</i> (Stanford Language and Cognition Lab), on a population roughly 160 times larger.

The prediction figures in part five, Unpredictability, come from an extended analysis completed in August 2026, which stratifies the original finding by the child's age and the interval between check-ins. All other figures appear in the technical report.

The full report, with methods, confidence intervals and limitations, is available at kinedu.com/research. The Kinedu Assessment is a developmental surveillance instrument. It is not diagnostic, and it is not a substitute for your pediatrician.