

» Nature vs. Nurture

A Marshmallow in the Hand

Delaying gratification is not always the rational choice

A four-year-old girl sits at a table in a featureless room. A friendly researcher places a marshmallow in front of her and tells her that if she can resist eating it for 15 minutes, he will be back with another one and she can then eat both. He leaves, and what she does next will predict her success and mental health for the rest of her life. Such is the power of the now classic marshmallow study, long thought to be a measure of self-control.

The initial research began in the late 1960s, and follow-up work has suggested that the length of time a child waits before eating the marshmallow is a better predictor than intelligence of success as an adult. A new study published last October in *Cognition*, however, indicates that children's behavior in such situations may not always reflect only their innate self-control. A child may also be making a rational decision on whether to trust that the second marshmallow is indeed coming soon.

Celeste Kidd, a doctoral candidate in brain and cognitive sciences at the University of Rochester and lead author of the new study, suspected there might be a common misconception about the classic marshmallow study—namely, that

waiting is always the right choice. While volunteering years ago at a homeless shelter for families in Santa Ana, Calif., she realized that all the kids around her would eat their marshmallows straight away, living as they did in an environment where anything they had could be taken away at any time. "Delaying gratification is only the rational choice if the child believes a second marshmallow is likely to be delivered," Kidd says.

Although previous marshmallow-type studies have acknowledged that external factors might influence kids' ability to wait for the bigger reward, none had directly tested for those factors' effects. So Kidd and her colleagues ran a study in which they manipulated the reliability of their young participants' environment. A researcher gave children with an average age of four years some poor-quality art materials and told them if they could wait, she would return with better supplies. In a "reliable" condition, she did exactly that, but in an "unreliable" condition, she returned to explain she did not have any better materials after all. A marshmallow test followed. Those in the reliable condition lasted an average of 12 minutes, whereas those in the unreliable condition lasted only three.



With that in mind, the findings of the many decades of follow-ups to the marshmallow study [see timeline at right] are cast in a different light. The studies invariably point to a strong association between how long a child was able to wait before eating the marshmallow and various measures of mental health, competence and success in later life. A recent imaging study of the kids in the original study, now in their 40s, even found differences in the activity of key brain areas between those who could and could not resist temptation as children.

If Kidd is right, these differences may be the result of more than just innate self-control, such as socioeconomic status, parenting quality and other environmental factors that influence decision making. "It's incorrect to presume lack of willpower is the only relevant factor in determining children's wait times and, subsequently, the primary driver of children's successes later in life," she says.

—Simon Makin

MARK DOUET Getty Images (hand); MICHELE CONSTANTINI Corbis (marshmallow);
PENELOPE MATHERS (illustrations)



1972: Walter Mischel's classic "marshmallow study" is published. Preschoolers were given a treat and told that waiting 15 minutes to eat it would earn them a second marshmallow. They waited, on average, six minutes. Children who hid the marshmallow from view or who distracted themselves were able to delay gratification much longer.



1981: An experiment in pigeons produces similar results—distractions and visual obstruction helped the birds delay gratification.

1988: The children, now teenagers, who were better able to delay gratification in preschool show greater academic, emotional and social competence, including higher SAT scores.



1999: Mischel proposes a framework for willpower: a rational "know" system promotes self-control, and an emotional "go" system undermines it.

2005: At age seven children begin to understand being "of two minds," called the Ulysses conflict. The Greek hero's conflicting desires led him to strap himself to his ship's mast so he could hear the Sirens' song without succumbing to it.



2009: Failing to delay gratification at age four increases the risk of being overweight at age 11.

2011: The differences in Mischel's original subjects' ability to resist temptation remain evident four decades later.

2012: A child's ability to exert self-control is also influenced by environment, a new study shows.

» The Myth of the Family Meal

Eating together might not be as magical as researchers thought

Regular family meals have been touted as a preventive for all kinds of

Instead of fixating on family dinners, Musick and Meier suggest,

ages (top):
RAJAN University
IA KRONFELT
children (bottom)

Sphere of

These neurospheres—free-floating (red), neurons (green) and stem cells (blue)—are cultivated in a lab from stem cells