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Why a Claim About the Irrelevance of Parenting Time Doesn't Add Up

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In an article Wednesday, I criticized a study that found no link between children's outcomes and the amount of time that parents spent with their children. Several readers told me that they thought I had drawn the wrong conclusion. Here at The Upshot we want to show you not just what we think, but how we're thinking, and so I want to explain my statistical argument in more detail. It's a subtle but interesting issue, and if you get to the end, you'll earn an extra notch on your wonk belt.

My specific criticism was this: The study measured only the amount of time that parents spent with their children on two specific days, and a brief snapshot like this is an unreliable measure of how much time a parent might

typically spend with children. This measure contains a little signal and a lot of noise, which probably explains why the study failed to find a reliable correlation with children's outcomes.

Thus, the study does not demonstrate that children's outcomes are unrelated to the time we spend parenting, but instead that children's outcomes are not closely related to an unreliable measure of parenting time.

So when can noisy measures still yield useful insights? Statisticians have shown that statistical samples — even brief snapshots — can be a reliable guide to what is happening on average. It can seem like magic that the average can be reliable even if an individual data point is not, but it's true. The logic is simply that while I may have spent more time with my kids yesterday than I typically do — perhaps we were at Disney World — that will be offset by other people who may have spent less time with their kids than they usually do, perhaps because they got caught up at work. In a big enough sample, these underestimates and overestimates roughly cancel each other out. That is, some data imperfections simply average out.

This means that asking about how much time thousands of people each spent with their children — even in a very narrow window — can yield a reasonably reliable estimate of how much time, on average, people spend with their children. A graph showing 1,000 mythical parents who each vary in how much time they typically spend with their children, and how much time they spent with them yesterday, illustrates this point. The magic of statistical sampling is that both of these measures suggest that the average time that parents spend with their children is roughly the same, around two hours per day in this stylized example I created.

So the snapshot does in fact yield a useful estimate of the average amount of time parents spend with their kids. But a lot of research — including the study I wrote about — is not about the average, but rather the association between two variables, in this case, time spent parenting and children's outcomes. In these cases, the implications of unreliable measurements are far more troubling.

For the sake of argument, let's say that the more time that a parent

typically spends with a child, the better the outcome on a range of measures, including test scores. This suggests that plotting children's outcomes against the time parents typically spend with their children should yield an obvious positive association.

But the study I criticized did not measure how much time parents typically spend with children, although the better studies in this literature do. Instead, the authors focused on the time parents spent with their kids on two arbitrary days. That is, they analyzed the relationship between the noisy measure of parenting time shown in the first chart, with the sorts of child outcomes shown in the second chart. We can explore the implications by combining those data into a third scatter plot, which appears to show virtually no correlation.

The point is that an unreliable measure of parenting time appears to be unrelated to children's outcomes, even though the previous one showed that actual parenting time is associated with children's outcomes. The problems here stem from analyzing a highly imperfect measure of parental input in which the statistical noise overwhelms the signal, effectively disguising the relationship between parental time and children's outcomes.

Of course, this problem, which statisticians call "measurement error" — or in their wonky moments, "errors-in-variables" — is not confined to just this study. All measurements are imperfect, meaning that this problem afflicts nearly all studies to some degree. As a rule of thumb, the more imperfect the underlying measure, the greater the distortion, suggesting we should place greater reliance on studies in which the variables are well measured.

This is not an invitation to use "measurement error" as a cudgel to dismiss uncomfortable findings. Rather, it is better to think through how measurement error may sometimes prevent the data from speaking clearly. Typically — though not always! — measurement error results in weaker correlations and so it may account for many nonfindings, like the failure to find a relationship between child outcomes and time spent parenting.

More important, savvy statistical thinking can force even unreliable data to yield reliable insights. Survey researchers can try to design questions that

better elicit how intensively people parent most of the time. Other researchers rely on multiple measures to get more reliable insights, or make statistical adjustments that account for measurement error. While many psychology studies focus on the correlation or degree of association between two variables — which is typically weakened by measurement problems — economists often focus instead on the slope of the line of best fit, which is not distorted if the measurement problems are with the “effect,” rather than the “cause.”

Yes, data are imperfect. And this makes the business of interpreting statistical studies more fraught. But if the only alternative to imperfect numbers is no data, then I'll stick with the numbers. Better still is a careful reading of the data imbued with an understanding of their imperfections. Justin Wolfers is a senior fellow at the Peterson Institute for International Economics and professor of economics and public policy at the University of Michigan. Follow him on Twitter at @justinwolfers

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