No Age Differences? No Problem

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Abstract

In this essay we argue that the over-reliance on age effects in the field of developmental psychology belies attention to actual development, obscuring attention to actual developmental processes. We use examples from diverse content areas in developmental psychology, such as narrative and autobiographical memory, personality trait development, Piagetian conservation tasks, pubertal timing, and Dynamic Systems Theory to build this argument. We conclude by arguing that focusing on individual differences in development, and cultural and historical context as major mechanisms of developmental processes will provide a fuller and richer understanding of the complexity of human development.

We make three claims in this essay:

- 1) *The presence of age differences is not a guarantee that developmental processes have occurred.*
- 2) *The absence of age differences is not the absence of development.*
- 3) *The reliance on age obscures more important issues such as the centrality of cultural and historical context and individual differences in development.*

We have two primary motivations for writing about the over-reliance on age differences in developmental science. First, we want to have something in print to send to the next editor who rejects one of our papers as “not developmental” because we either have no age effects, or have only tested one age group, leaving who knows how many rich studies of developmental processes in the “file drawer.” Second, many in our field, including us, are becoming increasingly aware of the biases inherent in many of our design choices and the ways in which they perpetuate inequity and unsound science (see Syed & Kathawalla, 2021; Syed, Santos, Yoo, & Juang, 2018). The over-reliance on age differences that we focus on here is but one example of this among many (e.g., binary gender comparisons).

We do not think it is necessary to provide evidence for the notion that “age effects” are a prominent component of the empirical research in developmental science. See any developmental journal. But here is one brief example of why relying on age effects is not enough for a study to count as “developmental.” A series of studies have examined mean-level changes in the Big Five Traits across the lifespan. In particular, one common finding is that there are mean-level increases in conscientiousness in young adulthood (Roberts, Walton & Viechtbauer, 2006). Such findings have been provided as evidence of development. One plausible explanation of *possible* development is that the increased responsibility in social roles in young adulthood evokes more conscientious behavior (e.g., Roberts, 2007), yet those roles are not typically measured. It seems to be enough to just show these age effects exist, which does not bring us closer to *understanding* or *explaining* causal pathways of the developmental phenomenon at hand. In other words, these age-related effects do not tell us anything about development, or that development has in fact occurred.

Further, not only do findings of age differences not *explain* development, they obscure attention to more complex and more important issues such as cultural and historical effects, as well as individual differences in development. For example, although Piaget (1952) made strict claims about the role of age in determining a child’s cognitive stage, repeated studies have shown that there is far more variability than Piaget thought (e.g., preschool-aged children can be trained to pass conservation tasks; Siegler, 2016; Watanabe, 2017), and that children’s behavior is often contingent on the particular task rather than the underlying competency (Baillergeon, Spelke & Wasserman, 1985; Wynn, 1998). Additionally, cultural differences in cognitive development reflect developmental processes and activities that vary by cultural

group (e.g., observation skills; Correa-Chavez & Rogoff, 2009), rather than age. But despite these findings, the fixation on age as evidence of development continues.

How then did we get to this point where observed age differences are a primary way of demonstrating developmental change? Just as scholars are increasingly pointing to the necessity of understanding historical context for our participants (Fish & Syed, 2017; see more on this below), it is increasingly important to understand the history of our own practices in thinking about this question. Let's begin with the cross-sectional design.

As we thought about why age has become such a focus for demonstrating developmental process, we examined the original intent of cross-sectional design. In such a design age is on the X axis, and the idea is that participants in all comparison groups would be equivalent except for chronological age. This may seem to be a values-free design choice to create 'cleaner' data, getting rid of the mess as experimental designs are meant to do (see Syed, 2021), otherwise known as maximizing internal validity. However, such a choice is not values-free at all; it is part of a legacy within psychological science that can perpetuate bias and racism. Some of the first cross-sectional studies, which helped to institutionalize this design in the field, were the early studies on intelligence (e.g., Schaie, 1965). Specifically, the original research on IQ was based on narrow samples of white, middle and upper class children, to which everyone else was compared (often for the worse; see Fryer & Levitt, 2013 for a review). Such designs (which can also be seen beyond cross-sectional work, of course) reinforced the notion of white middle class children as the 'norm,' leading to the perpetuation of racist ideology and practice, along with highly questionable data (e.g., Laundra & Sutton, 2008; Shenk, 2017; Turkheimer, Haley, Waldron, d'Onofrio, & Gottesman, 2003). Given that psychology samples *continue* to be highly homogenous in terms of race, ethnicity, class, and country of origin (Hartmann, Kim, Kim, Nguyen, Wendt, Nagata, & Gone, 2013; Syed et al., 2018), age norms derived from such cross-sectional studies continue to be, at a minimum, part of the problem of the disregard for *explanations* of developmental process and, more problematic, part of the perpetuation of inequities in the academy¹.

And yet...age *is* actually important in some areas. Perhaps most critically, establishing age norms and normative variability provide a benchmark for developmental milestones, and prescribe avenues for interventions (e.g., Moodie, Daneri, Goldhagen, Halle, Green, & LaMonte, 2014; see also Shuttleworth, 1939). It is important to know when delays in language, physical mobility, or pubertal transition are indicative of an underlying problem². Yet, we reiterate, those norms need to be inclusive of diverse samples or they are meaningless. And, of course, age norms only *signal* a potential problem – they do not *explain* the problem. For example, it has long been known that early puberty is a risk factor for later internalizing problems (Mendle & Ferrero, 2012), though it is not clear that is the case across racial and ethnic groups (see

¹ Indeed, the same argument about a lack of understanding of mechanism and age comparisons can be made about race comparisons, perhaps most notably for biological and medical outcomes (see Roberts, 2012)

² Although it is important to note that age norms become less predictive of developmental markers as individuals age (e.g., the standard deviations get larger).

Mendle, Turkheimer, & Emery, 2007 for a review). However, it is not beginning puberty at a certain age, but underlying and related factors, such as gender identity (Nastuaki, Samuels, & Leve, 2014) or socialization with older peers (e.g., Ge, Conger, & Elder, 1996) that *explain* actual development. Thus, age is not a causal variable. It can be a biased marker that is *sometimes* a proxy for the accumulation of other co-occurring events (identity or relationships, in this case; see also Schmidt & Teti, 2005; Wohlwill, 1970). Decentering age means attending to these other markers, only some of which (e.g., transition to middle school) are associated with age.

Given these critiques, moving beyond age allows us to see actual developmental processes that may *explain* age-related development. For example, the robust literature on early memory and narrative development, shows that the socio-cultural activity of parent-child conversations about past events shapes how children remember the past and understand themselves over time (e.g., Nelson & Fivush, 2004). Yes, as children get older their memory improves, but careful observational, longitudinal, and experimental studies show that what predicts various components of children's memories, narrative representations, and self-development are individual differences in the ways in which parents talk with their children about the past (Fivush, Haden, & Reese, 2006), which are heavily embedded in cultural contexts that have particular values about emotion, selves, and narration (e.g., Reese & Neha, 2015; Wang, 2006).

In fact, contemporary developmental theories have stepped away from age as the strongest predictor variable. For example, studies designed from the framework of Dynamic Systems Theory explain developmental change through complex interactions between constraints at the level of the environment, task, and individual (Thelen, 2005). Age is but one individual level constraint and, in many studies generated from a DST approach, not the most meaningful one (mood, energy level, attentional state are often more influential; Smith & Thelen, 2003). Rather, change is measured as it happens in real time by "zooming in" on transition points (e.g., toddlers suddenly using the past tense of verbs; Adolph, Robinson, Young & Gill-Alvarez, 2008; Marcus, Pinker, Ullman, Hollander, Rosen, Xu, & Clahsen, 1992; Perone & Simmering, 2017; Siegler & Crowley, 1991), and examining how advances in one behavioral domain (e.g., motor development) propel advances in a different domain (e.g., language development; Iverson, 2010). Such studies show how portraying developmental change through demonstrations of age differences erases the most interesting and rich explanations of change.

Further, it also turns out development is not always linearly age-graded. For example, careful short-term longitudinal studies show that even when children "pass" a particular developmental task, such as mirror self-recognition, they may "fail" the next week (Courage, Edison, & Howe, 2004), showing a developmental pattern of fits and starts rather than stage-like development dependent on age (see also Syed & McLean, 2018). Similarly, by modifying task dynamics, experimenters can make the A not B error (commonly linked to a narrow timeframe in infancy) come and go into toddlerhood (Spencer, Smith & Thelen, 2001; Schutte & Spencer, 2002). Other work shows that assumed age-related findings from cross-sectional work, such as the rigidity of stereotypical beliefs about gender, are called into question when careful longitudinal analyses are done (Trautner, Ruble, Cyphers, Kirsten, Behrendt, &

Hartmann, 2005). Thus, there are many shapes that developmental trajectories can assume beyond a positively sloped line.

Indeed, longitudinal work also has the ability in its design to showcase the importance of individual differences in one stage, as well as individual differences in pathways of development. In terms of the former, sometimes the absence of age effects is because of large within group variance. For example, Friedman and colleagues (Friedman, Miyake, Robinson, & Hewitt, 2011) showed that individual differences in executive function (e.g., self-restraint) are substantial in toddlerhood and remain developmentally stable into childhood. In terms of variability in pathways of development, some scholars have taken advantage of rich longitudinal datasets, using qualitative and mixed-methods to show various trajectories of development within the same sample. For example, Syed (2010) showed five different pathways that college students took to negotiating their ethnic identities and majors over time, revealing the vast diversity in how individuals develop in their understanding of themselves (see also McLean, Koepf, & Lilgendahl, 2021).

We hope these examples of alternate approaches provide readers with ideas for reimagining how we approach the study of actual developmental processes and explanations for them. We conclude with one more approach from recent calls to *center cultural and historical context in human development*, calls that we think are paradigm-shifting. In contrast to how the original IQ studies excluded diverse samples, *by design*, recent calls argue that we need to center culture and context as mechanisms, *by design*, in part to address the inequities in our very theories and approaches to developmental science. For example, in the context of understanding Native American students' experiences in higher education, Jillian Fish (Fish & Syed, 2017) has argued that a revision to Bronfenbrenner's ecological system model (1979) is needed, such that the chrono and macrosystems are centered, rather than the individual. *This means that no study of individual human development can be done without centering history and culture.* Such a revision to a theoretical framework and study designs would produce a dramatically different understanding of the nature and course of human development that turns our attention away from the proxy variable of age to the rich content and context of human development.

A recent empirical example of such a reimagined framework can be found in Onnie Rogers' work. In a longitudinal study of youth in middle childhood, Rogers, Rosario, Padilla, and Foo (2021) found age-related increases in the importance of racial identity, particularly for Black and multi-racial children. However, these age-related increases seemed to be due to the socio-political context, as the murder of Michael Brown and the rise of the Black Lives Matter movement occurred between the two assessment points. Indeed, these age-related increases in racial identity importance for Black and multi-racial children could not be explained by age, as 5th graders in 2016 rated the importance of their race much higher than 5th graders in 2014. Indeed, the authors note, "An age-based model would not predict such differences..." (p. 3) (see also Rogers, Niwa, Chung, Chae, & Yip, under review; Rogers & Way, 2018).

In conclusion, it makes sense that the field started with cross-sectional designs – descriptive work is a necessary starting place. Our intent is not to dismiss the use of cross-sectional designs as they have an important place in descriptive work, which is often a necessary starting place. But in many areas of development, we have moved beyond the descriptive³. In fact, some high-impact developmental journals explicitly state their mission is to publish “work that specifically attempts to elucidate mechanisms of developmental change at one level” (*Developmental Science*). Our goals for the field have changed as we have learned more about development. To remain relevant and to be able to provide meaningful contributions to our science and to society at large, we need to change our ways. Scholars who are providing newer and revised frameworks that include culture, context, and history, *by design* (Fish & Syed, 2017; Rogers et al., under review; see also Garcia-Coll, Lamberty, Jenkins, McAdoo, Crnic, Wasik, & Vázquez García, 1996), will shape the future of our science as we continue to increasingly understand the complex nature of human development, including the role of context, culture, and individual differences rather than the simplistic variable of age.

³ But see Galliher, McLean, & Syed (2017) . for a warning about moving too quickly beyond description.

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