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The Value of Genetically-Sensitive Research in Understanding Links between Parenting and Child Development

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At the 2023 Academy Awards show, a theme running through many of the speeches were awardees' references to their parents. From actress Michelle Yeoh dedicating her award to her mother, to directors Daniel Scheinert and Daniel Kwan describing how their parents nurtured their creativity, the speeches were a reminder of the formative influence that people individually, and society in general, attribute to parents. However, the empirical study of the impact of parenting on children is not as straightforward as this perception suggests. This is because links between parenting and child outcomes might not necessarily be due to a causal impact of parenting on children, as it is often interpreted. A key issue is that of genetic confounding, which refers to the possibility that links between parenting and child outcomes may be explained by genes passed on from parent to child (Jaffee & Price, 2012). For example, if parents' genetic disposition contributes to their enjoyment of reading, they may be more likely to raise their children in a book-filled home, and they may also pass these genes on to their children, in whom those genes may be associated with greater interest in reading as well. In this scenario, the appearance of a causal link between books in the home and child reading is created by genes shared between parents and children.

Of the various research approaches that have been used to tackle the issue of genetic confounding, one of the most persuasive is that of the adoption research design. It is persuasive both because it makes intuitive sense, and because it is empirically effective. If a child is adopted by individuals outside their biological family, parents and children will not be genetically related. Thus, although adoptive parents' genes may still affect the way they parent their adopted children (Wertz et al., 2019), their genes are not passed on to the children, ruling out this source of confounding. Adoption studies can thus provide compelling evidence for a causal effect of parenting on children, alongside other causally informative designs such as discordant-twin studies (Vitaro et al., 2009) or randomized-controlled trials of parenting interventions (Jeong et al., 2021)

The issue of *Monographs of the Society for Research in Child Development* by Reiss and colleagues (2023), *Parenting in the Context of the Child: Genetic and Social Processes*,

synthesizes evidence on the effects of parenting from one of the largest, longest-running, and most comprehensive adoption studies in the world, the Early Growth and Development Study. The study has gathered data from over 500 families who had adopted a child shortly after birth, and who have been followed alongside the children's biological parents and siblings for well over a decade. The study has collected rich information on a varied set of parent characteristics and child outcomes, including parental caregiving, parents' relationships, child temperament, parent and child psychopathology, and cognitive and educational outcomes. In the following sections, I will first summarize some of the key scientific contributions of the EGDS study, and then reflect on some of the future directions in this area of research.

First, EGDS research shows that parent characteristics (e.g., parental mental health) and parenting practices (e.g., harsh parenting) matter for child outcomes, particularly for child emotional and behavioral problems. This statement may seem trivial, but it is emphasized here both because the EGDS shows it so convincingly – by taking into account genetic confounding – and because debates about the impact of parenting continue to polarize researchers and the general public. What is notable about the EGDS study is that it covers a relatively restricted range of possible family backgrounds, because the financial and personal eligibility screening of adoptive families results in a sample skewed towards greater economic and personal resources. However, even within these relatively more privileged environments, the way that parents behaved and interacted with each other and with their children, and their own psychological health was varied and affected children's outcomes. This finding goes against the idea that only the most extreme variations in parenting, particularly toward the negative, affect children. It should be noted, however, that effects of parenting tended to be small to medium-sized, both in absolute terms and relative to non-adoption studies. The latter might be due to genetic influences, again emphasizing the importance of considering genetic confounding.

Second, research from the EGDS reveals the impact of fathers on children. The inclusion of fathers in developmental research, particularly in genetically sensitive research, is still relatively rare, despite repeated calls to pay more attention to fathers (Cabrera et al., 2018). The EGDS study included not only adoptive fathers, but also a considerable number of biological fathers, who represent half of the genetic influences passed on to children. Findings from the EGDS consistently show that characteristics of adoptive fathers, such as depression and anxiety, and of their parenting affected children's outcomes, often to the same or sometimes an even greater extent than adoptive mothers. The negative impact of maternal depression and anxiety on child wellbeing is well-recognized and has spurred efforts to improve detection and treatment; the EGDS suggests that the same should apply to depression and anxiety in fathers.

Third, EGDS research has advanced our understanding of how children's characteristics shape the parenting they receive (i.e., child effects). To identify child effects, the EGDS linked birth parent characteristics to adoptive parent behaviors. This approach is compelling, because in the absence of a selective adoption placement or contact between birth and adoptive parents, the only way that adoptive parent behaviors would come to be associated with birth parent characteristics is because adoptive parents are reacting to the manifestation of these genetically-transmitted characteristics in the child. EGDS research draws a detailed and nuanced picture of child effects, highlighting the many aspects of child behavior that can elicit

differences in parenting, and illustrating how these effects initiate and sustain parent-child interaction patterns over the longer-term. Child effects can be a sensitive topic, because the suggestion that something about the child may have contributed to a parental response, especially a negative one, can evoke a connotation of "blaming the victim." However, a child cannot be held responsible for the behavior of adults. Instead of assigning blame or responsibility, the purpose of this work is to give a full description of the factors involved in initiating and maintaining problematic interactions, with a view toward breaking negative cycles.

What are considerations for the future of this work? First, it is important to emphasize the continued value of quantitative genetic studies such as the EGDS that infer genetic influences, in an era where direct measurement of genetic variation is relatively cheaply and easily done (van Dongen et al., 2012). This is because molecular genetic studies do not capture all of the genetic influences on traits and behaviors, a phenomenon that has been termed "missing heritability." This "missingness" is particularly high for some of the outcomes that are of greatest interest to developmental researchers, such as children's behavioral and emotional problems and cognitive skills (Pingault et al., 2022). The implication is that compared to twin or adoption studies, molecular genetic data currently provide an ineffective means to control for genetic confounding. Another reason for the continued value of adoption studies is that they are able to disentangle the individual contributions of children's and parent's genes to child outcomes. That is, if a molecular genetic study identifies an association between an individual's genetic variants and an outcome (e.g., educational attainment), this association could arise either because the genes affect something within the individual (e.g., brain development) or because the genes are shared with the individual's parents, in whom these genes may influence the environments that parents are creating (e.g., if parental genes influence the parenting they provide) and that are relevant to the outcome. When combined with molecular-genetic data, adoption studies can measure such environmentally-mediated genetic effects and reveal gene-environment interplay (Cheesman et al., 2020).

Second, as the monograph authors mentioned, new variations of the adoption design are emerging. One of these is the "adoption at conception" design, which studies families with children conceived through in vitro fertilization (IVF) (Lewis et al., 2011). This design is particularly powerful because it can also take into account pre-natal influences, which in a traditional adoption design are indistinguishable from birth parent genetic influences, except to the extent that they can be measured and accounted for. Furthermore, in countries where IVF is paid for by public funds such as the UK National Health Service and thus is relatively more accessible, the IVF design offers an opportunity to recruit more diverse and population-representative samples of families. Another innovation is to augment traditional adoption designs with molecular genetic data, as briefly described above. This is particularly useful in the absence of information on birth parents, because children's molecular genetic data could provide at least some information on the genetic risk for various outcomes, such as mental health problems.

Finally, parenting research is increasingly paying attention to parenting as a lifelong process. Studies in sociology, demography, and economics have documented how common it is for

parents of adult children to provide resources to their offspring, in the form of financial support or practical assistance (e.g., childcare for grandchildren) (Swartz, 2009). The prevalence and importance of such intergenerational supports is likely to increase, as young people rely on and are in close contact with their parents for longer periods (e.g., even before the pandemic, 44% of young adults lived with their parents, this number increased to 52% in 2020; Pew Research Center, 2020). As the participants in the EGDS get older, there is a unique opportunity to learn more about how parenting and the parent-child relationship unfolds as children grow into adulthood. In this way, the EGDS will continue to teach us about the impact of parenting on people's lives.

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