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"Children are very vulnerable"

Interview with Jianghong Li about her research, cross-discipline approach and the importance of thinking outside the box.

Jianghong Li

Why is it so important for you to explore the health and well-being of children?

Children are compelling and they are our future. Yet, children are very vulnerable for several reasons. First of all, their voices and interests are often not heard or not taken seriously enough in the adults' world. Second, children are vulnerable because they cannot choose the social and physical environments in which they were born and grow up. Children who were born into disadvantaged families where parents have lower social and economic resources or suffer from poor physical and mental health problems are stuck in that developmentally constraining (inhibiting) milieu for at least 18 years. After they enter into adulthood, many children continue to suffer from the adverse impact of growing up in this environment. It is well-established that early life, from conception until the age of five, sets the foundation for health, competence, and educational achievement in later stages of human development. Recent research evidence tells us that the critical early life in fact starts even earlier. Another reason why children are vulnerable is that they are powerless in protecting their own health and in pursuing and defending their rights as a human being. For example, when adults smoke in the car or the house when children are present, children become passive smokers and hence they are at risk of developing a range of smoking-associated health problems later on. Yet, children are not in the position to avoid this exposure. A further example is that in school, teachers evaluate students but they do not have the right to voice their views about teachers with regard to teaching and learning. My observation is that young children, even at age six, are very capable of having an opinion on what is fair or unfair and right or wrong.

Violence and wars make children particularly vulnerable. Putin's invasion of Ukraine is devastating to Ukraine's children and their families, with a long-lasting detrimental impact on their health and development. I can only hope that resolute and sincere efforts

from the international community to protect the children with adequate provision of essential services would attenuate the long-term impact of the war on these extraordinarily vulnerable children.

When did you start research on children's health and well-being? What was the trigger?

I began my research career on child health and wellbeing in April 2003, three years after I moved from Germany (Göttingen) to Perth in Western Australia with my family. My daughter was 8.5 years of age and my son 2.5 years old. As I said above, children are compelling and I have been always very interested in topics on health. In the 1990s, I worked on two field studies on familial and community-level determinants of infant health and survival in rural China. In November 2000, I attended a fascinating research seminar on increasing trends in child and adolescent health problems and their social and biological antecedents, at the Telethon Kids Institute (formerly called "Telethon Institute for Child Health Research") in Perth, a well-known research institution on children and adolescents in Australia and in the world, founded by Fiona Stanley. At that time, I had wished that one day I could work at that institute and to integrate my background in social demography and social stratification with research on child health and wellbeing. Luckily, the opportunity did come in April 2003, when I was offered a research fellow position at the Telethon KIDS Institute to work with a group of young scientists from epidemiology, clinical psychology, medicine, public health to investigate multicausal risk factors contributing to the existing and newly emerging health problems in children and adolescents. That was an important turning point in my research career. I worked at the Institute for nine years until June 2012, when I moved back to Germany with my family and I started my new position at the WZB in July in that year.

Why is a cross-discipline approach important for your research on child health and wellbeing?

As social scientists, we were trained to use parsimonious theoretical frameworks to guide our empirical investigations (A parsimonious framework is a theory that introduces the least new assumptions about the subject in question). But the reality is quite the opposite. Social phenomena which we try to understand and explain are far more complex than parsimonious theories assume. The same holds true for health outcomes in all population groups. If we conduct our research only in silo, we only see a small part of the whole picture. It is like a frog sitting in the well and see only the small circle of the sky (坐井观天, a Chinese expression of the pitifulness of having a narrow vision and in this case doing research in silo). Not only our vision of the world is narrowed by doing research in a silo, but also our data collection (width and depth), analytical approaches and interpretation of the results can be constrained and even biased, leading to wrong conclusions. I have an enlightening research experience to share here.

Can you tell us more about this?

When I was still working at the Telethon KIDS Institute, I had the opportunity to investigate the long-lasting impact of mothers' experience of life stress events during pregnancy on their children's school grades in middle childhood, together with my colleagues from cognitive psychology, neuroscience, and clinical psychology. We analyzed

the longitudinal cohort data from the Raine Study. Our hypothesis was that maternal exposure to socioeconomic stressors (e.g., marital problems, divorce/separation, financial problems, residential relocation) during pregnancy has a negative effect on offspring's cognitive outcomes. The rationale for the hypothesis was that mothers' exposure to stressors during pregnancy will raise their cortisol level, which in turn crosses the placenta to disturb the ongoing neurological and physiological development of the fetus.

To test this hypothesis, we first estimated multivariate models using the combined sample of boys and girls. Our preliminary results showed that maternal stress during pregnancy had no effect on children's test scores in mathematics and literacy at age 10, thus not supporting our hypothesis. When I discussed the initial results with my colleagues from the Clinical Division of the Institute, they suggested that it was important to look at sex interactions by estimating separate models for boys and girls. The reason was that male and female fetus might react differently to the raised cortisol level in the placenta caused by maternal stress, due to genetic and physiological differences between the sexes. That made good sense to me, although I would never have thought of it myself. The new results from gender-separate analyses were astonishing and fascinating: among girls, mothers' exposure to four or more stress events in pregnancy was associated with lower test scores for reading at age 10, supporting our hypothesis; but in contrast, among boys, maternal exposure to 3 or more stress events was linked to higher reading score and higher test scores for mathematics. How would I interpret these gender differences? My co-authors from cognitive psychology and neuroscience provided insights into the seemingly "contradictory" gender-specific findings and directed me to the relevant existing literature.

One important take-away message for me was that perspectives from experts outside my own discipline are crucial for better understanding the complexity of the problem under investigation. Our preliminary analyses based on pooled data, which ignored sex differences in genetics and physiology, showed no significant association between maternal stress exposure in pregnancy and offspring's school achievement at age 10, because the positive effects in males and negative effects in females "canceled each other", resulting in null effects. Without investigating the sex differences, the study would have reached a wrong conclusion. The study was published in the Journal of Pediatrics in 2013.

How would you describe the limitations of your own discipline?

In sociology, we put a strong emphasis on early socialization within the home as a determinant of differences between boys and girls in behavior, preferences, perceptions, and choices for certain educational trajectories and occupations. We think that socialization shapes gender differences in areas of cognitive strengths and capabilities. But my observations over the last 30 years, my own casual experiment with the socialization of my daughter and son, and my reading of the scientific literature made me realize that many aspects of gender differences in behavior, preferences and cognition are biological in nature. We dressed our daughter in clothing with blue or natural colors before she turned three, but she irresistibly chose to wear pink and red color clothing when she had the choice. We never gave her Barbie toys to play, but she still ended up with loving to play Barbies later when our nanny gave her one. My son was dressed in

clothing with pink and white colors as a baby. We displayed dolls and stuffed animals in the play area of the living room and in his bedroom, but he showed absolutely no interest in dolls. He liked toy vehicles the most. When I took him for a walk in the pram, he would stare at a passing vehicle that made loud noise. In my opinion children's preferences for certain school subjects and being good at them does not have as much to do with parent's aspirations through socialization as with genetics. A typical example is that children who are talented in music were born to parents who are musicians. This also holds true for children's talents in sports, mathematics and language.

To accept that biology is important for understanding gender differences in behavior, preferences, and cognition could perhaps put one at the risk of being perceived as "sociologically incorrect" or being a "biological reductionist" within the circle of the social sciences. But we must be cognizant of the limitations of our own discipline and be open to interpretations and explanations of social phenomena from other disciplines. Only with this openness can we better grasp the complex system of our social world. I also think that there is an over-emphasis on existing theories in sociological research, which can stifle innovation and hinder new discovery by discouraging or even inhibiting explorative research without a theoretical basis. This can be problematic, particularly in understanding our rapidly changing and diversifying social world. In health and biomedical research there is greater openness and a stronger explorative spirit among researchers.

On the other hand can social sciences benefit biomedical and health research and in what ways?

Yes. There is an increasing interest among social epidemiologists, population health and biomedical researchers in understanding nature-nurture (gene-environment) interactions and their role in the complex etiology of diseases. Social sciences can make a significant contribution to advancing this knowledge in both theory and methods. Developmental health scholars already recognize that differences in social, economic and psychological conditions in early life (from conception onward) influence human health and development. This occurs through a biological embedding process, whereby the body and the brain constantly interact with the stimuli from the immediate physical, social and economic environments. Sociologists can provide insights into certain social structures that are a fundamental cause of major diseases. This insight can inform upstream policy and interventions aimed to improve health and wellbeing for all.

Methodologically speaking, social scientists have developed some sophisticated models that can be used in health and biomedical research. More broadly speaking, I think both disciplines have something to offer and to learn from each other in their analytical approaches: health and biomedical research could benefit from taking a dose of social sciences' emphasis on theory, whereas social science research can benefit from taking a more open and more explorative approach used in health and medical research to understanding the complex unknowns.

Finally, emerging evidence suggests that experience of social adversity in early life is associated with epigenetic changes that affect gene activity and expression in children and young adults, with regard to a range of health problems (e.g., obesity, asthma, and

mental health disorders). Inter-disciplinary research is desperately needed to confirm or disconfirm that this link is causal. This is very exciting research and social scientists can contribute to the advancement of this knowledge by bringing their theoretical and methodological expertise to this scientific endeavor.

The questions were asked by Kerstin Schneider.

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