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Dunedin Study Evidence Summary

Submission to the Royal Commission into Early Childhood Education and Care

The Dunedin Multidisciplinary Health and Development Study (commonly known as “the Dunedin Study”) is a longitudinal research project that has followed a representative group of just over 1000 individuals since they were born in the early 1970s in Dunedin, New Zealand.¹ Study members, who are now 50 years old, have had almost every aspect of their lives measured as they have grown up and reached middle age. Through a large body of scientific work, Dunedin Study researchers have demonstrated the important role childhood experiences play in influencing health and wellbeing outcomes across adulthood.

To inform the work of the Royal Commission into Early Childhood Education and Care, this submission provides an overview of key Dunedin Study findings relating to the lifelong impact of childhood experiences. Below we highlight five early life factors that Dunedin Study researchers have found to consistently forecast adult health and wellbeing outcomes, independent of the effects of other developmental risk factors. Evidence relating to each factor is described separately, but it is important to note that no single factor entirely accounts for outcomes in adulthood. Indeed, research shows that early life risk factors are more likely to have cumulative rather than individual effects on outcomes in later life,² and that early life factors are likely to influence outcomes through multiple interacting pathways.³

1. Childhood brain health

At age 3 years, Dunedin Study members took part in a pediatric examination that included a neurological evaluation and assessments of verbal comprehension, language development, motor skills, and social behaviour. Together, those measures formed an index of early childhood brain health. Children who had poorer brain health at age 3 had poorer mental health across adolescence and adulthood⁴ and by mid-adulthood exhibited faster biological aging and poorer cardiovascular health.⁵

Dunedin Multidisciplinary Health & Development Research Unit

PO Box 913, Dunedin 9054, New Zealand

Tel +64 3 479 8508 • Fax +64 3 479 5487

Email dmhdru@otago.ac.nz dunedinstudy.otago.ac.nz



After linking Dunedin Study data to government administrative databases and electronic medical records, Study researchers showed that children with poorer brain health at age 3 were also more likely to go on to represent a disproportionate share of the economic costs associated with crime, social welfare, hospitalisations, prescriptions, and other indicators of poor health and social dysfunction. A small proportion of Study members (approximately 20%) accounted for the majority (approximately 80%) of those economic costs, and poor early childhood brain health was a good predictor of going on to be in that high-cost group.⁶

2. Childhood socioeconomic conditions

It is well established that there is a socioeconomic gradient in health and wellbeing outcomes: people living in disadvantaged socioeconomic conditions are more likely to experience poor outcomes across many different life domains. Dunedin Study research has reliably shown that this socioeconomic gradient starts in early childhood.⁷ The findings show that children who grew up in socioeconomically disadvantaged families (from ages 3 to 11 years) were more likely in adulthood to have multiple indicators of poor physical health⁷ and mental health,⁸ to be at greater risk for age-related diseases,⁹ and to be biologically aging at a faster rate than their peers of the same chronological age.² Children from disadvantaged backgrounds were also more likely to become parents at an earlier age and to have less positive parenting skills.¹⁰

3. Childhood self-control

Self-control can be described as the ability to delay gratification, control impulses, persist in the face of challenges, and appropriately modulate one's emotions and behaviours. Using a comprehensive, multi-occasion, multi-informant assessment of self-control from ages 3 to 11 years old, Dunedin Study research has consistently shown that children's overall self-control skills predict a wide range of outcomes in adulthood. Similar to the idea of a socioeconomic gradient in health and wellbeing outcomes, there is also a self-control gradient.

The poorer a child's self-control skills were across ages 3 to 11 years, the more likely they were in mid-adulthood to have poor physical health, substance dependence difficulties, and low income and financial difficulties, and to engage in antisocial behaviour.¹¹ Further into adulthood, low childhood self-control was associated with a faster pace of biological aging² and greater age-related physical decline, more signs of brain aging, less consistent use of positive health and financial behaviors, more negative attitudes toward aging, less social integration, and lower life satisfaction.¹²

4. Adverse childhood experiences

Adverse childhood experiences, including abuse, neglect, and household dysfunction, are also consistent predictors of risk for poor outcomes in adulthood. Dunedin Study research has shown that the more adversity a child experienced, the more likely they were in adulthood to experience poorer physical, cognitive, mental, neural, and social outcomes.^{9,13,14} Similarly, people who experienced childhood sexual abuse were more likely to have persistent problems across their 20s, 30s, and 40s in terms of physical health, mental health, sexual health, interpersonal relationships, economic outcomes, antisocial behaviour, and cumulative problems across multiple life domains.¹⁵

5. Childhood social isolation

Between the ages of 5 and 11 years, Dunedin Study members' peer interactions and relationships were repeatedly assessed. Children who experienced chronic social isolation across childhood were more likely in adulthood to have poorer cardiovascular health,¹⁶ risk factors for age-related diseases,⁹ and markers of faster age-related cognitive decline.¹⁷

Implications

The Dunedin Study has investigated the health and development of a representative cohort of people over five decades, from birth to middle age. Together, the findings show that early childhood conditions and experiences such as brain health, socioeconomic conditions, self-control, adverse experiences, and social isolation are consistently associated with outcomes in adulthood across multiple life domains. Those associations are not simply explained by the coinciding presence of other developmental risk factors, suggesting that the five early childhood factors discussed here are all potentially fruitful targets for prevention and intervention. In sum, Dunedin Study findings indicate that policies and initiatives aimed at improving early life brain health, socioeconomic conditions, and self-control, or at preventing or ameliorating the impacts of adverse experiences and social isolation in childhood, are most likely to translate into long-term individual, community, and societal benefits.

Dr Hayley Guiney

Research Fellow

Dunedin Multidisciplinary Health & Development Research Unit

University of Otago

References

1. Poulton R, Guiney H, Ramrakha S, Moffitt TE. The Dunedin study after half a century: reflections on the past, and course for the future. *Journal of the Royal Society of New Zealand* 2022; 1-20.
2. Belsky DW, Caspi A, Cohen HJ, et al. Impact of early personal-history characteristics on the Pace of Aging: implications for clinical trials of therapies to slow aging and extend healthspan. *Aging Cell* 2017; **16**(4): 644-51.
3. Melchior M, Moffitt TE, Milne BJ, Poulton R, Caspi A. Why do children from socioeconomically disadvantaged families suffer from poor health when they reach adulthood? A life-course study. *Am J Epidemiol* 2007; **166**(8): 966-74.
4. Caspi A, Houts RM, Ambler A, et al. Longitudinal Assessment of Mental Health Disorders and Comorbidities Across 4 Decades Among Participants in the Dunedin Birth Cohort Study. *JAMA Netw Open* 2020; **3**(4): e203221-e.
5. Schaefer JD, Caspi A, Belsky DW, et al. Early-Life Intelligence Predicts Midlife Biological Age. *J Gerontol B Psychol Sci Soc Sci* 2016; **71**(6): 968-77.
6. Caspi A, Houts RM, Belsky DW, et al. Childhood forecasting of a small segment of the population with large economic burden. *Nat Hum Behav* 2016; **1**: 0005.
7. Poulton R, Caspi A, Milne BJ, et al. Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet* 2002; **360**(9346): 1640-5.
8. Koenen KC, Moffitt TE, Poulton R, Martin J, Caspi A. Early childhood factors associated with the development of post-traumatic stress disorder: results from a longitudinal birth cohort. *Psychol Med* 2007; **37**(2): 181-92.
9. Danese A, Moffitt TE, Harrington H, et al. Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers. *Arch Pediatr Adolesc Med* 2009; **163**(12): 1135-43.
10. McAnally HM, Iosua E, Sligo JL, et al. Childhood disadvantage and adolescent socioemotional wellbeing as predictors of future parenting behaviour. *J Adolesc* 2021; **86**: 90-100.
11. Moffitt TE, Arseneault L, Belsky D, et al. A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences* 2011; **108**(7): 2693-8.
12. Richmond-Rakerd LS, Caspi A, Ambler A, et al. Childhood self-control forecasts the pace of midlife aging and preparedness for old age. *Proceedings of the National Academy of Sciences* 2021; **118**(3): e2010211118.
13. Reuben A, Moffitt TE, Caspi A, et al. Lest we forget: comparing retrospective and prospective assessments of adverse childhood experiences in the prediction of adult health. *J Child Psychol Psychiatry* 2016; **57**(10): 1103-12.

14. Gehred MZ, Knodt AR, Ambler A, et al. Long-term Neural Embedding of Childhood Adversity in a Population-Representative Birth Cohort Followed for 5 Decades. *Biol Psychiatry* 2021; **90**(3): 182-93.
15. Guiney H, Caspi A, Ambler A, et al. Childhood sexual abuse and pervasive problems across multiple life domains: Findings from a five-decade study. *Development and Psychopathology* In press.
16. Caspi A, Harrington H, Moffitt TE, Milne BJ, Poulton R. Socially isolated children 20 years later: risk of cardiovascular disease. *Arch Pediatr Adolesc Med* 2006; **160**(8): 805-11.
17. Barrett-Young A, Ambler A, Cheyne K, et al. Childhood social isolation as a predictor of retinal neuronal thickness in middle age: A lifecourse birth cohort study. *Psychosomatic Medicine* In press.