

## INTRODUCTION

# Introduction to JINS Special Section: Resilience and Wellness after Pediatric Acquired Brain Injury



INS is approved by the American Psychological Association to sponsor Continuing Education for psychologists. INS maintains responsibility for this program and its content.

Miriam H. Beauchamp<sup>1,2</sup> and Keith O. Yeates<sup>3,4,5</sup>

<sup>1</sup>Department of Psychology, University of Montreal, Montreal, Quebec, Canada

<sup>2</sup>Ste-Justine Hospital Research Center, Montreal, Quebec, Canada

<sup>3</sup>Departments of Psychology, Pediatrics, and Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada

<sup>4</sup>Alberta Children's Hospital Research Institute, University of Calgary, Alberta, Canada

<sup>5</sup>Hotchkiss Brain Institute, University of Calgary, Calgary, Alberta, Canada

Acquired brain injuries (ABI) involve damage to the brain that occurs after birth and is not due to congenital or genetic causes. ABI are prevalent throughout childhood and adolescence and arise from a range of causes, including traumatic brain injury (TBI) and non-traumatic insults such as stroke, brain tumors, infections, and hypoxia. The adverse effects of pediatric ABI have been extensively documented; regardless of etiology, they can affect multiple domains, including physical, cognitive, social, adaptive, and behavioral functioning. Impairments caused by ABI typically follow a dose–response relation, with more severe and diffuse injuries resulting in worse and more persistent negative outcomes, often leading to lifelong impairments and poor quality of life.

Most research on the consequences of ABI focuses on the difficulties and deficits that occur as a result of the injury. In this context, it is easy to forget that some children with ABI exhibit surprisingly rapid or good recovery, display positive outcomes, and return to, or even exceed, pre-injury levels of functioning. Indeed, some children with ABI are able to adapt to their symptoms and sequelae, compensate for any impairments, succeed in academic, social, and community settings, and experience good quality of life.

Accounts of good recovery after ABI are readily available. For example, a subgroup of children with severe TBI show no deficits in one or more domains of functioning (neuropsychological, behavioral, adaptive, academic) between 6 months and 4 years postinjury (Fay et al., 2009). At the milder end of the TBI spectrum, most children who sustain mild TBI or concussion display no postconcussive symptoms or neuropsychological difficulties within 1 month of their injuries (Beauchamp et al., 2018; Zemek et al., 2016). Other ABI populations also display instances of positive outcome. Adolescents born extremely premature, many of whom sustain perinatal brain

injuries, perceive their health and well-being as similar to term-born peers (Hack et al., 2011). Similarly, young adult survivors of childhood brain cancers report unexpectedly good health-related quality of life, which may be attributable to better coping mechanisms and greater optimism (Stam et al., 2006).

Research focusing on positive outcomes after ABI is increasing and has the potential to provide critical information on the factors that are protective or predictive of preserved functioning, and conversely, on what markers may be useful in identifying children at-risk for poor outcome. Positive outcomes can be conceptualized in a variety of ways and using diverse methodologies. Many authors evoke the notion of resilience to explain seemingly contradictory associations between experienced hardship and favorable outcome. Resilience can be broadly defined as “the capacity of a dynamic system to adapt successfully to disturbances that threaten system function, viability, or development”; applied specifically to psychological disciplines, it usually refers to “positive adaptation in the context of risk or adversity” (Masten, 2014, pp. 9–10). For example, evidence suggests that certain aspects of resilience (Losoi et al., 2015; Tonks et al., 2011) and character strengths such as hope, zest, and courage (Hanks et al., 2014) are associated with better outcome after TBI.

Research focusing on healthy behaviors and quality of life and their determinants offers additional insights into what factors are associated with well-being after ABI such as stroke, brain tumors, and TBI (e.g., Di Battista et al., 2014; Gupta & Jalali, 2017; O’Keeffe et al., 2017). For example, health promotion and self-efficacy have been shown to be positively associated with health status, life satisfaction, and participation after TBI (Braden et al., 2012). Thus, healthy behaviors and quality of life, while often operationalized as indicators of poor outcome after ABI, can also be used to identify patients and families with good outcomes.

Collectively, descriptors referring to positive psychology, plasticity, reserve, resilience, character strengths, coping, healthy behaviors, and quality of life can be subsumed under the broader notion of “wellness,” defined by the World Health Organization as the absence of disease or infirmity in combination with a state of complete physical, mental, and social well-being (WHO, 1946). Wellness may thus be conceptualized as an umbrella term for a range of predictors, measures, and outcomes of optimal functioning and constitutes an interesting avenue for exploring “the other side of ABI.”

The aim of this special section of JINS is to showcase a collection of empirical articles that address notions of resilience and wellness after pediatric ABI. The articles concern a variety of etiologies of ABI, including TBI and concussion, neonatal stroke and hypoxic-ischemic encephalopathy, extremely low birthweight and prematurity, and brain tumor. They also represent a range of definitions and conceptualizations of resilience and wellness, and describe a variety of methodological approaches.

Several key distinctions are reflected in the articles. One is whether resilience and wellness are defined in terms of outcomes or in terms of characteristics that may predict outcomes. For example, Durish et al. examine psychological resilience as a predictor of concussion outcomes in adolescents, showing that it predicts postconcussive symptoms, as mediated by anxiety and depressive symptoms. Similarly, Donders et al. focus on cognitive reserve, as measured by maternal education, as a moderator and predictor of cognitive outcomes after TBI in children. In both of these studies, resilience is viewed as a personal characteristic that can affect outcomes.

By contrast, Taylor et al. define resilience in terms of positive academic and behavioral outcomes of children born preterm and extremely low birthweight. They show that resilience defined in this fashion is predicted by factors such as children’s cognitive functioning and learning, and more advantaged family environments. In a similar fashion, Beauchamp et al. examine wellness after pediatric concussion, with wellness defined in terms of multiple endpoints. They show that wellness can be predicted by children’s age and developmental history, as well as by injury mechanism and acute mental status. In these two studies, resilience and wellness are defined as outcomes in and of themselves, and the focus is on identifying the factors that help to predict them.

Another key distinction reflected in the papers is that resilience and wellness are very much in the eye of the beholder. That is, researchers and health-care providers may have different definitions of resilience and wellness than children with ABI or their parents. Williams et al. use a mixed methods approach to examine how parents of children with neonatal brain injury define resilience and show that qualitative and quantitative definitions are aligned but distinct. They also show that resilience in this population depends on close medical follow-up, early intervention, and intrinsic child and parent factors. McCarron et al. argue that resilience and wellness should be defined in terms of the goals of children with ABI if rehabilitation is to be truly patient centered. They show

that the key goals for youth with ABI focus on activities and participation, body function, and environmental factors.

The papers also reflect a key distinction between resilience as defined by intrinsic *versus* extrinsic factors. Conklin et al. study aerobic fitness and motor proficiency as intrinsic characteristics that may promote better cognitive outcomes in children who are brain tumor survivors. Durish et al. and Donders et al. also treat resilience as an intrinsic characteristic, be it psychological resilience or cognitive reserve, respectively. In contrast, Taylor et al. and Williams et al. show how extrinsic factors, such as the family environment and the quality of health care, can promote resilience and wellness.

A final important distinction reflected by the papers is that resilience can be defined at different levels of analysis. Although resilience and wellness are defined in most cases at the level of children’s behavioral or psychological outcomes, they can also potentially be defined in terms of brain health. Conklin et al. use task-based functional magnetic resonance imaging to understand the neural substrates associated with better motor proficiency. Christensen et al. present a brief literature review to suggest that children’s developing brains may demonstrate a surprising resilience in response to ABI, evidenced by reduced vulnerability to confabulation. However, more work is needed to determine the underlying neural mechanisms that may protect against confabulation in younger brains.

The range of definitions and measures used in the studies in this special section reflects not only the breadth of concepts relevant to positive outcomes, but also the fact that applying positive perspectives to the study of ABI is a relatively new endeavor. Nonetheless, rehabilitation researchers are already exploring the efficacy of positive psychology, positive parenting interventions, and health and wellness programs for promoting optimal outcome in individuals with ABI (e.g., Andrewes et al., 2014; Antonini et al., 2012; Ashworth et al., 2015; Brenner et al., 2012). The conceptual boundaries between the constructs of positive psychology, plasticity, reserve, resilience, character strengths, coping, healthy behaviors, optimal outcome, quality of life, and wellness may well be somewhat blurry. Nevertheless, future research on who does well after pediatric ABI constitutes fertile ground for furthering the science of resilience and for developing interventions to promote wellness among children with ABI.

## REFERENCES

- Andrewes, H.E., Walker, V., & O’Neill, B. (2014). Exploring the use of positive psychology interventions in brain injury survivors with challenging behaviour. *Brain Injury*, 28(7), 965–971. doi: [10.3109/02699052.2014.888764](https://doi.org/10.3109/02699052.2014.888764)
- Antonini, T.N., Raj, S.P., Oberjohn, K.S., & Wade, S.L. (2012). An online positive parenting skills programme for paediatric traumatic brain injury: feasibility and parental satisfaction. *Journal of Telemedicine and Telecare*, 18(6), 333–338. doi: [10.1258/jtt.2012.120404](https://doi.org/10.1258/jtt.2012.120404)
- Ashworth, F., Clarke, A., Jones, L., Jennings, C., & Longworth, C. (2015). An exploration of compassion focused therapy following

- acquired brain injury. *Psychology and Psychotherapy*, 88(2), 143–162. doi: [10.1111/papt.12037](https://doi.org/10.1111/papt.12037)
- Beauchamp, M.H., Aglipay, M., Yeates, K.O., Desire, N., Keightley, M., Anderson, P., Brooks, B.L., Barrowman, N., Gravel, J., Boutis, K., Gagnon, I., Dubrovsky, A.S., & Zemek, R. (2018). Predictors of neuropsychological outcome after pediatric concussion. *Neuropsychology*, 32(4), 495–508. doi: [10.1037/neu0000419](https://doi.org/10.1037/neu0000419)
- Braden, C.A., Cuthbert, J.P., Brenner, L., Hawley, L., Morey, C., Newman, J., . . . Harrison-Felix, C. (2012). Health and wellness characteristics of persons with traumatic brain injury. *Brain Injury*, 26(11), 1315–1327. doi: [10.3109/02699052.2012.706351](https://doi.org/10.3109/02699052.2012.706351)
- Brenner, L.A., Braden, C.A., Bates, M., Chase, T., Hancock, C., Harrison-Felix, C., Hawley, L., Morey, C., Newman, J., Pretz, C., & Staniszewski, K. (2012). A health and wellness intervention for those with moderate to severe traumatic brain injury: a randomized controlled trial. *Journal of Head Trauma Rehabilitation*, 27(6), E57–E68. doi: [10.1097/HTR.0b013e318273414c](https://doi.org/10.1097/HTR.0b013e318273414c)
- Di Battista, A., Godfrey, C., Soo, C., Catroppa, C., & Anderson, V. (2014). Depression and health related quality of life in adolescent survivors of a traumatic brain injury: a pilot study. *PLoS One*, 9(7), e101842. doi: [10.1371/journal.pone.0101842](https://doi.org/10.1371/journal.pone.0101842)
- Fay, T.B., Yeates, K.O., Wade, S.L., Drotar, D., Stancin, T., & Taylor, H.G. (2009). Predicting longitudinal patterns of functional deficits in children with traumatic brain injury. *Neuropsychology*, 23, 271–282.
- Gupta, P. & Jalali, R. (2017). Long-term survivors of childhood brain tumors: impact on general health and quality of life. *Current Neurology and Neuroscience Reports*, 17(12), 99. doi: [10.1007/s11910-017-0808-0](https://doi.org/10.1007/s11910-017-0808-0)
- Hack, M., Forrest, C.B., Schluchter, M., Taylor, H.G., Drotar, D., Holmbeck, G., & Andreias, L. (2011). Health status of extremely low-birth-weight children at 8 years of age: Child and parent perspective. *Archives of Pediatrics and Adolescent Medicine*, 165(10), 922–927. doi: [10.1001/archpediatrics.2011.149](https://doi.org/10.1001/archpediatrics.2011.149)
- Hanks, R.A., Rapport, L.J., Waldron-Perrine, B., & Millis, S.R. (2014). Role of character strengths in outcome after mild complicated to severe traumatic brain injury: a positive psychology study. *Archives of Physical Medicine and Rehabilitation*, 95(11), 2096–2102. doi: [10.1016/j.apmr.2014.06.017](https://doi.org/10.1016/j.apmr.2014.06.017)
- Losoi, H., Silverberg, N.D., Waljas, M., Turunen, S., Rosti-Otajarvi, E., Helminen, M., Luoto, T.M., Julkunen, J., Öhman, J., & Iverson, G.L. (2015). Resilience is associated with outcome from mild traumatic brain injury. *Journal of Neurotrauma*, 32(13), 942–949. doi: [10.1089/neu.2014.3799](https://doi.org/10.1089/neu.2014.3799)
- Masten, A.S. (2014). *Ordinary magic*. New York: Guilford Press.
- O’Keeffe, F., Stark, D., Murphy, O., Ganesan, V., King, J., & Murphy, T. (2017). Psychosocial outcome and quality of life following childhood stroke—A systematic review. *Developmental Neurorehabilitation*, 20(7), 428–442. doi: [10.1080/17518423.2017.1282052](https://doi.org/10.1080/17518423.2017.1282052)
- Stam, H., Grootenhuis, M.A., Caron, H.N., & Last, B.F. (2006). Quality of life and current coping in young adult survivors of childhood cancer: positive expectations about the further course of the disease were correlated with better quality of life. *Psycho-Oncology*, 15, 31–43. doi: [10.1002/pon.920](https://doi.org/10.1002/pon.920)
- Tonks, J., Yates, P., Frampton, I., Williams, W.H., Harris, D., & Slater, A. (2011). Resilience and the mediating effects of executive dysfunction after childhood brain injury: a comparison between children aged 9–15 years with brain injury and non-injured controls. *Brain Injury*, 25(9), 870–881. doi: [10.3109/02699052.2011.581641](https://doi.org/10.3109/02699052.2011.581641)
- World Health Organization. (1946). *Preamble to the constitution of the World Health Organization as adopted by the international health conference* (Vol. Official Records of the World Health Organization, pp. 100), New York: World Health Organization.
- Zemek, R., Barrowman, N., Freedman, S.B., Gravel, J., Gagnon, I., McGahern, C., Aglipay, M., Sangha, G., Boutis, K., Beer, D., Craig, W., Burns, E., Farion, K., Mikrogianakis, A., Barlow, K., Dubrovsky, A.S., Meeuwisse, W., Gioia, G., Meehan, W.P. III, Beauchamp, M.H., Kamil, Y., Grool, A.M., Hoshizaki, B., Anderson, P., Brooks, B.L., Yeates, K.O., Vassilyadi, M., Klassen, T., Keightley, M., Richer, L., DeMatteo, C., Osmond, M.H., & Pediatric Emergency Research Canada (PERC) Concussion Team (2016). Clinical risk score for persistent post-concussion symptoms among children with acute concussion in the ed. *Journal of the American Medical Association*, 315(10), 1014–1025. doi: [10.1001/jama.2016.1203](https://doi.org/10.1001/jama.2016.1203)