

# Impact of Childhood Leukemia Treatment on Attention Measured by the Continuous Performance Test Factor Structure

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**OBJECTIVES:** To describe the impact of central nervous system–directed treatment on attention and its relation to academic outcomes in childhood acute lymphoblastic leukemia (ALL) survivors.

**SAMPLE & SETTING:** 51 children diagnosed with ALL at two pediatric oncology treatment centers in the southwestern United States.

**METHODS & VARIABLES:** A prospective, longitudinal design measured attention after a child was in remission, two years after the start of treatment, and at the end of treatment. Attention measures from the Conners' Continuous Performance Test were grouped into composite subdomains based on a factor structure describing focused attention, hyperactivity/impulsivity, sustained attention, and vigilance.

**RESULTS:** Children treated for ALL exhibited decreased focused attention, sustained attention, and vigilance during and at the end of treatment when compared to age- and gender-normed references.

**IMPLICATIONS FOR NURSING:** Pediatric oncology nurses are in a position to ask patients and parents about neuropsychological difficulties during ALL treatment. Patients who experience these effects are at risk for decreased academic abilities after treatment.

**KEYWORDS** attention; childhood leukemia; pediatric oncology; survivors

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The population of young adults who have survived cancer is growing, with 1 in 530 young adults aged 20 to 39 years having had cancer (Ward, DeSantis, Robbins, Kohler, & Jemal, 2014). Among childhood cancer survivors, acute lymphoblastic leukemia (ALL) is the most frequent diagnosis (Turcotte et al., 2017). Prior to the use of central nervous system (CNS)–directed therapy, the brain was the primary site of initial relapse among children with ALL who achieved a bone marrow remission (Pui & Evans, 2006; Pui et al., 1998). CNS-directed treatment with intrathecal (IT) and high-dose systemic chemotherapy, primarily methotrexate, is essential for long-term survival, which approaches 90% (Pui, 2003; Pui et al., 1998). As many as 60% of these children experience CNS treatment–related cognitive problems (Buizer, de Sonnevile, & Veerman, 2009; Insel et al., 2017; Kanellopoulos et al., 2016; Krull et al., 2008; Krull, Hockenberry, Miketova, Carey, & Moore, 2013) that negatively affect academic success (Insel et al., 2017; Krull et al., 2013; Moore et al., 2016), behavioral adjustment (Patel & Carlson-Green, 2005; Stenzel et al., 2010), and quality of life (van der Plas et al., 2015). Attentional regulation is one neurobehavioral domain that is commonly noted to be vulnerable among children with ALL (Ashford et al., 2010; Bava, Johns, Kayser, & Freyer, 2018; Buizer, de Sonnevile, van den Heuvel-Eibrink, & Veerman, 2005; Cheung & Krull, 2015; Jacola et al., 2016; Richard, Hodges, & Heinrich, 2018), and there is some evidence that the frequency of problems is associated with younger age and female sex (Jacola et al., 2016; Krappmann et al., 2007). Buizer et al. (2005) found subtle deficits in attention and information processing in