

## Neurocognitive Impairment and Associations with Substance Use in Pediatric Cancer Survivors: CCSS Results

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## Abstract

**Background:** Childhood cancer survivors are at risk for psychological distress, pain, and neurocognitive impairment. Relations between these factors and substance use are unknown.

**Methods:** 11,151 5-year survivors, 53.2% female; mean age (standard deviation): 31.4 (7.5) years, completed surveys measuring neurocognitive concerns (CCSS-Neurocognitive Questionnaire: Emotional Regulation/Memory/Task Efficiency/Organization), distress (Brief Symptom Inventory-18: Depression/Anxiety/Somatization) and questions about pain and substance use. Multivariable polytomous regressions assessed associations between neurocognitive impairment and alcohol (heavy/risky) and current tobacco use, and whether distress or pain moderated these associations.

**Results:** Survivors were impaired in at least one neurocognitive domain (Task Efficiency=22.2%, Emotional Regulation=18.2%, Organization=11.5%, Memory=24.5%). 13.5% endorsed smoking, 41.5% risky drinking, and 11.4% heavy drinking. Emotional Regulation impairment was associated with increased risk of smoking (OR=1.81, 95%CI:1.53-2.14) and drinking (risky:OR=1.59, 95%CI:1.25-2.03; heavy:OR=2.44, 95%CI:1.84-3.23) while Memory impairment was associated with risky drinking (OR=1.37, 95%CI:1.09-1.71). Impaired task efficiency was associated with lower risk of smoking (OR=0.80, 95%CI:0.66-0.97) and drinking (risky: OR=0.60, 95%CI:0.48-0.75; heavy: OR=0.63, 95%CI:0.47-0.84).

Somatization was associated with a decreased risk of heavy drinking in neurocognitively-impaired survivors (Emotional Regulation: OR=1.10 vs. 2.39,  $p=0.030$ ; Organization: OR=0.48 vs.1.42,  $p=0.006$ ; Memory: OR=0.50 vs.1.11,  $p=0.021$ ). Depression attenuated associations between impaired Task Efficiency and risky drinking (OR=0.37 vs. 0.70,  $p=0.003$ ). Pain moderated associations between impaired Organization and risky drinking (OR=0.69 vs. 1.50,  $p=0.007$ ).

**Conclusions:** Neurocognitive impairment is associated with increased risk of substance use in childhood cancer survivors, particularly in those with depression or pain. Treatments targeting depression and pain, in addition to neurocognitive rehabilitation, may reduce harm associated with substance use.