

Psychological and Neurocognitive outcomes in survivors diagnosed with cancer as adolescents and young adults: A Report from the Childhood Cancer Survivor Study

Pinki K. Prasad, Kristina K. Hardy, Nan Zhang, Deo Kumar Srivastava, Kim Edelstein, Lonnie Zeltzer, Marilyn Stovall, Wendy Leisenring, Nita L. Seibel, Gregory T. Armstrong, Leslie L. Robison, Kevin R. Krull

ABSTRACT

**Background:** Among long-term survivors of adolescent and young adult (AYA) cancer, little is known about psychological distress and neurocognitive functioning.

**Objectives:** To characterize psychological and neurocognitive function in cancer survivors diagnosed during AYA in the Childhood Cancer Survivor Study (CCSS), and to identify risk factors associated with impairment.

**Design/Method:** Participants were survivors (n=6192; mean 23.6 years from diagnosis) and siblings (n=390) who completed the CCSS Follow-up 2003 (FU 2003) survey, including the Brief Symptom Inventory and the CCSS – Neurocognitive Questionnaire. The associations between functional outcomes (employment, education, and living independently) and psychological and neurocognitive impairment were examined using logistic regression.

**Results:** Among the 6192 survivors, 2589 were diagnosed as AYA (1602 between 11-15 and 987 between 16-21). Compared to siblings, survivors reported significantly higher rates of somatization (15.6 vs. 6.7%; OR 2.36, 95%CI 1.55–3.60), depression (11.7% vs. 8.0%; OR 1.55, 95%CI 1.04-2.30), and anxiety (7.4% vs. 4.4%; OR 2.00, 95%CI 1.17-3.43). AYAs had higher impairment on the CCSS-NCQ, including problems with Task Efficiency (17.2% vs. 10.8%; OR 1.72, 95%CI 1.21-2.43),

## ASPHO Abstract

Emotional Regulation (19.1% vs. 14.1%; OR 1.74, 95%CI 1.26-2.40), and Memory (25.9% vs. 19.0%; OR 1.44, 95%CI 1.09-1.89); compared to survivors diagnosed at younger ages, AYAs also had higher rates of impaired somatization (15.6% vs. 13.4%; OR 1.20, 95%CI 1.04-1.39). Among survivors with a history of central nervous treatment (i.e., brain tumors or acute lymphoblastic leukemia) those treated during AYA had greater memory impairment compared to those treated at younger ages (34.9% vs. 30.8%; OR 1.21, 95%CI 1.02-1.43). Adjusted for current age and sex, survivors diagnosed as AYAs with impaired task efficiency (OR 2.93, 95%CI 2.28-3.77,  $p<.0001$ ) or depression (OR 1.94, 95%CI 1.43-2.63,  $p<.0001$ ) were more likely to be unemployed, while survivors with memory problems demonstrated reduced educational attainment (OR 1.45, 95%CI 1.17-1.79,  $p=0.0006$ ).

**Conclusions:** AYA is a critical period of socioemotional growth and the diagnosis of cancer during this period has the potential to disrupt developmental processes related to educational goals and functions required for independent living. Since psychological and neurocognitive impairment is related to functional outcomes, further follow-up with the AYA survivors is necessary.