

# Trajectories of Obesity and Overweight Rates Among Survivors of Childhood Acute Lymphoblastic Leukemia

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**A**cute lymphoblastic leukemia (ALL) is the most common and survivable form of childhood cancer (Howlader et al., 2014). To date, ALL survivorship rates are greater than 90% for pediatric patients (Howlader et al., 2014), leading to a growing concern about the numerous long-term effects of childhood cancer treatment. For instance, adult survivors of childhood cancer are 8.2 times more likely to have a severe or life-threatening condition than cancer-free siblings (Oeffinger et al., 2006), and 75% of five-year childhood cancer survivors report at least one adverse health outcome (Geenen et al., 2007). Most alarming is the disproportionate impact that these adverse outcomes have by age, as a younger age at ALL diagnosis (aged 6 years or younger) is associated with worse post-treatment cardiac outcomes (Lipshultz et al., 1995; Mulrooney et al., 2009), academic achievement (Harila-Saari et al., 2007), performance/global/verbal IQ (von der Weid et al., 2003), likelihood of earning a college degree (Haupt et al., 1994; Holmqvist et al., 2010), and income as an adult (Holmqvist et al., 2010). In an effort to improve the lives and not merely the longevity of childhood ALL survivors, a need exists to identify the modifiable negative health outcomes of childhood cancer therapy and how these vary by age.

One of the most common and potentially modifiable outcomes of ALL treatment is obesity/overweight status (Asner, Ammann, Ozsahin, Beck-Popovic, & von der Weid, 2008; Oeffinger et al., 2003; Reilly et al., 2000). Numerous samples of childhood ALL survivors demonstrate obesity rates two times greater than the general population or other comparable cohorts (i.e., siblings) (Asner et al., 2008; Garmey et al., 2008; Oeffinger et al., 2003). This elevated prevalence increases the vulnerability of ALL survivors to a wide range of harmful outcomes, including hypertension, type 2 diabetes, asthma, nonalcoholic fatty liver disease, gastrointestinal problems, endothelial dysfunction, and other medical and psychological comorbidities (Pulgaron,

**Purpose/Objectives:** To describe the trajectories of obesity/overweight rates by age group among survivors of childhood acute lymphoblastic leukemia (ALL) from diagnosis through several years post-therapy.

**Design:** Longitudinal, descriptive.

**Setting:** Hematology/oncology clinic in the southwestern United States.

**Sample:** 62 child and adolescent ALL survivors receiving treatment and follow-up care from 1999–2013.

**Methods:** Retrospective chart review of height, weight, and body mass index.

**Main Research Variables:** Annual obesity/overweight rates and developmental age groups.

**Findings:** Different trajectories of obesity/overweight rates existed among age groups. Forty-seven percent of adolescents met the Centers for Disease Control and Prevention criteria for obesity/overweight status at some point following diagnosis, compared to 68% of school-age and 73% of preschool children. Preschool children demonstrated the most rapid rate increase following diagnosis, with a particularly susceptible period in the years immediately following therapy. Obesity/overweight persistence was most characteristic of school-age children.

**Conclusions:** Important variations in rate and pattern of weight status trajectories exist by age group, demonstrating that children diagnosed with ALL during the preschool and school-age developmental years have the greatest vulnerability of developing obesity/overweight status.

**Implications for Nursing:** Obesity/overweight prevention efforts are greatly needed in children with ALL, and efforts should occur before ALL treatment completion in preschool and school-age children.

**Key Words:** leukemia; pediatric obesity; adolescent; child; preschool

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2013). In addition, the accumulation of obesity and its comorbidities results in a lifetime of increased medical costs and diminished quality of life (Finkelstein, Graham, & Malhotra, 2014; Kanellopoulos, Hamre, Dahl, Fossa, & Ruud, 2013). Given that obese children and