


Playground Shade Availability and Socioeconomic Position of Students at St Louis Public Elementary Schools

Elementary schools should provide a minimum of 20 minutes of daily recess. Although outdoor play is important for child wellness, a lack of proper sun protection can increase the risk of developing skin cancer. Approximately 40% to 50% of UV exposure occurs before 20 years of age; therefore, school playgrounds must provide adequate shade to help protect children from the dangers of sun exposure. Few studies have focused on quantifying playground shade, especially in the United States. Recent New Zealand and German estimates range from 11.6%3 and 14.5%4 to 41%.5 Two-thirds of US school principals reported that their playgrounds had less than 20% shade cover.6 Herein we quantify shade availability on public elementary school playgrounds in a US city—St Louis, Missouri—and determine whether shade is associated with the socioeconomic position of students’ families.

Methods | All St Louis public elementary schools except charter schools were included, including 139 from St Louis County (constituting 20 school districts) and 35 from the city of St Louis, for a total of 174. The proportion of students using free and reduced-price lunch (FRL), which reflects students’ household income and serves as a socioeconomic indicator, was obtained from the Missouri Department of Elementary and Secondary Education’s Comprehensive Data System (https://apps.dese.mo.gov/MCDS/home.aspx). Google Earth Pro, version 7.3/2/5776 (Google LLC), satellite data and imagery were obtained to visualize and measure the area of each school playground and respective shade cover from trees and shade structures. All playgrounds were evaluated with Google Earth Pro by both authors independently. Adjacent grassy fields and kindergarten playgrounds were noted. Multiple linear regression was performed using SPSS, version 24.0 (IBM Corp), with the outcome variable being the percentage of playground shaded by trees or shade structures, and predictor variables being the percentage of students using FRL, total playground area (in square meters), and presence of a kindergarten playground. The latter 2 variables were included in the analysis to account for potential confounds. A 2-sided analysis of variance was used to calculate significance (P < .05). Because this study did not involve human participants or data, an institutional review board application and informed consent were not needed.

Results | Among the 174 schools sampled, the mean (SD) percentage of each playground shaded was 7.6% (7.3%), and the median was 5.6% (range, 0%-38.5%). Twenty-one schools (12.1%) had no shade. The percentage of students using FRL ranged from 6.1% to 94.9%. We found a negative association between shade and percentage of students using FRL, which translated to approximately 2 m² (22 ft²) of shade lost per 1% increase in students using FRL when accounting for the mean playground size of 3647 m² (R = −0.25; P < .01). This trend remained significant when controlling for total playground size and presence of a kindergarten playground, neither of which affected shade cover.

Discussion | Our measurements of shade cover are lower than what previous studies have found (7.6% mean vs ≤41%).5 With a large proportion of lifetime UV exposure occurring in childhood,2 increasing playground shade may be an important step in minimizing skin cancer risk. We also found that shade cover is indeed negatively associated with student FRL, with shade availability decreasing as proportion of students with FRL rises. This finding may suggest that students at schools with less affluent children are subject to higher UV exposure during the school day, contributing to risk of skin cancer or complicating care of photosensitizing conditions.

Our study is limited to data from 1 city. Importantly, we measured tree cover in August during peak foliage; because most trees in St Louis lose their leaves in winter, our study may overestimate shade in a year-long context. In addition, we did not analyze where children spend the most time on these playgrounds or whether play equipment was shaded, which also influences UV exposure. Nonetheless, this research exposes an actionable gap in shade availability on these playgrounds and provides a template for further work in other geographic locations.

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### Surgery and Salvage Limited-Field Irradiation for Control of Cutaneous Squamous Cell Carcinoma With Microscopic Residual Disease

Cutaneous squamous cell carcinoma (CSCC) is the second most common malignant neoplasm in the United States, with an estimated 1 million cases diagnosed annually. Most patients have an excellent prognosis with surgery alone, but a small subset have poor outcomes. Margin status following surgery greatly affects outcomes. Complete circumferential peripheral and deep margin assessment, which involves en face sectioning to allow for nearly 100% histologic margin assessment, is associated with lower recurrence rates compared with standard assessment, in which approximately 1% of the margin is evaluated. Patient and tumor characteristics, treatments, and outcomes are summarized in the Table. Most patients (91%) had high-stage tumors based on the AJCC8 staging system and the American Joint Committee on Cancer (AJCC) 8th edition staging (AJCCB8) system for head and neck CSCC. Tumors categorized as BWH stage T3 or AJCC8 T4a/T4b were excluded because these tumors have a high risk of poor outcomes regardless of treatment modality. Medical records of eligible patients were reviewed for clinical information, primary tumor characteristics, outcomes (including local recurrence [LR], nodal metastasis, distant metastasis [DM], and disease-specific death [DSD]), types of treatment (including surgical method and adjuvant therapy), and information on radiation treatment (ie, radiation modality, dose, and fractions). Descriptive statistics were performed in October 2018.

#### Results

A total of 11 patients (8 men and 3 women; mean [SD] age, 70 [11] years) with CSCCs who underwent salvage irradiation for positive histologic margins were identified. Patient and tumor characteristics, treatments, and outcomes are summarized in the Table. Most patients (10 [91%]) had high-stage tumors based on the AJCC8 (ie, T3) and/or BWH (ie, T2b) staging systems. All patients received salvage radiation therapy to the primary tumor only. Nine of 11 patients (82%) had a CSCC-related poor outcome. Four patients (36%) had a LR, 7 (64%) developed nodal metastasis, 2 (18%) developed DM, and 3 (36%) died of CSCC. Of the 9 patients who had a poor outcome, the disease-free interval ranged from 0 to 34 months (mean, 19 months). One of 2 patients who had no evidence of disease died from follicular lymphoma 8 months after treatment. The other patient with no evidence of disease was alive and had no evidence of recurrence at 60 months.

#### Discussion

Prior adjuvant radiation studies for CSCC have included clear and positive histologic margins in the same analysis, making it difficult to evaluate the association between microscopic residual disease and outcomes. The data presented herein indicate that salvage limited-field irradiation for aggressive CSCCs with microscopic residual disease resulted in a progression rate of more than 80%, although only 4 patients developed LR within the radiated field. This rate is much higher than the usual failure rate for high-risk CSCC. In patients with BWH T2b stage CSCC, the usual LR rate is 26% (71 of 273), and the overall CSCC failure rate is 33% (90 of 273) (BWH, unpublished data, January 2000 to December 2016). Thus, radiation therapy can aid in local control of tumors when histologic negative margins cannot be achieved, but may be limited in overall disease control in those with AJCC or BWH high-stage tumors given the high risk of out-of-field progression. This small series underscores the importance of aggressive surgery to achieve