Psycholinguistic Screening for Cognitive Decline in Cancer Survivors: A Feasibility Study

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OBJECTIVES: To test the feasibility of using psycholinguistic speech analysis as a proxy for cognitive function in men undergoing treatment for prostate cancer.

SAMPLE & SETTING: Audio-recorded speech samples were collected from 13 men enrolled in a parent study at the University of Kansas Cancer Center in Kansas City.

METHODS & VARIABLES: Audio-recorded speech samples, collected from clinical interviews and in response to a prompt question during the parent study at two time points, were evaluated to determine feasibility relationships between neurocognitive and psycholinguistic measures.

RESULTS: Correlations between neurocognitive and psycholinguistic measures were identified for prompted speech, but the strength of relationships varied between time points. No relationships were identified in clinical interview speech samples.

IMPLICATIONS FOR NURSING: Feasibility was demonstrated for recording, transcribing, and analyzing speech from clinical interviews, and results suggest relationships between neurocognitive and psycholinguistic measures in prompted speech. If validated, psycholinguistic assessments may be used to assess cognitive function in cancer survivors. Advances in natural language processing may provide opportunities for automated speech analyses for cancer treatment–related cognitive decline.

Prostate cancer primarily occurs in older men, with a mean age of 66 years at diagnosis; therefore, age-related comorbidities are common (Nguyen et al., 2015). Androgen-deprivation therapy (ADT) is used to treat prostate cancer throughout the disease trajectory by reducing testosterone to castration levels. Results related to the cognitive trajectory of men receiving ADT for prostate cancer remain mixed (Ryan et al., 2020). Estimates of treatment-related cognitive decline range from 47% to 69%, and cognitive decline may significantly affect functioning, ability to live independently, and quality of life (Gonzalez et al., 2015; Mundell et al., 2017; Nelson et al., 2008). With new interventions demonstrating the potential for overcoming negative cognitive and other effects of ADT, early identification of treatment effects on cognition is increasingly important (Manson et al., 2019). No standard of care exists for the assessment of cognitive changes in cancer survivors. Existing methods include the use of self-report measures, which may trigger follow-up assessments that involve a complex battery of abstract neurocognitive tests. This testing is conducted by trained psychometricians over two or more hours and may increase anxiety about cognitive abilities in older adults (Williams et al., 2014).

Because language production depends on intact function in a number of cognitive domains, spoken language reflects cognition that can be ascertained in everyday speech by measuring the complexity of grammar and vocabulary, as well as idea density in spoken language (Chen et al., 2009; Fernàndez & Cairns, 2010). Psycholinguistics and neurolinguistics—scientific disciplines that involve studying the psychological and neurobiologic factors linking cognition with language production and the effects of neurologic disorders on language—provide strategies designed to evaluate cognition as reflected