

# The Multifactorial Model of Cancer-Related Cognitive Impairment

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**PROBLEM IDENTIFICATION:** Cancer-related cognitive impairment (CRCI) is common and is associated with cancer and its treatments. Evidence suggests that the causes are multifactorial, but the field is lacking a comprehensive conceptual model of CRCI to summarize existing knowledge and provide a way to understand and predict causal links, as well as to generate hypotheses.

**LITERATURE SEARCH:** PubMed® and Google Scholar™ were searched, and 130 articles demonstrated several lacking factors needed for a more comprehensive CRCI model.

**DATA EVALUATION:** The new multifactorial model of CRCI includes social determinants of health, patient-specific factors, co-occurring symptoms, treatment factors, and biologic mechanisms.

**SYNTHESIS:** The multifactorial model of CRCI is based on established and emerging evidence. This model is inclusive of all cancer types and associated treatments.

**IMPLICATIONS FOR NURSING:** Although it would be ideal to evaluate all the concepts and components in this model in a comprehensive fashion, investigators with existing datasets could evaluate portions of the model to determine directionality for some of the proposed relationships. The new model can be used to design preclinical and clinical studies of CRCI. Knowledge of the occurrence of CRCI and factors that contribute to this symptom will allow nurses to perform assessments of modifiable and nonmodifiable risk factors.

**KEYWORDS** biobehavioral model; cancer-related cognitive impairment; conceptual model

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Cognitive changes associated with cancer and its treatments, known as cancer-related cognitive impairment (CRCI), are reported by about 45% of survivors and patients receiving treatments for cancer (Schmidt et al., 2016; Wefel et al., 2014). Although chemotherapy is one factor (Ren et al., 2019), evidence suggests that the causes and mechanisms of various cognitive changes are multifactorial (Bai & Yu, 2021; Mampay et al., 2021; Yang & Hendrix, 2018). Because several cognitive domains are affected (Ren et al., 2019), CRCI results in decrements in activities of daily living (Boykoff et al., 2009), personal- (Potrata et al., 2010) and work-related responsibilities (Lange, Licaj, et al., 2019), and financial (Boykoff et al., 2009), emotional, and social well-being (Rust & Davis, 2013).

Despite efforts by the International Cognition and Cancer Task Force to harmonize assessment methods (Wefel et al., 2011), conceptual and empirical issues in CRCI research remain (Horowitz et al., 2018). Conceptually, neuropsychological tests may not detect the subtle changes and specific cognitive processes associated with CRCI (Horowitz et al., 2018). Empirical issues include the following absences: a universal definition of CRCI, a standard battery of subjective and objective measures to diagnose CRCI and monitor changes throughout time, and a correlation between neuropsychological test results and subjective reports of CRCI (Horowitz et al., 2018).

An equally important issue is the absence of a comprehensive conceptual model of CRCI. A conceptual model provides a visualization of the relationships among a set of concepts (i.e., variables that can be empirically observed or measured) that are thought to be linked to a phenomenon (Earp & Ennett, 1991). As a result, a conceptual model summarizes existing knowledge and provides a way to understand or predict causal links and to generate hypotheses (Earp & Ennett, 1991).