Examining Pupillary Response During Driving Simulation as a Measure of Cognitive Load in Breast Cancer Survivors

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Breast cancer survivors (BCSs) frequently experience changes in cognitive function attributed to the disease and treatment. Proposed mechanisms for these cognitive changes include damage to neuroprogenitor cells, increased production and release of peripheral and central proinflammatory cytokines, malfunction of DNA repair mechanisms, and oxidative stress (Asher & Myers, 2015; Janelsins et al., 2014). BCSs have reported difficulty across a number of cognitive domains, such as short-term memory, attention and concentration, processing speed, and executive function, including the ability to multitask (task switching) (Ahles et al., 2012; Asher & Myers, 2015; Wefel et al., 2011). However, other studies have failed to note objective cognitive changes or dysfunction after treatment. BCSs’ performance on standard neurocognitive tests frequently do not correlate with their self-report of cognitive changes. Some qualitative research results have included participants’ concerns related to operating a vehicle, difficulty driving to familiar locations, and accident near-misses (Myers, 2012; Player et al., 2014). Standard neurocognitive testing may not be sensitive to the level of cognitive effort expended by BCSs to achieve performance that is within normal limits (Hermelink et al., 2010).

Kahneman’s (1973) theory of attention and effort defines cognitive effort (also referred to as cognitive workload) as the mental effort or amount of attention and resources allocated to perform a task. Cancer survivors frequently report having to work harder to accomplish cognitive tasks they used to perform without difficulty prior to their diagnosis and treatment.