**Running on Empty: The Effects of Food Deprivation on Concentration and Perseverance**

**(*Literature Review Section*)**

Many things interrupt people’s ability to focus on a task: distractions, headaches, noisy environments, and even psychological disorders. To some extent, people can control the environmental factors that make it difficult to focus. However, what about internal factors, such as an empty stomach? Can people increase their ability to focus simply by eating regularly?

One theory that prompted research on how food intake affects the average person was the glucostatic theory. Several researchers in the 1940s and 1950s suggested that the brain regulates food intake in order to maintain a blood-glucose set point. The idea was that people become hungry when their blood-glucose levels drop significantly below their set point and that they become satisfied after eating, when their blood-glucose levels return to that set point. This theory seemed logical because glucose is the brain’s primary fuel (Pinel, 2000). The earliest investigation of the general effects of food deprivation found that long-term food deprivation (36 hours and longer) was associated with sluggishness, depression, irritability, reduced heart rate, and inability to concentrate (Keys, Brozek, Henschel, Mickelsen, & Taylor, 1950). Another study found that fasting for several days produced muscular weakness, irritability, and apathy or depression (Kollar, Slater, Palmer, Docter, & Mandell, 1964). Since that time, research has focused mainly on how nutrition affects cognition. However, as Green, Elliman, and Rogers (1995) point out, the effects of food deprivation on cognition have received comparatively less attention in recent years.

The relatively sparse research on food deprivation has left room for further research. First, much of the research has focused either on chronic starvation at one end of the continuum or on missing a single meal at the other end (Green et al., 1995). Second, some of the findings have been contradictory. One study found that skipping breakfast impairs certain aspects of cognition, such as problem-solving abilities (Pollitt, Lewis, Garza, & Shulman, 1983). However, other research by M. W. Green, N. A. Elliman, and P. J. Rogers (1995, 1997) has found that food deprivation ranging from missing a single meal to 24 hours without eating does not significantly impair cognition. Third, not all groups of people have been sufficiently studied. Studies have been done on 9–11 year-olds (Pollitt et al., 1983), obese subjects (Crumpton, Wine, & Drenick, 1966), college-age men and women (Green et al., 1995, 1996, 1997), and middle-age males (Kollar et al., 1964). Fourth, not all cognitive aspects have been studied. In 1995 Green, Elliman, and Rogers studied sustained attention, simple reaction time, and immediate memory; in 1996 they studied attentional bias; and in 1997 they studied simple reaction time, two-finger tapping, recognition memory, and free recall. In 1983, another study focused on reaction time and accuracy, intelligence quotient, and problem solving (Pollitt et al.).

According to some researchers, most of the results so far indicate that cognitive function is not affected significantly by short-term fasting (Green et al., 1995, p. 246). However, this conclusion seems premature due to the relative lack of research on cognitive functions such as concentration and perseverance. To date, no study has tested perseverance, despite its importance in cognitive functioning. In fact, perseverance may be a better indicator than achievement tests in assessing growth in learning and thinking abilities, as perseverance helps in solving complex problems (Costa, 1984). Another study also recognized that perseverance, better learning techniques, and effort are cognitions worth studying (D’Agostino, 1996). Testing as many aspects of cognition as possible is key because the nature of the task is important when interpreting the link between food deprivation and cognitive performance (Smith & Kendrick, 1992).

Therefore, the current study helps us understand how short-term food deprivation affects concentration on and perseverance with a difficult task. Specifically, participants deprived of food for 24 hours were expected to perform worse on a concentration test and a perseverance task than those deprived for 12 hours, who in turn were predicted to perform worse than those who were not deprived of food.