

# Stress of Nursing Students Studying Online

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## INTRODUCTION

Stress impacts both quality and length of life (Bowman, 2005; Sapolsky, 1998), but the stress of learning is yet to be understood. Recent researchers attempt to explain how stress can both increase and hamper learning, but no studies were found that linked learning stress to life long stress. Until recently no technologies could measure the biophysical variables in normal activities of life. Invasive technologies made it difficult to study people in vivo.

The Allostatic Load Theory provides a foundation for the study as learning begins at the earliest stages of life and continues until old age (Alvarez, Wiegert, & Krugers, 2006; McEwen, 1998). Research indicates stress over long periods induces a variety of chronic diseases (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Blair, Granger, & Raza, 2005). Weight gain, hypertension, osteoporosis, immunosuppression, insulin resistance, atherosclerosis, and cardiovascular disease are a few complications of long term stress (Karlmanla, Singer, McEwen, Rowe, Seeman, 2002). The ultimate result is death. Stress may be the largest public health issue for the new century.

Since learning stress is known to reduce memory transfer (Shors, 2006), the reduction of stress becomes an instructional design issue (Molinari, Dupler, & Lungstrom, 2005) Stress prevents learning by limiting perceptions, impairing thinking, and hampering transfer of capabilities during performance (Wu, Song, Tian-Bao, Li, He, Ge, Wang, 2007; McGaugh, 2004; Kuhlmann, Piel & Wolf, 2005). The problems later trigger more stressful performance events (Sapolsky, 1998).

## BACKGROUND

The inability to think or remember concepts, procedures, and methods can threaten lives when demonstrated by service professionals like pilots, air controllers, nurses, doctors, police, firemen, and armed forces. The outcomes of a particularly stressful situation can be the failure to process information properly (Kuhlmann, Piel & Wolf, 2005). Stress management is vital to saving lives. Instructors should no longer view stress as a normal and uncontrollable side effect of the academic process. The stress related disease epidemic begins in childhood (Marano, 1999; diFabio & Prosch, 2003; Rosenzweig, Breedlove, & Watson, 2004; Isgor, Kabbaj, Akil, & Watson, 2004) and the demand for life long learning, means stress management is a life long issue.

Stress reduces immune function creating vulnerability to acute illness (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). Reducing stress could minimize colds, flu, and mild depressive symptoms that complicate student achievements and relationships. Stress hormone levels can predict future relationship problems according to Glaser and associates (Glaser, Robles, Malarkey, Sheridan, & Kiecolt-Glaser, 2004).

## ALLOSTATIC LOAD

Allostasis was first described by Sterling and Eyer (1988) to explain the constant biophysical change occurring to meet perceived and anticipated challenges. McEwen and Stellar (1993) developed a model describing how stress reactions may be both adaptive and life-threatening. The model describes the results

of repeated stress reactions. The long term effect of continuous hormone release produces homeostasis in the immediate situation but can wear down the body.

The allostatic load model links adaptation and survival to disease process through persistent acute responses to stress. With each perception neurochemicals are released to activate or restrain bodily functions. This triggers psychological reactions that create further neurochemical responses. When a response to a perceived demand occurs, the body is successful, and similar responses are often chosen in future situations. Repeated occurrences that are beneficial in the short run have deleterious effects over time (Mirescu, Peters, & Gould, 2004; McEwen, 2002).

Reducing learning stress theoretically enables more learning, but studies are needed to define how this occurs. What elements of instructional design make a difference? Are there alternative methods of reducing test anxiety besides those commonly used? For instance, do popsicles, massage, acupuncture, or music help? Which is less upsetting, performance testing in isolation with a video camera, using a peer group or with just an evaluator? How does simulation work in stress reduction? The science is very young.

## **STRESS INDICATORS**

Learning is biological. There are many neurochemicals involved. A brief glimpse of brain chemicals explains the impact on learning and why learning allostatis model. Cortisol is a glucocorticoid key to acute adaptations to stress (Stewart, 2000; Hughes, Romick, Sandor, Phillips, Glaister, Levy, Rock, 2003). Cortisol is easily measured in the lived experience and its impact on learning needs study. Glucocorticoids enhance amygdala activity. The amygdala is a small area of the central brain that facilitates reactions to fear and other strong emotions. Emotion-related memory is centered here (Charney, 2004; Kilpatrick, & Cahill, 2003). Research indicates information processing begins in the amygdala. Cortisol mobilizes and replenishes energy stores. By impacting the amygdala the hormone increases arousal, vigilance, focused attention, and memory formation.

Continual and sustained cortisol produces negative effects. Long term effects include: weight gain, hypertension, osteoporosis, immunosuppression, insulin resistance, atherosclerosis, and cardiovascular disease (Romeo, Bellani, Karatsoreos, Chhua, Vernov, Conrad,

McEwen, 2006; Listen, Miller, Goldwater, Radley, Rocher, Hof, Morrison, McEwen, 2006; Karlamangla, Singer, McEwen, Rowe, Seeman, 2002). For each reaction in the body, another negative feedback system exists to turn off the reaction. Cortisol is turned off through a complicated system involving other glucocorticoid and mineral corticoid receptors. Measurement of hormones like Dehydroepiandrosterone, Corticotropin-releasing hormone might also impact learning stress research in the future.

One can measure other variables. The cardio-pulmonary systems react immediately to stressors. Norepinephrine and Neuropeptide Y impact the body by influencing the cardiovascular system and feelings of anxiety. Epinephrine modulates memory consolidation (Cahill & Alkire, 2003). Overtime stress can cause cardiovascular problems. Are there differences in reactivity at different ages? If so, how should stress be defined and measured?

Students report psychological stress from preschool through adulthood and studies now find that prenatal stress can have impacts on learning and stress management (Priebe, Brake, Romeo, Sisti, Mueller, McEwen, & Francis, 2006). Higher education students experience stress related ailments like ulcers, and autoimmune disease (Heath, Macera, & Nieman, 1992; Reid, Mackinnon & Drummond, 2001) due to the learning environment (Hughes, et al., 2003). K-12 students also experience stress related symptoms like stomach aches and headaches. What variables stress people with what learning styles? There is a lot to study and learn.

## **MAIN FOCUS: ALLOSTATIC LEARNING MODEL**

The Allostatic Learning Model (see figure 1), attempts to explain the complex relationships among genetic, environmental and physical learning variables as they relate to stress and achievement. Previously researchers studied variables separately making it impossible to see how factors are interrelated. There are many important seminal works on individual factors, but few studies incorporate many factors into the same study. The allostatic learning model permits study of a variety of factors simultaneously.

Measuring stress processes under everyday conditions challenged educational researchers until recently. Self-report methods are considered unreliable due to

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