Differences in Regional Cerebral Blood Flow for Females and Males with Elevated Self-Reported PTSD Symptoms

Christina Nunez, MS, Mohammed Alshamsi, MS, Stevie Schapiro, BA, Bailey McDonald, MS, Charles Golden, PhD. Daniel Amen, MD and Kristen Willeumier, PhD

Nova Southeastern University

Introduction

Single-photon emission computed tomography (SPECT) is a form of nuclear imaging that measures the perfusion and functionality of tissues including regional cerebral blood flow (rCBF). Posttraumatic Stress can lead to over-activation in various areas of the brain.

Research indicates females and males may differ in their stress responses and acquisition of fear which may suggest different brain reactivity between genders in PTSD.

This study serves to compare (rCBF) at baseline levels between females and males who endorse high levels of PTSD symptoms.

Methodology

Females and males with elevated self-reported PTSD symptoms were selected from a deidentified adult clinical outpatient database. Elevated scores were determined to be at least two standard deviations above the sample mean. Those with comorbid diagnoses were included. No significant differences existed between genders for race or age. ANOVAs were used to test the differences between females and males' baseline levels of rCBF. Alpha was set to .001.

Sample Characteristics	Females	Males
N	383	389
Mean Age	37.51 years	36.37 years
White%	65%	65%

Results

See table for significant differences between men and women on rCBF. No significant differences were found for the right motor sensory area or left parietal region.

Direction of Outcome	Hemisphere	Brain Region	Analysis Outcome
Females had significantly lower rCBF when compared to males	Left	Frontal	$F(1,770)=17.173$, $\eta p^2=.022$
		Occipital	$F(1,770)=88.897$, $\eta p^2=.104$
		Temporal	$F(1,770)=11.594$, $\eta p^2=.015$
		Cerebellum	$F(1,770)=121.549$, $\eta p^2=.136$
	Right	Frontal	$F(1,770)=49.496$, $\eta p^2=.060$
		Occipital	$F(1,770)=144.190$, $\eta p^2=.158$
		Temporal	$F(1,770)=58.005$, $\eta p^2=.070$
		Cerebellum	$F(1,770)=138.506$, $\eta p^2=.152$
		Parietal	$F(1,770)=42.303$, $\eta p^2=.052$
Males had significantly lower rCBF when compared to females	Left	Limbic	$F(1,770)=228.628$, $\eta p^2=.229$
		Basal Ganglia	$F(1,770)=234.383$, $\eta_p^2=.233$
		Motor Sensory	$F(1,770)=31.459$, $\eta_p^2=.039$
	Right	Limbic	$F(1,770)=211.896$, $\eta_p^2=.216$
		Basal Ganglia	$F(1,770)=138.506$, $\eta_p^2=.152$
		Vermis	$F(1,770)=51.637$, $\eta_p^2=.063$

Conclusion

Given the large effects males exhibited in the limbic and basal ganglion regions, males may struggle with emotional regulation, memory, and motor control due to dysfunction in these regions.

Females may struggle with dizziness, aspects of executive functioning, processing language and emotions, and difficulty processing visual information due to deprivation in the frontal, temporal, occipital, and cerebellum regions.

Limitations included a lack of specificity to trauma and the utilization of a self-report measure to define PTSD symptoms.