*Journal of Health Disparities Research and Practice*

*Volume* 12, *Issue* 4 2018 *Article* 36

2019 STEP-UP SPECIAL ISSUE

# Effects of Maternal Separation and Adolescent Stress on Microglial Levels in the Adult Brain

Joseph Noel-Torres*

James Porter, PhD†

Kimberly Santos-Avilés‡

Anixa Hernández-López**

*

†Ponce Health Sciences University Basic Science Department

‡Ponce Health Sciences University Psychology Department

**Ponce Health Sciences University Basic Science Department

# Effects of Maternal Separation and Adolescent Stress on Microglial Levels in the Adult Brain*

Joseph Noel-Torres; James Porter, PhD; Kimberly Santos-Avilés; and Anixa Hernández-López

## Abstract

Early life stress, such as maternal separation, has been associated with depressive-like symptoms in adult rats. Previous studies have linked depression with reduced activation of microglia in different parts of the brain. Microglia are important for neuronal transmission and plasticity, both of which are affected by stress. However, whether developmental stress alters microglial function to cause depression in adulthood is not fully understood. We hypothesized that exposing rats to early life stress would lead to depressive-like symptoms in adults that would be associated with reduce microglial levels in the brain. To test this hypothesis, male and female rats were maternally separated for 3 hours a day starting at post-natal day 1 for 14 days. After the rats reached adolescence (P28), they were exposed to repeated restraint stress for 2 hours a day for 14 days. Rats were then housed in their home cages until adulthood. Then, the rats were tested in the zero maze to measure their anxiety and the forced swim test to measure their depressive-like behaviors. Compared to the control group that did not receive maternal separation or restraint stress, the stressed female rats showed more depressive-like behaviors. We are currently quantifying microglial activity via western blots of the microglial marker Iba-1 to determine whether the increased depressive-like behavior correlates with changes in microglia in specific brain regions.

**KEYWORDS:** Microglia; Depression; Early life stress; Female rats

---

*The STEP-UP HS program is supported by the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health, Grant number: 2 R25 DK098067-06. This work was supported by G12 MD007579 Brain Research and Integrated Neuroscience Core (BRAIN) and R15 MH101700 to JTP.

**Journal of Health Disparities Research and Practice**
**Volume 12, STEP-UP Special Issue, Summer 2019, pp. 54**

School of Public Health
University of Nevada, Las Vegas

# Effects of Maternal Separation and Adolescent Stress on Microglial Levels in the Adult Brain

Joseph Noel-Torres
James Porter, PhD, Ponce Health Sciences University Basic Science Department
Kimberly Santos-Avilés, Ponce Health Sciences University Psychology Department
Anixa Hernández-López, Ponce Health Sciences University Basic Science Department
**Coordinating Center:** University of Nevada, Las Vegas

## ABSTRACT

Early life stress, such as maternal separation, has been associated with depressive-like symptoms in adult rats. Previous studies have linked depression with reduced activation of microglia in different parts of the brain. Microglia are important for neuronal transmission and plasticity, both of which are affected by stress. However, whether developmental stress alters microglial function to cause depression in adulthood is not fully understood. We hypothesized that exposing rats to early life stress would lead to depressive-like symptoms in adults that would be associated with reduce microglial levels in the brain. To test this hypothesis, male and female rats were maternally separated for 3 hours a day starting at post-natal day 1 for 14 days. After the rats reached adolescence (P28), they were exposed to repeated restraint stress for 2 hours a day for 14 days. Rats were then housed in their home cages until adulthood. Then, the rats were tested in the zero maze to measure their anxiety and the forced swim test to measure their depressive-like behaviors. Compared to the control group that did not receive maternal separation or restraint stress, the stressed female rats showed more depressive-like behaviors. We are currently quantifying microglial activity via western blots of the microglial marker Iba-1 to determine whether the increased depressive-like behavior correlates with changes in microglia in specific brain regions.

**Keywords:** Microglia, Depression, Early life stress, Female rats

## ACKNOWLEDGEMENTS

The STEP-UP HS program is supported by the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health, Grant number: 2 R25 DK098067-06. This work was supported by G12 MD007579 Brain Research and Integrated Neuroscience Core (BRAIN) and R15 MH101700 to JTP.