

# **An accessible review on black holes: Their history, formation and accretion**



Aaron Barrios

*The following is an excerpt from a longer piece. For the full text, please visit <https://journals.colorado.edu/index.php/honorsjournal/article/view/2441> or scan the QR code.*

## **Abstract**

Black holes are among the most famous scientifically studied objects. Besides the numerous papers written about them every year, they are the subjects for much of the sci-fi genre, such as *Interstellar*. Furthermore, with the relatively recent imaging of two supermassive black holes, much effort has been put into explaining black holes to the public. Yet more advanced learners—such as undergraduate researchers—are caught between the limited descriptions of public-based information and the maze of complex, deeply-mathematical papers. The goal of this paper is to bridge these two areas with an accessible yet rigorous review of black holes and their accretion disks.

# **Depression and the Role of Perceived Stress Controllability During the COVID-19 Pandemic**



Sarah Johlfs

*The following is an excerpt from a longer piece. For the full text, please visit [https://scholar.colorado.edu/concern/undergraduate\\_theses/z890rv682](https://scholar.colorado.edu/concern/undergraduate_theses/z890rv682) or scan the QR code.*

## **Abstract**

The learned helplessness theory of depression suggests that a perceived loss of control over stressful events is associated with depression. However, little research has tested this relationship in humans, and there has been little to no discussion of the possible effect of biological sex. The present study examined the relationship between perceived stress controllability and depression in a sample of college students during the COVID-19 pandemic, and whether biological sex moderated this relationship. Participants (ages 18-38, N = 295) were

university students who were enrolled in the study near the beginning of the COVID-19 pandemic and assessed across the subsequent eight weeks. Using remote surveys, we assessed stressors the participants had experienced as well as the amount of control they felt they had over each; we also assessed anhedonic depression via surveys. At baseline, there was a significant correlation between perceived stress controllability and depression. Biological sex was not a moderator of this relationship, but planned post hoc analyses revealed baseline perceived stress controllability was significantly associated with depression in females but not in males. Across the eight weeks of the study, there was not a significant relationship between change in perceived stress controllability and change in depression, and biological sex was not a moderator. Planned post hoc analyses, however, showed that there was a significant correlation between change in perceived stress controllability and change in depression in females but not in males. These results suggest a possible relationship between perceived stress controllability and depression in females. However, our results were mixed and therefore further research is necessary to elucidate the nature of the relationship between perceived stress controllability and depression, and the extent to which this is moderated by sex. If this relationship does exist, it could suggest a potential target for therapy, particularly in females.

### **Lay Summary**

The Learned Helplessness Theory of Depression proposed by Seligman in 1975 suggests that feeling a lack of control over stressful life events is associated with feelings of depression. When reviewing previous research on this topic, I found little that tested this relationship in humans. Further, there was little discussion regarding the possible effect that biological sex has on this relationship. In this study, we chose to examine the relationship between perceived control over stressful life events and depression in 295 university students aged 18-38. I chose to study this during the COVID-19 pandemic (a time when there was a large spread loss of control) and I chose to study whether being biologically female or male changed the strength of this relationship. Each participant was sent online surveys to assess their level of perceived control and level of depression at the beginning and end of the 8-week study. When looking solely at week one surveys, we found a significant negative correlation between perceived control and depression such that the more control a person felt they had over stressful events, the less feelings of depression they experienced. When looking at whether the strength of this relationship changed based on one's biological sex, we found that the relationship between perceived control and depression was stronger in females than in males. When we looked across the study to determine if changes in perceived control were associated with changes in depression, we found no significance, i.e. as a person's perceived control changed over time, their feelings of depression did not change over time. Additionally, we found that the strength of this relationship was the same for both females and males. However, further planned analyses in which we looked at this relationship only in females vs. only in males showed a stronger relationship between change in perceived control and change in depression in females than in males. These results suggest a possible relationship between perceived control and depression in females but not in males. However, our results were mixed, and therefore further research is necessary to determine the nature of the relationship between perceived control and depression, and the extent to which biological sex affects the strength of this relationship. If this relationship does exist, it could suggest a potential target for treatment of depression, particularly in females.