2021

Winning entry for 2021

Nhi Doan
Connecticut College, ndoan1@conncoll.edu

LP21_06

Name

Nhi (Sandy) Doan

Title of Paper

EVALUATION OF ANIMAL MODELS AND PREVIOUS STUDIES ON PTSD

Class Year

Sophomore

Date Research Undertaken

Fall 2020

Citation Style Used

APA

Affiliated Course

Neuroscience Department: Individual Research (NEU 391)

Faculty Name

Professor Ruth Grahn

Student Major

Neuroscience major, intended Math and Philosophy minors

Narrative Questions

1. **Describe how you came to choose your topic, specifically noting any pre-research that you did. What sources did you use in this pre-research? To what extent did you consult with librarians, faculty, or others? How did this pre-research lead you to your topic?**

While enrolled in an individual study, I met one-on-one with my advisor Professor Ruth Grahn. I studied several papers about psychiatric disorders, each one coming from a different perspective, be it on the biological, pharmacological, hormonal, or cognitive level. Each paper focused on PTSD, depression, OCD, or some other disorder. My task was to learn the foundation of the research and write a paper about it before designing and collecting my own data in the spring. I talked with many faculty members from the Biology and Chemistry departments (I will describe these discussions in question 2) and consulted with librarians to choose a topic to focus on. My preliminary research includes a large number of assigned readings and some studies published by Professor Grahn. Two papers stood out for me: “OCD - a challenge to be met” and “Darwinian Concept of Stress.” I was interested in exploring the idea of using animal models in research, how they impacted the efficacy of drug invention, and how the result in animal models could be translated into efficacy in the human body. I asked myself many questions when reading these papers, such as: why do we need animal models? what were the advantages and disadvantages of using them? what do we do with what we have, given the limitations of animal models? when designing an animal model, what should we pay attention to? and how have previous researchers studied the subject? I talked with my advisor and decided to use these questions as a guide to understand the project. I researched more about the translatability of animal models and the ways researchers have creatively tackled some limitations. In the end, I compiled a list of review articles and books about the use of animal models, the inconsistencies in the research, and some studies that employed animal models to assess the drug efficacy. Additionally, because animal models have been used in various psychiatric disorder testings, I narrowed my topic into animal models of posttraumatic stress disorder (PTSD) because PTSD has a clear triggering cause, which seems to be easier to manipulate in clinical research. I hope that by studying PTSD, I can transfer some of its characteristics and overlapping symptoms to other disorders, such as general anxiety disorder and

depression. This research will serve as a foundation for my studies in graduate school.
References: Korte,S.M , Koolhaas, J.M, Wingfield, J.C, & McEwen, B.S. (2005). The Darwinian concept of stress: benefits of allostasis and costs of allostatic load and the trade-offs in health and disease. Neuroscience & Biobehavioral Reviews. 29 (1), 3-38. https://doi.org/10.1016/j.neubiorev.2004.08.009 Richter-Levin, G., Stork, O. & Schmidt, M.V. (2019). Animal models of PTSD: a challenge to be met. Molecular Psychiatry, 24, 1135–1156. https://doi.org/10.1038/s41380-018-0272-5

2. **Describe your process of finding information for your project. Note specifically the tools you used to undertake your research, as well as the specific search strategies you used within these tools. (Note: "Ebsco," being an umbrella vendor, is not a specific enough response when identifying tools; listing the "library database" is also an unacceptably vague answer. Specific tools include JSTOR, America: History & Life, Web of Science, etc., along with OneSearch, the new library system.)**

To my mind, the process of finding the sources makes up my personal journey of understanding the topic. I learned from many people--from 2018, 2019, 2020 winners' applications to the librarian Andrew Lopez and my professors in various science classes. I learned from Professor Hardeman and Instructor Suriyapperuma in the Biology department to find sources based on a certain parameter to save time. I learned from Instructor Emily Tarsis in the chemistry department how to structure a paper logically. I talked to other science students who had successfully carried out research not just at our college but other institutions. Before I talked with people, I did not know how to use the * sign ("transla*, animal*, psych*) to include a lot of results in my searches. I also learned to look at the citations of many papers to see if there were overlapping citations amongst them, and from that I could find primary resources. I used the library OneSearch's advanced search, Science Direct, Scopus, PubMed and Google Scholar to search for big topic animal models. I typed in "animal research", "animal model*", "rat", "rodent", "model", "diff*", "difference in strains". I read the abstract and decided whether the paper was related to my topic. If it was, I downloaded it. For a general topic like animal models, I selected "review paper" to get a comprehensive view. When I learned that there were many factors that influenced the model, such as rat strain and nutrition, I searched for some specific papers that discussed and performed experiments on it. After finding numerous results about the topic, I narrowed the search down by entering for specific terms, such as "PTSD", "posttraumatic", "stress disorder", "anxiety disorder". I also looked at past papers of the authors I had found and discovered more works that were relevant to my study. I set some parameters, such as publishing time and field. Professor Grahn encouraged me to draw on the most recent paper of the authors I liked to update relevant information. I also did not include any papers that were from 2000 or before because the information could be out of date. I limited the search to psychiatry, psychology and biology fields. I used only research

articles, government reports, and book chapters. I looked at PTSD under different lenses: the biological, genetics, hormonal, pharmaceutical, and therapeutical approach. I wanted to have the most comprehensive view on the topic. If the books I was looking for were not in our library system, I used the Interlibrary loan to assess them. One thing I learned during this process was that deciding a certain number of topics to focus on at the beginning is very important because it keeps me from digressing and straying into other fields. For different types of topics, I use different types of articles. For example, for the general topic like animal models I used review papers only to get the most comprehensive view. There is a small line of main keywords after the abstract, and I could glance at them to make sure the paper was relevant. Google Scholar and Science Direct are two most useful websites, as they allow me to find the studies that have had the most impact by looking at the citations as well as the trajectory and development of the research.

3. **Describe your process of evaluating the resources you found. How did you make decisions about which resources you would use, and which you wouldn't? What kinds of questions did you ask yourself about resources in order to determine whether they were worthy of inclusion?**

One of the main time-consuming factors in science research is that there is so much information to peruse. I developed various strategies for the different sections of the paper, but all articles had to come from reliable and reputable sources. All of the websites should be nonpartisan, government-run, or academic. I would choose books and review articles for general topics (e.g. advantages and limitations in using animal models). For specific sections like animal research in PTSD, I limited myself to research articles. At the beginning of the process, I read all the papers from beginning to end. When I was more comfortable with the way authors constructed their research, I decided to begin with only the abstract and results. If I read papers from unfamiliar authors, I read through the methodology to see if there were any differences in the way they carried out the experiment (some of them did the research during daylight hours, which is not optimal in the case of rats because they are active at night). At the end of my papers, I was required to compare the methodology and results, so I was careful to consider the way the researchers designed the study, even at the smallest level of detail like sexes, strains, and time of the experiment. When examining the papers, I always tried to answer a question: Does this paper offer me a different vantage point? If not, how is it different from other papers (method, subjects...)?, and so on. For instance, if I already have a good paper about genetic variation amongst rats, I would not include another paper on the same topic, or I would choose the more comprehensive papers. In addition, I was looking for ideas to conduct an experiment during the Spring semester, so I paid a close attention to the differences in methods other researchers chose. I would not choose to include papers that had the same methodology (i.e same task, same design, etc.), but I noted down the differences in the way they carried out their experiments (for instance, time of the day, strain, or sex). This practice helps me to produce more consistent result on the same drug. Even though I am only at the beginning of my research career, I am glad that I took this class early so I could develop necessary skills to prepare for the summer research. With the knowledge in this field

and experience in handling rats in the spring, I will be able to design my own experiments and prepare better for graduate applications in my senior year.