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Neuroscience 201

Women in Neuroscience: The Sex-Specific Work of Jill M. Goldstein

Introduction

Women in scientific fields face difficulties that men generally don't encounter as often such as: difficulty obtaining credibility, problems with sexual harassment and discrimination, issues with unequal payment, and isolation from learning experiences and friendship (1). Unfortunately, these issues generally lead to fewer numbers of women in progressing fields and an unequal distribution of knowledge. "[I didn't want to go to a woman doctor] because I supposed that men have better trained minds than women," said Dianna Trilling in an interview about her history with psychoanalysts (2). This quote emphasizes that even among fellow women, there is the belief that females simply won't accomplish a job as efficiently and effectively as a male could. These discriminatory issues make it an even greater of an accomplishment for a woman to be of great success in a scientific subject, particularly within the recently growing field of neuroscience. One individual who has successfully beaten the odds and has published influential works in neuroscience is Jill M. Goldstein.

Jill M. Goldstein takes a new approach on differences in men and women. Where some see these differences in sex as inequality, she sees these differences in an anatomical cause-effect manner. More specifically, Goldstein is interested in the psychological disorder Schizophrenia. She analyzes this disorder in a male versus female fashion, exploring how the disorder impacts both of the sexes and what morphological differences can account for variances in overall effects or predisposition for development (3). Goldstein has also worked on issues pertinent to women's health like anorexia nervosa and hormonal changes that occur with stressful events (4, 5). This exemplifies her desire not only for understanding neurological sex differences, but also specifically aiding fellow women that struggle with disorders. Jill Goldstein is arguably approaching neuroscience in a more constructive form of subjectivity that will help with more specific understanding of disorders between sexes.

Schizophrenia

Jill Goldstein's studies with schizophrenia are influential within neuroscience in that they will help with clinical research for better treatments of schizophrenia. It is agreed that there are differences in the human brain between males and females, especially in neuron density of the

nucleus and a larger size of the cerebellum in men (6). However, few studies have examined how these differences impact an individual's chance or predisposition for developing a specific disorder. Goldstein's research may then fill in these gaps of information, which can lead to more efficient methods of treatment and potentially, prevention. Not only is this type of study important for individuals with schizophrenia, but this methodology may be modeled for other disorders if it is found to be successful. Examining the differences in brain morphology and functioning may also be directly applied farther to fields such as psychopharmacology, for example. Antipsychotic medication may be altered to be less generalized, and more individualized for the different sexes. Medication could be targeted to specific areas of the brain depending on whether a male or female is prescribed the medication. For example, Goldstein's research has found there to be large sexual dimorphism in the cortex of individuals with schizophrenia, which could suggest that more drugs specified for the cortex may increase treatment successes (7).

Goldstein has conducted additional research on schizophrenia, exploring inheritance of this disorder from parent to child (3). In this study, she and her colleagues found children of a parent with schizophrenia to have a 6-fold increased chance of also developing the disorder (3). This study is of great importance in understanding the genetic factors that contribute to schizophrenia. By addressing the impact biological parents can have on someone attaining a disorder, the field can begin to tease out other potential factors of the bio-psycho-social model to better hone in on how we can either prevent disorders from occurring as frequently, or predict when a disorder will most likely appear in an individual. Science aims to be able to develop predictive models, which is exactly what Goldstein and her colleagues have attained in this study.

Anorexia Nervosa

Anorexia nervosa in women is another one of Jill Goldstein's scientific interests, showing not only interests in sexual dimorphism, but also psychological disorders that pertain most usually to women. Similar to her studies of schizophrenia, she and her colleagues looked at brain morphology and activation differences in those currently struggling with the disorder, and those who have been successfully treated (5). They concluded that women currently diagnosed with, and those that have recovered from anorexia nervosa, have lowered hypothalamus, amygdala, and anterior insula activity before eating, when compared to those without any history of the

disease (5). Moreover, after eating, recovered individuals' anterior insula was no longer suppressed, suggesting that this area may be a highly targeted region for this disorder (5). These findings may help direct future research by targeting the anterior insula with psychopharmaceuticals, psychosurgery, or other treatment mechanisms. Furthermore, research on the anterior insula may also be conducted to discover other underlying information on this brain area.

Hormones

Hormone cycle and stress response is another female-specific area of research that Jill Goldstein has explored. She had women rate pictures on miscellaneous scales to measure stress levels while they were scanned using an fMRI (4). This study was conducted multiple times during the women's menstrual cycle. The findings suggest that there are similarities to women and men's response to stress when women's estrogen and progesterone levels are low (most similar to male's), so it is likely that these hormonal changes are generating response differentiation (4). Moreover, Goldstein noted that the responses are location specific, which indicates that hormonal levels have specific responses depending on where they are centralized (4). It is especially exciting to see the hormonal cycle of women being studied, as it is generally a form of scapegoat that is used to explain "odd" behavior by women. This study can help alter some of the stigma around women's emotional response and provide factual information rather than applying assumptions to an entire population.

Conclusion

Truly, the most interesting and admirable aspect of Jill Goldstein is her ability to focus on male-female differences in a scientific manner within a male-dominated field. Where some individuals choose to discriminate for sake of power, Goldstein has chosen to discriminate for the sake of knowledge and medical efficacy. Additionally, she has been resourceful in tackling rather generalized subject fields rather than highly specified subsets of neuroscience. This broadness allows for a better foundation of information that may be expanded on and applied in many useful manners. It is also positive to see a woman exploring more about the female brain, and how gender-specific conditions like the menstrual cycle alter responses to stimuli. By taking a more general yet gender-specific approach to neuroscience, Jill Goldstein has paved the way for more research that can follow many different directions, which is arguably one of the most

useful scientific approaches for prediction and modeling.

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