The Relationship Between Academic Major, Personality Type, and Stress In College Students

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Abstract
In society, science majors are typically stereotyped as highly stressed and not very social. To see if this stereotype has any real truth to it, we measured the work load, perceived stress, and personality traits in natural science majors compared to social science and humanities majors in undergraduate college students. Science majors were found to spend more time in class but did not report having more out of class work relating to academics. No difference in personality traits was found between different majors. Stress correlated positively with neuroticism, as found in previous studies, but did not correlate with any other personality traits. Also, neuroticism correlated negatively with extraversion. Other correlations between personality traits were not reproduced. Together, these results suggest that there is no difference in stress or personality between natural science and humanities/social science students. Due to our results, this stereotype seems to be refuted.

Introduction
When someone is asked to picture a science major, a well-known stereotype usually comes to mind: a stressed out, neurotic, socially inept science geek who never steps foot outside of a lab. In popular culture, shows like The Big Bang Theory encourage this label. Due to the amount of time spent in lab and the difficulty of many of the courses, science majors oftentimes make jokes about switching to a communications major. Indeed, a recent New York Times article reported that 40% of science and engineering majors and 60% of premed students switch to a different discipline (Drew, 2011). But whether science majors are actually more stressed than other majors is difficult to answer. An individual’s stress level is influenced by a myriad of factors, including personality type, environment, and coping mechanisms (Vollrath, 2001). Developed by Lazarus and colleagues (as cited in Vollrath, 2001), the transactional stress theory explains that stress is from the ongoing interaction between a person and his perceived environment. If science majors are indeed highly stressed, then it must be due to a complex interaction between the individual and his environment.

Personality and Stress
A great deal of research has already revealed a significant relationship between personality and stress. A study done by Ebstrup, Eplov, Pisinger, and Jorgensen (2011) used the perceived stress scale and the NEO five-factor inventory to determine the relationship between different personality types and stress. The researchers found a significantly large positive correlation between neuroticism and stress. On the other hand, they found a moderate significant negative relationship between extraversion and stress. Similarly, there was a moderate negative correlation between conscientiousness and stress. An article written by Carver and Connor-Smith (2010) explored how different personality types may use different coping mechanisms, which would influence how an individual handles stress. Individuals that are considered extraverted are characterized as sociable, energetic, and assertive. Due to their sociability, extraverted people tend to have stronger support systems in times of difficulty. Also, extraverted people oftentimes view stressful events as challenges and opportunities to problem solve. Conscientious individuals, characterized as self-disciplined and persistent, also engage in problem-solving as a proactive method of coping. In addition, conscientious people tend to be less impulsive and avoid engaging in risky behavior that could lead to stress. In comparison, neurotic individuals are prone to feeling anxious, sad, and distressed when problems arise. Rather than dealing with problems head on, neurotic individuals tend to avoid finding solutions. Since neurotics tend to be more introverted, they do not have as strong a support system to rely on. These differences in coping mechanisms could play a large role in the perceived stress of an individual.

Personality and Major
A study done by Pringle, DuBose, and Yankey (2010) determined whether the personality types of business majors matched social stereotypes. According to Holland’s theory of vocational choice (as cited in Pringle et al., 2010), people will be inclined to enter into professions where the work environment suits their personality, meaning that those in the same discipline will possess similar personalities. Pringle et al. (2010) measured five personality characteristics, achievement motivation, conformity, conscientiousness, creativity, and extroversion, of a sample of students majoring in business administration fields. They found that marketing majors were significantly more extraverted than other business majors with accounting majors being the least extraverted. Also, accountants scored significantly higher in conformity over other business majors. These results suggest that, at least for business majors, students choose majors that match their personality type and the common stereotype. Similarly, a study done by Myers and McCaulley (as cited in Pringle et al., 2010) found that creative students prefer to major in liberal arts than in business. However, to our knowledge, no study has been done to see if science majors at the undergraduate level possess the personality types, such as neuroticism, that they are typically stereotyped to be.

Major and Stress
A study done by Bunevicius, Katkute, and Bunevicius (2008) compared the mental health, stress levels, and personality traits of medical students to humanities students. The researchers hypothesized that due to the personality types of medical students and the psychological stress of medical school, the frequency of anxiety disorders and depression would be higher amongst medical students than humanities students. To test their hypothesis, the researchers sampled medical and humanities students at two different universities in Lithuania. They found that humanities and medical students had no significant difference in prevalence of anxiety or depression. Also, medical students were less extraverted compared to humanities students but were more emotionally stable. However, these results may not necessarily apply to undergraduate students. After all,
doctors encounter a great amount of physical, emotional, and mental stress while working; it makes sense that medical students would have to be emotionally stable in order to do their job well. Maybe science undergraduates are more susceptible to feeling stressed because students are being “weeded out.” Thus, we hypothesized that science majors would feel more stressed than humanities and social science majors due to an increase in work load and a higher prevalence of the personality trait neuroticism.

Participants
A convenient data sample of 95 Lake Forest College students (42 science majors, 53 non-science majors) was asked to complete the survey. The participants ranged across all academic years acknowledged by Lake Forest College (15 freshman, 45 sophomores, 16 juniors, 17 seniors) with 2 participants unreported. All collected survey data was a self-report measure.

Measures

Cohen’s Perceived Stress Scale (PSS)
Coenen, Kamarck, and Mermelstein (1983) developed the 10-item PSS to determine how stressful participants felt their lives to be. The PSS is a frequently used and highly reliable measure of stress; in their study, Cohen et al. (1983) had a Cronbach’s α of 0.85. A typical item on the scale is “In the last month, how often have you been upset because of something that happened unexpectedly?” The PSS is scored on a 5-point interval scale (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often.) Items 4, 5, 7, and 8 were recoded from a positive direction into a negative direction and then summed with the other items to create a new stress variable with scores ranging from 0 to 40, 0 being never stressed and 40 being highly stressed. Following the PSS, participants were asked one non-coded question in order to lift the participants’ spirits (please write down the nicest compliment that you were given in the last month.) A copy of the PSS can be found in Appendix A.

The Big Five Inventory (BFI)
Developed John, Donahue, and Kentle (1991), the BFI is a 44-item scale used to measure different facets of personality: extraversion, agreeableness, conscientiousness, neuroticism, and openness. Our survey was a 25-item scale measuring only neuroticism, conscientiousness, and extraversion. A typical item on the scale is “I see myself as someone who is talkative.” Participants’ responses are on a 5-point Likert scale ranging from 1 = disagree strongly to 5 = agree strongly. For measuring extraversion, items 1, 3, 4, 7, 10, 13, 19, and 22 were used; items 3, 4, 13, and 19 were reverse-scored from a negative direction to a positive direction. For measuring conscientiousness, items 2, 5, 8, 11, 14, 17, 20, and 23 were used; items 5, 11, and 14 were reverse-scored from a negative to a positive direction. For measuring neuroticism, items 6, 9, 12, 15, 16, 18, 21, 24, and 25; items 9, 12, 18, 24, and 25 were reverse-scored from a negative to a positive direction. A copy of the abridged BFI can be found in Appendix B.

Covariates

Gender and grade-level were measured. Participants were also asked to self-report their major. Responses were coded into two categories: natural science major and other. Lake Forest College has determined which departments fall into the category of natural science: biology, chemistry, environmental studies, mathematics and computer science, neuroscience, and physics. To further answer our questions regarding correlations between stress and academic major, at the end of the survey, participants were asked to report how many hours a week they spend in class including labs, choir, orchestra etc., as well as how many hours a week, including weekends, participants spend doing homework. These questions can be found in Appendix C.

Procedure
Each participant was approached by one of our group members and asked to complete a survey for a class project for Psychology 221. Participation was voluntary and participants were instructed to contact Professor Brekke if they experienced problems or wanted to know more about the study. If a question made the participant feel uncomfortable or the participant could not think of an answer, they were instructed to leave that question blank and move on. While taking the survey, participants were given privacy to ensure an accurate self-report and to reduce any pressure or desirability bias felt by the participant. After completion of the survey, the participants’ responses were placed in a folder so as to keep the data anonymous.

Results

Measure Reliability
Scale validity was assessed for the stress and big five inventory measures used in the study. Cronbach’s Alphas were calculated for both the PSS and the three personality traits selected from the big five inventory. The PSS was found to be highly reliable (10 items, α=.885). All three big five inventory subscales were found to be reliable at the personality level. The neuroticism subscale consisted of 9 items (α=.882), the extraversion subscale consisted of 8 items (α=.903), and the conscientiousness subscale consisted of 8 items (α=.775).

Descriptive Statistics

The mean stress score of students sampled was 22.5 (SD=4.0), with scores ranging from 10 to 33. Scores for extraversion subscale ranged from 8 to 40 (M=26.0, SD=7.3). Scores for the neuroticism subscale ranged from 8 to 36 (M=22.8, SD=6.3). The mean score of the conscientiousness subscale was higher than the means of the other two subscales (M=34.0, SD=5.5). The mean hours spent in class was higher for science majors than for humanities and social science majors (M = 19.9, 7.63; M = 13.6, 5.9). Refer to Table 1.

Significance and Correlations
To determine if science majors have a larger workload than other majors, we ran a correlation test. A statistically significant correlation was found between time spent in class and major type, r(90) =.432, p<.05. This correlation is reflected in Figure 1, which represents the mean time spent in class by humanities and social science majors versus natural science majors. The mean hours for science majors was found to be significantly higher, r(90) = 4.436, p<.05. There was a non-significant correlation between hours per week spent doing homework and major type, r(90) = 0.175, p = .094. No other statistically significant correlations were found between major type and the other measures used.

To determine whether there is a correlation between stress and personality types, we ran a correlation test. A statistically significant positive correlation between neuroticism and stress was observed, r(90) =.432, p<.05. In figure 2, an increase in neuroticism was correlated with an increase in stress. Figure 2 shows an r2 value of 0.187, which indicates that 18.7% of the variance in stress is explained by its linear relationship with the observed values of neuroticism, which is a moderate correlation. There were no other significant correlations between stress and the other measures.
other measures used. A non-significant correlation between conscientiousness and stress was found, found \( r(90) = 0.194 = p = 0.087 \).

Extroversion and neuroticism were significantly negatively correlated, \( r(90) = -0.310, p < 0.05 \). There were no significant relationships found between consciousness and the other two big five inventory factors. Consciousness was found to be positively correlated with number of hours spent on work.

**Discussion**

At the beginning of this study, we hypothesized that neurotic individuals would be more stressed due to differences in coping mechanisms (Carver & Connor-Smith, 2010). Since previous studies, such as Pringle et al. (2010), have shown that societal stereotypes of particular majors actually correspond with the personality types of the individuals, we believed this would be true of science majors. Since science majors are characterized as overly stressed and neurotic, we hypothesized that science majors would be more stressed than humanities or social science majors due to differences in workload and personality.

We found that there was no significant difference between stress and major. This finding changes how we interpret the data of our study. Since our hypothesis was based around the idea that natural science majors are more stressed out than non-natural science majors, these findings refutes our hypothesis, but we collected other data that can be used to look at secondary relationships.

There were no significant differences found in personality traits between humanities and social science majors compared to natural science majors. The only difference between students in natural sciences and students in other majors was the amount of time spent in class per week. This result is consistent with the fact that most natural science majors spend added class hours in their lab sections, a feature which most humanities classes do not have. A common stereotype is that natural science majors spend more time preparing for their classes. The results of our study show that there is no difference between natural science majors and humanities/social science majors when measured by a self-report.

Previous studies have concluded that there are correlations between personality traits and stress (Ebstrup et al., 2011). Like Ebstrup et al. (2011), we found a significant negative correlation between neuroticism and stress. However, unlike Ebstrup et al. (2011), we did not find a significant negative correlation between stress and extroversion and stress and conscientiousness. It is possible that we did not find these correlations due to restriction of range in our sample. Our sample was drawn strictly from college students; on the other hand, Ebstrup et al. (2011) randomly sampled from the suburbs of Copenhagen, Denmark, with a range in age of 18-69. In comparison, college students generally have to be fairly responsible and conscientious in order to stay in school. We also found a significant negative correlation between neuroticism and extraversion.

In addition to confirming previous results, a strong strength of our study is its originality and filling a gap in knowledge. Researchers such as Pringle et al. (2010) have explored the relationship between personality and major. However, to our knowledge, no one has explored the relationship between undergraduate science majors and personality. By doing our study, we showed that the personality stereotype of science majors may not be very accurate. Also, Bunevicius et al. (2008) compared the stress levels of graduate humanities students and medical students and found no significant difference; however, this study was done in Lithuania. By conducting our study and finding similar results, we were able to extend the external validity of this study to undergraduate Americans.

**Weaknesses and Future Studies**

Several improvements could be made to our study. First, we ran a correlational study, which prohibited our ability to make causal inferences towards our data collection. Thus, the internal validity for this study is very low. Also, we used convenience sampling as a means of finding participants, which resulted in 50% of our data coming from sophomores, which is not representative of the population of Lake Forest College. This restriction of range could have a negative effect on our external validity and may have influenced our results. For example, the academic stress felt by a senior working on a senior thesis will be very different from a freshmen adapting to college classes. In regards to our survey, we did not limit the study to full-time students and did not take into account the possibility of part-time student participants. Therefore, the outliers for the self-report measure on how many hours a week spent in class may be explained by this factor. Instead of having students give a self-report measure on the amount of hours a week spent doing homework, we should have provided a scale or range of hours to circle (such as 0-4, 5-9, etc.) to reduce impossible answers (180 hours) or written responses (too many to count). Also, we may have gotten better results if

**Figure 1:** Participant characteristics. The Perceived Stress Scale is from Cohen et al. (1983); the neuroticism, conscientiousness, extraversion subscales of the Big Five Inventory is from John et al. (1991). All values represent raw scores.
we used a stress survey targeting college students specifically. Although the PSS is commonly used and is a psychometrically sound survey, the questions focus on a more general stress. If we had used a college-specific stress survey, we may have had questions more specific to academic stress. In the future studies, researchers should consider using a different scale to measure stress and making the question pertaining to amount of time spent studying not a written response question. Like all psychological studies, the presence of weaknesses is inevitable. Although our study contains some flaws, it may be used as a model for future research.

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References


