



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Ashwath M. Radhachandran	Project Number J1219
Project Title To Stress or Not to Stress: The Effect of Stress from Academic Exams on Pulse Rate and SpO2	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to observe whether or not stress from academic exams had an effect on the pulse rate and blood oxygen level of students (SpO2). It was hypothesized that stress from academic exams would increase students pulse rate by 20 beats per minute. Previous experiments show that exercise or physical stress can affect pulse rate. Therefore, mental stress should also have an affect on pulse rate. In contrast, stress was hypothesized to have no observable effect on students' SpO2. Blood oxygen levels typically do not have drastic changes.</p> <p>Methods/Materials In this project four different classes were tested: math, Spanish, science and history. Two different sets of data were collected in each class. The control set was 3 SpO2 and pulse rate readings and the second set was collected before and after exams. During an exam in any class, students took pulse and SpO2 readings before and after the exam.</p> <p>Results Standard deviation and overall averages of all readings were calculated. Averages were calculated for all control readings, readings before exams and after exams. The average for all the control pulse rates was 80 beats per minute (bpm), the average for pulse rates before exams was 91 bpm and the average for pulse rates after exams was 82 bpm. The change in pulse rate before and after exams was 9 bpm with a standard deviation of 15. The standard deviation among the differences is high, but it can at least be said the pulse rates of some students were affected by stress. SpO2 on the other hand had no observable change as hypothesized.</p> <p>Conclusions/Discussion The results showed that stress had an affect on pulse rate, but no observable affect on SpO2. Stress is a common feeling that students experience when taking exams during school. The education system is constantly trying to improve teaching methods and students' ability to perform on exams. The first step to achieving this is by detecting and reducing stress that students may experience during exams. This project's goal was achieved because it detected that some students faced stress during exams.</p>	
Summary Statement This experiment tested the change in blood oxygen and pulse rate of students before and after exams in four different classes.	
Help Received Thank you to my mentor Mr. Rajeev Rajan who provided me with equipment and thanks to Mrs. Gillum who guided me through the project. Thanks to the companies Nonin and SpoMedical that also contributed pulse oximeters to help me conduct my experiment. Lastly thanks to my test subjects that participated in	