

HYPOTHESIS ON THE EFFECTS OF DAILY USE OF FACE MASKS ON OUR PHYSICAL AND MENTAL HEALTH

EAI6060: FINAL PAPER

Abstract

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by Professor Joel Schwartz

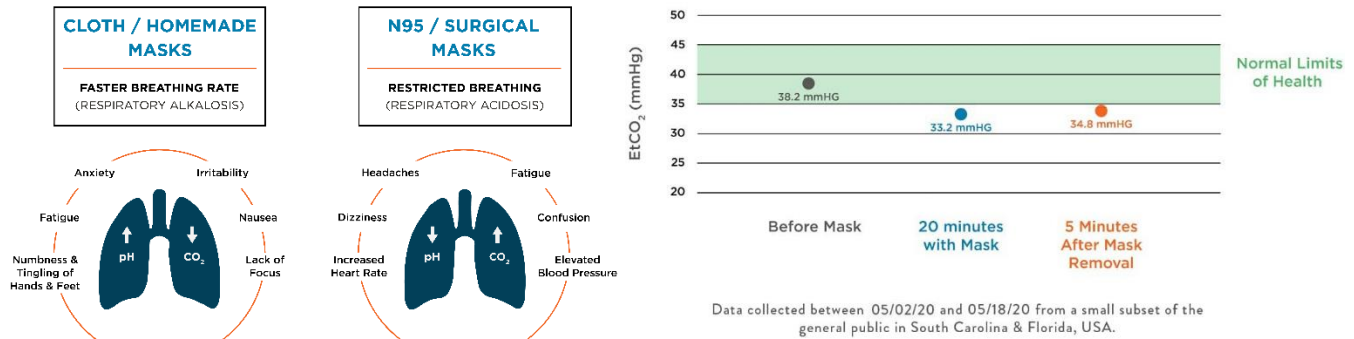
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We only had four simple life needs before Dec 2019: food, air, shelter & water, but face masks are added to this list shortly after Dec 2019. The year 2020, in the history pages, is one to go down. As new cases of Covid-19 begin to arise with a global count of 65.8 million confirmed cases and 1.5 million deaths as of 8 Dec 2020, the reason behind the enforced quarantine is because long before signs occur, the virus that causes COVID-19 can be spread by such factors as coughing, sneezing, or even communicating in close vicinity. The use of cloth, surgical masks, and N-95 masks, etc. to minimize the distribution of COVID-19 has been suggested for face coverings. This suggestion seems to have caused an uproar among the population, particularly in the United States, and in some cases, municipal and/or state-ordered mandates for mask use. Furthermore, workers in certain occupations not previously accustomed to mask use were suddenly forced to work to reduce the number of new cases when wearing masks. This has contributed to various issues, with the view of masks as uncomfortable, cumbersome, discomfort, or inconvenient. It has also contributed to fears that prolonged use of the mask may be unsafe or dangerous. The present hypothesis paper is an attempt to explore if the masks we are using in our day-to-day life is really affecting our physical and/or our mental health or not, and we will propose a solution for it.

Hence, to understand the effects of regular face-covering, an experiment was conducted, where a survey was created using SoGoSurvey to ask a total of 18 questions to individuals who wear masks on daily basis and work or go to school. Along with this experiment, multiple other experiments performed by other researchers were also referred to this hypothesis. Based on the interviews of 10 random individuals, the questionnaire was created. For the questionnaire, all the related issues posed during the interviews were put together and considered. The suggested questionnaire then was tested by me. As a recall period, a 7-day period was taken. A total of 50 persons participated in the study, where their IP address was encrypted to comply with HIPAA laws, where their e-mail IDs, phone numbers, names were not taken. To conduct the experiment, four rules of HIPAA i.e., confidentiality, the integrity of the information, protection against misuse of data, ensuring compliance by the participants were followed. Participants have been using face masks of various kinds like a surgical mask, N 95 masks, cloth masks, reusable masks on daily basis for 3-8hrs, 5-7 days a week. The survey was designed in such a way that, it gradually starts with common questions, and then moves to behavioral questions and then breathing-related questions. For survey questions, please find the references. Along with this experiment, various other sources were referred to, as the sample number i.e., the number of participants in my experiment is 50, which is very limited to conclude anything. And the survey had various limitations as the free platform was used, where various questions were not asked.

Right now, we all have been following government guidelines on how and where to wear a face covering. But have we ever thought of its effects on our health? Sure, it helps to curtail the spread of Covid-19 but there are some who might be getting affected physically or mentally. Now let us examine the experiment. It had 62% male participants and 38% female participants. Out of which, 84% of them believe face covering for protection. After face-covering 70% of them follow social distancing strictly. Total 54% believe that mask helps in the reduction of the spread of COVID-19 and 38% of them believe in some variety of masks not all. But among all, 50% of them feel overheated when they wear masks, 60% of them have trust issues with people without masks/wearing masks halfway. It was surprising to see that many of them have various masks from surgical to N95 masks. This was a little about behavioral assessment. But do we know that 16% feel irritated all the time when they wear masks and 48% feel irritated sometimes immediately or after 1 to 2 hrs. I feel shocked to know that it disrupts the breathing of 80% of people. One can consider that despite protection provided by face masks they may be the cause of some side effects, including breathing difficulties, slurred speech, warming/sweating, and itching. 72% of our participants feel suffocated where 36% of them take long breaths all the time and 36% take long breaths sometimes. In healthy adult health care staff, Roberge and colleagues studied the effect of wearing a N95 respirator and observed a small improvement in breathing that does not appear to alter tidal volume or breathing frequency, but only N95 masks were used and for a short period of time. According to the physiological hypothesis of Baskaran Chandrasekaran and Shifra Fernandes, exercise with masks will now increase the pathophysiological risks of underlying chronic disease, particularly cardiovascular and metabolic risks, by 40 percent of participants. Instead of intensive activity while wearing facial masks, social exercisers are advised to perform medium to moderate-intensity exercise. They also suggested that individuals with chronic diseases exercise alone at home, without the use of facemasks, under observation as appropriate. When asked some psychological questions, 44% observe changes in mood after wearing face coverings, 32% have observed recent health changes physically or mentally, 34% felt depressed and anxious when they started wearing masks compared to the quarantine period. From the data I was able to collect, 80% feel that mask disrupt their breathing, 72% feel suffocated and 68% take long breaths upon wearing masks. This suggests that the mask somehow affects most people's breathing in one way or another, such as slow poison, and what common people don't know is that certain masks can trigger fast breathing,

resulting in stable levels of CO₂ falling below. The decreased pressure allows the blood vessels in the brain to narrow, limiting the supply of blood to the brain and reducing the quantity of available oxygenated blood. In comparison, the loss of CO₂ pressure stops all the oxygen they hold from being released by red blood cells. The condition of the brain has an intensified hunger for oxygen in a hypocapnic flow (low CO₂), but the blood supplies are limited and the capacity to carry oxygen is impaired. To stop steadily suffocating the brain, resetting breathing habits by Respiratory Muscle Conditioning and intentional breathing protocols are key. Physiological carbon dioxide (CO₂) levels and pH can be changed when using face masks. Both elevated CO₂ (N95, surgical masks) and reduced levels of CO₂ (cloth / handmade masks) can have adverse effects on the mind and body.



The results of hyperventilation reduced intake of O₂ or prolonged accumulation of CO₂ can lead to symptoms such as anxiety, shortness of breath, headache, dizziness or discomfort, numbness or tingling in the hands and feet, difficulty sleeping, no matter what mask one wears. And after the mask is off, wearing a fabric mask may also induce dysfunctional breathing that continues, reducing CO₂ in the body above normal limits, causing anxiety, headaches, irritability, and fatigue.

Now let us analyze the data collected in a way that we can build a model in the future to predict a target variable. To begin with, only study 50 participants were studied, therefore, creating a model to predict if the participant is getting affected physically and/or mentally is inappropriate because of insufficient training and testing data. But if we could conduct this experiment on a larger scale, we can use features like frequency of using face masks, activity levels with face masks, their body temperature changes with face masks, the strength of their respiratory system, rapid breathing, and normal breathing levels when they have a mask on, type of face mask they use, their mood changes post wearing a face mask, their recent mental health condition to create the model to predict if the person will experience the ill effects or not. After achieving the results, we can build a business model to help the suffering people. This experiment had a question if people would be interested in buying a technical shield which monitors CO₂ and O₂ levels and indicated the health of basic respiratory system would help them manage to control the shortness of breath, rapid breathing, and eventually help reduce dysfunctional breathing. Surprisingly, 25% of the participants voted 'yes' to get such a device, 42% were unsure and 27% were confused due to the cost factor. But only 6% of them voted not to buy any such shield. Given the current situation where the vaccine is already in the market with certain effectiveness, masks would still be part of our life as per Amy Graff of SEGATE. We will still need to wear a mask even if you get a COVID-19 vaccine. Even when you are inoculated, face coverings will be appropriate for some time and while the scientific evidence is reasonably strong that the vaccine prevents you from the infection, it is not completely sure whether it keeps you from spreading the virus to others, health officials claim. It is not clear whether the virus might indeed set up shop in your nose and cause you to transfer droplets into others, even though you may not be "sick." For those who tested positive and recovered from the infection, the mask recommendation is the same. Although the chance of reinfection is incredibly low in early studies, this virus is still new, and researchers still do not completely understand how immunity functions with it. There will also be a need to perform breathing techniques for those who do not wish to invest in a system. For people who are not interested to buy the device or cannot buy it and broadly for all people, we can create a mobile application, which can predict our respiratory health from our breathing patterns and help us by suggesting breathing exercises and monitor us while doing them using an IoT device like a smartwatch.

To determine the consequences of wearing face masks during normal lives, higher intensity athletic activities, and in special communities, further research is required, since the COVID-19 pandemic will involve this need for a longer period. In fact,

during several events, randomized clinical experiments evaluating various mask types and assessing the physiological effects and/or the safety effects for the wearer or others will be useful for the public. More quality analysis by scientists will help assist public health authorities when promoting or mandating the wearing of masks. We would be able to access the solution that this hypothesis indicated would be economical or not after such extensive studies only. We all know the cost of healthcare in the United States is too high, so as stated above a free smartphone application with some premium functionality would also be useful. Not only can these majors support people, but they would also reduce their expenses. And we will be able to provide more ideas for the betterment of human beings using the data produced by the application. If we plan to build a device-like technological shield, it would be important to have clinical trials. Social distancing seems to be safer than wearing facemasks even after vaccination, considering the known and hypothesized dangers, as face protection could affect us physically as well as psychologically if used for long hours daily.

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