My younger brother and I made another turn around the park. It was nice to talk as we walked off all the food from our picnic dinner. As we looped past the soccer goals, we headed for the bench to finish our discussion of the *Incredibles*. Looking at the sky, I suddenly stopped talking and exclaimed, “isn’t that sunset beautiful? I could look at it for hours if only it would stay.” When there was no response, I looked over at my brother. He simply stared back. Appalled, I realized I had done it again: I had forgotten that my little brother is colorblind.

My brother is not alone. One in every eight Caucasian males is colorblind to some degree (Brody). Because there are so many people who are colorblind, any adverse effects of colorblindness would affect a large portion of our population. Although some people believe that colorblindness—a condition that limits a person’s ability to perceive color—has no long-lasting negative effects, studies and personal experiences show that colorblindness jeopardizes academic success, career opportunities, and personal safety and health. By increasing awareness of colorblindness’ effects and pervasiveness and making a few simple changes, these problems can be diminished.

**Description**

In order to understand why colorblindness can be problematic, it is important to know what it is. Colorblindness is a condition in which a person’s ability to perceive color is limited. Jane Brody describes typical color perception: “Cone cells at the center of the human retina determine the perception of color through three classes of pigments that are activated by different wavelengths of light. This information is then transmitted to the brain for interpretation.” If one of the three types of cone cells is damaged or missing, a
person is colorblind (Brody). There are three main types of colorblindness. The first and most common type—
affecting about 6% of males—is anomalous trichromacy, in which a person has all three types of cones in their
eyes, but one of the types it damaged (Biggs). A similar but more severe type of colorblindness is dichromacy,
where one of the sets of cone cells is missing (Biggs). People with anomalous trichromacy and dichromacy can
see color, but not the full spectrum. Most people have impaired red-green vision, so they see blue and yellow
tones, but have difficulty distinguishing reds and greens (Biggs). A third kind of colorblindness is called rod
monochromacy, an inability to perceive color at all because of a total lack of cones (Harbisson).

Although colorblindness can come as a result of a disease or injury, in most cases it is genetic.
Colorblindness is a sex-linked trait. This means that it is a recessive trait carried on the X chromosome. Because
males have only one X chromosome and one Y chromosome, and females have two X chromosomes, males
who inherit a defective color vision gene from their mother will be colorblind, whereas females would need to
inherit it from both of their parents (Brody). Because of this, colorblindness is more common among males than
among females. In all, about 32 million Americans are colorblind (Brody). Because colorblindness affects so
many people, it is important to be aware of any adverse effects it may have.

**No effect?**

Some people believe that colorblindness does not have any serious negative effects. A study in Great
Britain followed over 12,000 children who had been tested for colorblindness (Cumberland et al.). The results
showed that colorblind individuals did no worse than other children academically, nor did they have more
work-related injuries (Cumberland et al.). Those who performed the study believe that “people with colour
vision defects develop effective adaptive strategies and behaviours, and they use other clues, such as a colour's
saturation, to deal with any potential limitations in their professional and personal lives” (Cumberland et al.).
This study suggests that there are no significant, recurring differences in the personal success of colorblind
individuals and those with normal vision. This assertion is supported by Neil Harbisson, a man with rod
monochromacy: “being completely color-blind is not a disability; it’s not even a visual problem. It’s a social
problem.” This study and personal belief represent the opinions of many people: colorblindness is no more than a social inconvenience.

**Harmful Effects**

Despite these viewpoints, I believe that colorblindness can have serious consequences. Fortunately, most of these could be alleviated with an increased sensitivity to the issue. If people know whether they are colorblind, they will be able to begin to compensate for this deficiency. If people—colorblind and non-colorblind alike—are aware of the potentially harmful effects of colorblindness, then they can make slight adjustments that will help colorblind people avoid what now are disastrous effects. Then colorblindness can become what many believe it is now: a minor inconvenience without serious effects.

Colorblindness hinders academic success throughout the educational years. Teachers use color to teach many concepts in schools, especially in a child’s early learning stages. This emphasis on color has increased since the study of British children, and it places colorblind students at a disadvantage because they cannot fully understand or participate in the activities. For example, a teacher may present fractions by asking children how many pieces of a pie diagram are green instead of brown; colorblind children cannot distinguish between the colors, and therefore cannot answer the question (Brody). Some children have been incorrectly labeled as having a learning disability because their colorblindness prevents them from understanding color-oriented lessons (Brody). Color is used in later education as well. In my middle school science class, my group failed the pH lab because the boy who was comparing pH test slips with the key was red-green colorblind and could not distinguish between the different hues. Colorblindness does have real consequences that can hinder a student’s learning. Fortunately, most issues with colorblindness in schools can be easily avoided. Elementary school teachers could use different designs in addition to the different colors, and thus maintain the visual appeal without excluding colorblind children from the lesson. If students knew they were colorblind, they could tell their teachers and thus avoid situations such as being assigned to match colors in a science lab. Students face difficulties because of their colorblindness. However, if students and teachers alike are more sensitive to
colorblindness, these problems can be avoided, and colorblind students can enjoy the full advantages of education.

After their schooling years, colorblind people face more limited job opportunities than those with normal eyesight. Jobs that emphasize color can be inaccessible or more difficult for the color impaired. Many jobs are more difficult for colorblind people to excel in: electronics, telecommunications, “chemistry, medicine, laboratory work, pharmacy, publishing, textiles, photography, interior design, painting”—a list that includes a variety of disciplines (Brody). As sad as it is that colorblind people may not qualify for these jobs and should pursue a different career path, it is even more tragic that many do not realize the problem in time to plan their life around it. It may seem strange that a colorblind person would not be aware of his condition, but for many, their first indication is a colorblindness test: “too often people prepare for years for a particular profession, only to discover that they cannot get a job because they failed a color vision test” (Brody). Andrew Woodrick was one such person: after passing a physical exam, he “enrolled in the Air Force Reserve Officers Training Corps” (Applebome). The next year, he was informed that “his original physical had failed to detect that he was colorblind and therefore ineligible to fly” so he dropped out of the program and was subsequently arrested for desertion (Applebome). After a few court cases, Woodrick was released, but the incident shows how colorblindness undetected can complicate a person’s life and interfere with his dreams. If Woodrick had known early on that he was colorblind, he could have pursued a different career and would never have faced the disappointment or law cases that followed his desire to be an Air Force pilot. There have been similar situations in fields such as firefighting, law enforcement, public transit, and gem appraisers (Mohn). If people were aware of their colorblindness and their subsequently limited opportunities, they would be able to plan their future accordingly.

A colorblind person’s personal opportunities can be diminished, and this is the most difficult to deal with if he does not know in advance about his condition or its potential consequences. Perhaps an even more serious issue that colorblind people face is higher risks to their safety and health.
Colorblindness can jeopardize a person’s safety, especially on the road. People with red-green colorblindness can not distinguish between the red, yellow, and green lights of a stoplight. When driving during the day, this is not too much of a problem because lights are always in the same position, with red on top. However, when they drive at night, are far away, or face a single caution light, it is almost impossible for them to know how to react to a light. One of many tragic incidents that clearly demonstrate this danger is that of a New Jersey Transit train engineer: he had been going colorblind “from diabetes but had kept his condition secret for nine years” (Pristin). Ultimately, he “ran a red signal . . . causing a collision in which he and two other people died” (Pristin). The engineer did not tell his employers about his colorblindness, and this led to three fatalities, including his own. Perhaps the entire situation could have been avoided if his employers had been made aware of the condition and its possible effects, and had adjusted accordingly.

Personal health can also be compromised because of a person’s inability to differentiate between different colors. Especially to those with the more common deficiencies—red-green colorblindness—red and brown look very similar. This means that such people find it difficult to detect blood in their excretions and secretions, especially their stool (Reiss). After hearing about patients who did not recognize bleeding induced by hematochezia, Reiss performed a study to determine the relationship between colorblindness and the ability to recognize blood in body fluids. Reiss found that subjects with even mild cases of colorblindness found it difficult to identify blood in body fluids, especially in stool. Even more alarming than these effects of colorblindness is the observation that most people do not even know about them. A survey suggests that only 10% of board-certified internists and gastroenterologists have even thought about the issue, and only rarely do they ask their patients whether they are colorblind (Reiss). Because most colorblind patients do not volunteer the fact that they are colorblind, it seems there is almost no consideration, by patients or doctors, about the potential consequences of colorblindness (Reiss). If patients and doctors would discuss the issue, patients would be aware of the risk. Patients could have their body fluids checked for blood, either informally by a spouse or other relative, or they could have a laboratory test for its presence. By being aware of colorblindness and its potentially harmful effects, patients and doctors could make certain to discuss the issue together, and patients
could find ways to become aware of blood in their body fluids in time to seek medical attention. This would help colorblind people to avoid the consequences of colorblindness on their personal health.

The inability to distinguish between red and brown causes another health problem: colorblind people can not tell whether their meat is cooked thoroughly. If people eat undercooked meat, not only will it be less delicious than if it were well-done, but it could also harbor diseases that are only killed when the meat is fully cooked. Food-borne diseases include E. coli, Salmonella, Trichinosis, and Mad-Cow disease (Walls 131). It is estimated that food-borne diseases “cause 76 million illnesses, 325 hospitalizations, and 5200 deaths in the United States each year” (Walls 131). Effects from these diseases usually include diarrhea, abdominal pain, and vomiting (Walls 131). Fortunately, these miserable conditions can usually be avoided with proper care: “the combination of proper hygiene and sanitation related to food handling and preparation, appropriate methods of refrigeration and freezing, and thorough cooking of foods comprises a very effective approach to preventing food-borne illness” (Walls 132). However, if colorblindness prevents people from knowing whether their meat is fully cooked or still pink, they could unwittingly eat undercooked food and be subject to the effects of food-borne diseases. But if colorblind people are aware of their condition and these health problems it could cause, they could find other ways to ensure their food is safe to eat. For example, they could use a meat thermometer or ask another person to check their meat. Colorblindness could prevent a person from knowing if their meat is undercooked, and thus make them susceptible to food-borne diseases. If colorblind individuals know that they are colorblind and the effects this could cause, they can find ways to compensate for it and keep themselves healthy.

Personal opportunities, safety, and health are all affected by a person’s ability to see color. Because there are so many people who are colorblind, and because the effects of colorblindness can be so serious, it is important that we address this issue. By testing children for colorblindness, they could adjust their lifestyle to accommodate their colorblindness. There are simple solutions to dealing with colorblindness, if people know about it: school lessons could feature not only color differences but also different patterns or designs. People could plan on a less restrictive career path. Stoplights could have different shapes of lights in addition to the
different colors. Doctors could check up on their colorblind patients a little more frequently. People could use meat thermometers when cooking. And I could be more careful to not mention color around my little brother.
Works Cited


