Swimming Caps and How They Affect the Speed of Swimmers

Problem

How will the caps on swimmers affect the speed that they swim?

Variables and the Control Group

Independent Variable

The caps that the swimmers will put on.

Dependent Variable

The speed that the swimmers got.

Control Group

The no cap data.

Control Variables

- The length of the pool
- The amount of water that the pool contains
- The width of the pool
- The measurement(s) I use for speed (seconds)
- The heights of the pool

Research

- Swimming in the ocean can create buoyancy using its salt and has slightly better hygiene than swimming pools that contain chlorine.
- Swimming caps can keep hair from distracting swimmers and they can decrease the mass of hair, so swimmers can have more superior strokes.
- Swimming caps can produce drag from wrinkles on them.
- Silicone caps increased compression and reduced drag and not lycra caps.
- Silicone caps created 4.4% less drag in swimmers rates from not having wrinkles when they were pulled over heads of swimmers.

5 Vocab words you need to know

1. Drag and it means "resistance to the movement of a hull through the water."
2. Compression and it means "the state of being compressed" and compressed means "being pressed together."
3. Buoyancy and it means "the power to float or rise in a fluid; relative lightness."
4. Circulation and it means "an act or instance of circulating, moving in a circle or circuit, or flowing."
5. Friction and it means "surface resistance to relative motion, as of a body sliding or rolling."

Hypothesis

If a cap of a swimmer increases compression, reduces drag, and doesn't have wrinkles on the exact one material of the cap, then the swimmer would get a better speed, because wrinkles on a cap can cause drag and compression on the cap, in that case, is actually a way for the hair to be pressed together with it, which can improve speed.

Materials

- A measuring tape
- A stopwatch
- A latex cap
- A silicone cap
- A pencil
- Two pieces of paper
- A folder

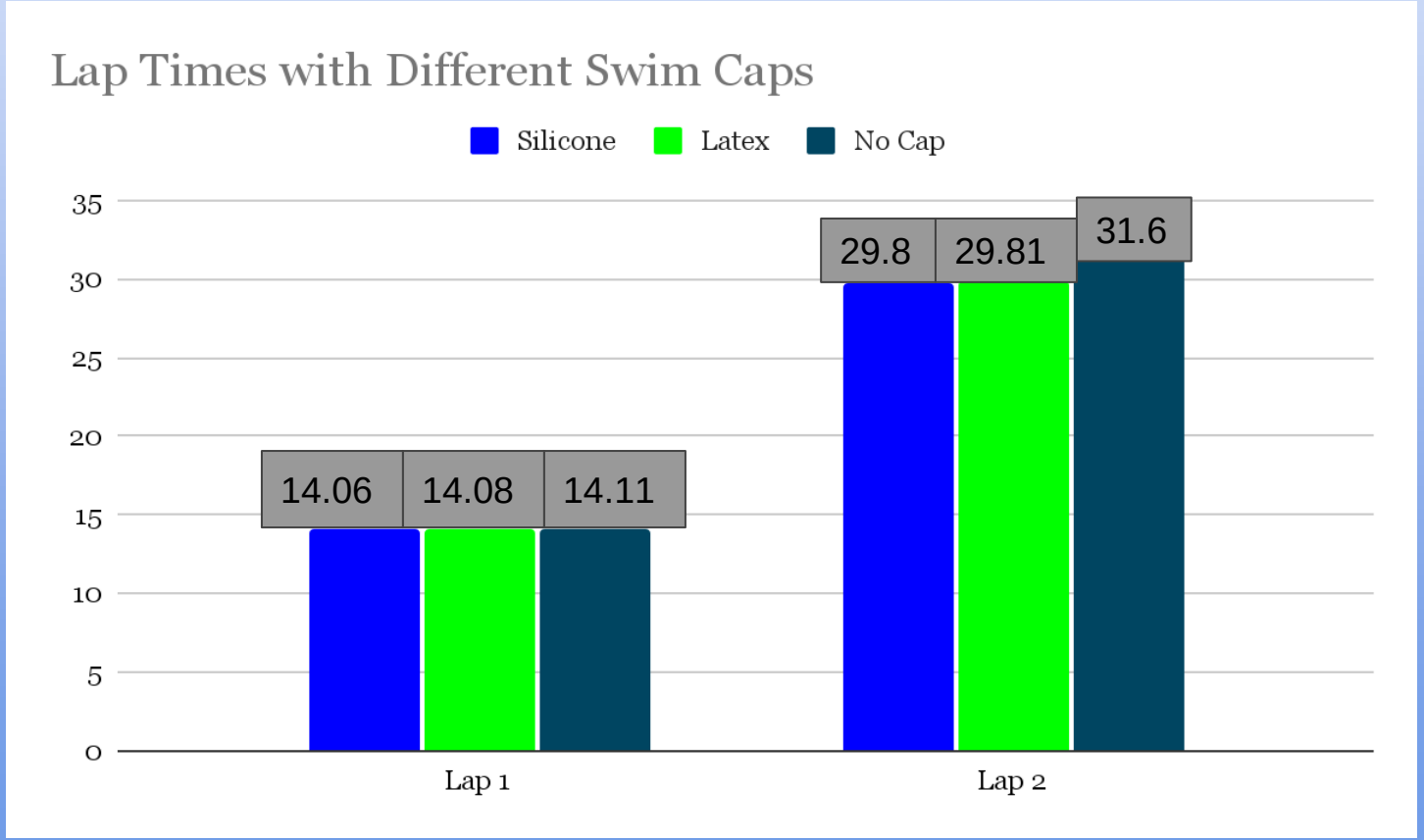
Procedure

1. Talk to a coach of a swim team or another professional in swimming if they would like to do the experiment.
2. Ask my science teacher to sign the SRC form.
3. Answer questions 1-5 on the SRC form.
4. Write the information needed for the swimmer to read in order to know why they should participate in the consent form.
5. Give it to the coach for the swimmer and their parents to sign it.
6. Go to the Oro Valley Aquatic Center, or the place where the experiment will be conducted.
7. Have a swimmer wear two types of caps, latex and silicone, and without a cap.
8. Set up a stopwatch for the swimmer with the different caps.
9. Start the stopwatch and let the swimmer swim 1 lap and then, 2 laps, which depends on the distance they can swim.
10. Take notes with a pencil on a piece of paper while the experiment continues.
11. After they finish the laps, ask them if they feel anything in the caps and if it changes their performance from the caps like the, material of the caps, the wrinkles on it, etc.
12. Repeat steps 9-11 two more times for a latex cap and no cap.
13. Get and receive the form from the coach.
14. Measure the width of the pool (already know the length of the pool and the height varies from the two ends of the pool) and the width would be 25 yards, the highest height would be 8 feet and one inch, and the length would be 50 meters.

Data Collection Table

Laps	Swimmers	Type of Caps	Time (speed, seconds)
1	Swimmer A	No cap	14.11 seconds
1	Swimmer A	Latex	14.08 seconds
1	Swimmer A	Silicone	14.06 seconds
2	Swimmer A	No cap	31.6 seconds
2	Swimmer A	Latex	29.81 seconds
2	Swimmer A	Silicone	29.8 seconds

Data Analysis Graph



Data Analysis

- In my procedure, the swimmer swam 3 laps in total for the two caps, latex and silicone, and without a cap.
- Latex had 14.08 seconds for 1 lap and 29.81 seconds for 2 laps.
- Silicone had 14.06 seconds for 1 lap and 29.8 seconds for 2 laps.
- No cap had 14.11 seconds for 1 lap and 31.6 seconds for 2 laps.
- Silicone's bar is shorter than the latex and no cap bars.
- Silicone has the fastest lap time than the no cap and the silicone lap times.
- Latex caps were "thinner" and "stretchy" as the swimmer said and silicone caps were "thicker" as the swimmer also said and they do have different textures.
- There were more wrinkles on the latex cap than the silicone cap.
- In the bar graph, it looks the same for all the three bars for "1 Lap," but the no cap number was greater than the silicone and latex numbers.
- The no cap bar was longer than the latex and silicone cap bars in the "Lap 2" data.
- The averages of the data is about 14.08 for the "Lap 1" data and 30.4 for the "Lap 2" data.
- The control group is the no cap data and the experimental groups are the latex and silicone cap data and the experimental groups have better data by having smaller numbers than the control group numbers.

Conclusion

My hypothesis about compression, drag, and no wrinkles for one specific type of cap was partially accepted and partially rejected because even though the silicone cap increased more compression than the latex cap and reduced drag, the cap still had some wrinkles when the swimmer swam the laps. In my graph, it shows that the times for the silicone cap are less than the times for the latex cap and no cap. Also, one of the pictures show that the silicone cap actually has wrinkles when the swimmer is swimming in the water and I learned about these two things during the experiment. What could have gone wrong was not having enough evidence to support the statement that silicone caps don't have wrinkles and if I could do this investigation again, I would correct this problem by adding competitive swimming events at the pool and even, comparing different swimming teams, or particular swimmers, and their results. I could also research this topic thoroughly by seeing if other websites agree with the statement or if they disagree with it and say something different.

Application

My project and the results of my experiment can affect society since people can know about what swimming cap would be the best to use when swimming in water and they can know which swim cap improves their speed and time the best, which is the silicone swim cap, as well as that swimmers can be benefited from a swim cap that has thick material, good compression, and making swimmers more faster than a latex cap or without a cap. Also, people can know how a swim cap actually improves the speed and time of a swimmer. If I could extend this project or do it again, I would try to have more swimmers for my project to have more accurate results and I would also observe the swim caps on the swimmers better and write about the wrinkles on them, their effect on the swimmers, their compression and drag, the material's effect on them and other major factors.

Acknowledgements

I would like to thank my mom for helping on this project by introducing me to a coach who would like to do the experiment (after the three coaches promised failed, the fourth one accepted to help), for the swimmer who agreed to do this project, and getting the opportunity to do this Science Fair project from my science teacher.

Pictures of my Experiment

Coach who helped with the project and signed the required forms.

Silicone swim cap.

Latex swim cap.

A stopwatch.

Pictures of my Experiment

The swimmer swimming with the latex cap.

The swimmer swimming with the silicone cap.