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## Why Proper Technique Works: An Insight into Scientific Principles that Make Skating Possible

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A recent change in figure skating this season is the evolution of triple axels and quad jumps in ladies skating. Most of the skaters doing these elements are 15 or 16 years-old. These changes raise many questions about the future of figure skating. What is the maximum number of revolutions in the air that a human could possibly complete? What are the long-term health effects of having skaters repetitively train these big jumps at such a young age? In an article published by NbcSports, Phillip Hersh explains concerns about early hip replacements becoming common among female skaters. A key to injury prevention is correct technique that minimizes harsh impact on muscles and joints. Coaches play a critical role in teaching skaters correct technique. In doing my research for this project, I have come to understand that much research has been done on figure skating injuries, but little exists on explaining how figure skating actually works and how to best optimize results. I aim to provide coaches with information that explains why certain techniques work to not only help them with injury prevention, but also to help foster an interest in science in a unique population. As a figure skater myself, I have found that my understanding of science and interest in the human body has helped me better understand certain aspects of the sport and recommendations by coaches. By compiling this information, I hope that I can transfer a similar understanding to other coaches and skaters. My target audience was coaches who I know could further transfer this information to their students and local skating communities.

In implanting this project, I first did my own research to understand what information was already available and how it was compiled. I then interviewed some of my own coaches to gain insight on aspects of the sport they felt were not well understood or difficult to explain. I then did more research based on their responses. Afterwards, I interviewed Dr. Clay Peterson, Associate Professor of Instruction in the Department of Health and Human Physiology at the University of Iowa. Dr. Peterson teaches courses in exercise physiology. I conducted this interview to gain additional information on concepts that I had researched or that were brought up in my interviews with coaches.

To put all of this information together, I created a brochure, shown the video, that highlighted key scientific concepts that were related to figure skating. Most sources that I looked at did not have all of this information in one place and dedicated to one sport. By creating this brochure, I compiled the information I had learned and collected into one easy to read spot for coaches to look through. Initially, I had planned to print copies of this brochure to distribute to local ice arenas around the time of World Figure Skating Championships (March 16-23). This event is the largest figure skating competition of the year and is usually a time when many coaches and skaters are closely following the international figure skating scene. However, due to the rapidly changing situation of the COVID pandemic, this event was cancelled about a week before it was scheduled to happen. Quickly following, ice arenas in the area shut down to minimize the spread of the virus. Following these changes, I chose to electronically send out my brochure by using figure skating club email lists, and decided to print and display my brochure in ice rinks at a later date when rinks were open again. Additionally, I created a blog post, brought up in the video, about my project to be published on Stem-o-sphere. I used this additional outlet to add some more concepts related to off-ice training since skaters across the world were all confined to training at home. To assess engagement of my project, I had planned to keep track of how many brochures were collected. Since I was not

able to physically distribute my brochures, I was not able to collect this data, but hope to do so in the future.

In the process of completing this project, I have learned additional information about the science of figure skating that I did not previously know, like counter rotating can help stop dizziness. I also become much more comfortable with brochure design and using programs like Adobe InDesign. In the future, I would like to see the printed version of my brochure distributed to local ice rinks. I would also like to consider adding more topics or more modes of communication that could help my project reach more people globally.

#### References

Hersh, Philip. "Quad revolution comes in force to women's figure skating." *NbcSports*, 19 Sept. 2019, <https://olympics.nbcsports.com/2019/09/19/alysa-liu-figure-skating-quad-revolution/>. Accessed 09 Oct. 2019.