

Physics Report-Societal/Ethical

October 24, 2022

Article: Herrmann, M., Engelke, K., Ebert, R., Müller-Deubert, S., Rudert, M., Ziouti, F., Jundt, F., Felsenberg, D., & Jakob, F. (2020). Interactions between Muscle and Bone-Where Physics Meets Biology. *Biomolecules*, 10(3), 432. <https://doi.org/10.3390/biom10030432>

The article I read is titled “Interactions between Muscle and Bone-Where Physics Meets Biology” published in the National Library of Medicine on Pubmed. The article explains how muscles depend on physical forces to initiate biochemical reactions in the body. Forces on the body impacting bones and muscles include gravity and exercise. Exercise creates stress and strains on muscles that is vital to maintain mobility and a wide range of movement. (Herrmann et al., 2020) It is physical movement of the body that initiates secretions of certain chemicals that in turn keeps the body healthy. The article also notes how immobility and not using muscles daily can “...trigger muscle and bone marrow fatty infiltration and propagate degenerative diseases such as sarcopenia and osteoporosis.” (Herrmann et al., 2020) This article is important because it emphasizes how physical exercise can prevent degeneration of muscles and bones, leading to a potentially longer lifespan. Not only do intrinsic forces in exercise impact muscles and bones, but also the extrinsic force of gravity can result in tissue adaptation, influencing muscle power and fracture resistance. (Herrmann et al., 2020) The article explains how different forces impact the body, and how this can benefit or negatively impact our personal health.

I thought this article was very interesting to know that the physical things we do each day impact our health internally, especially at such an intricate level involving secretions of various chemicals. I learned how the health of the body depends on environmental factors such as gravity

and the physical forces it experiences daily. The more muscles are engaged, the more it benefits the health of the individual, due to the processes that occur in the body. As an exercise science major, it is very important to understand what forces initiate biochemical reactions, and the cause and effect of these forces. It is fascinating how the body has so many large and miniscule factors that can impact our overall health. The article includes some societal and ethical implications of science. The main ethical and societal issue I identified was that low mobility and chronic inflammation is a major common health issue in older populations, however exercise can be used to counteract some of the results from this issue. It is up to everyone to decide how much exercise they engage in daily, but our society has grown increasing more immobile as technology advances. Exercise cannot be forced upon anyone, but based on the results in this article, exercise can greatly decrease the chances of bone and muscle diseases. With the health of America in such a bad state, society must shift to prioritizing physical activity to have a healthier future. It states that "...exercise and locomotion in concerted interaction between muscle and bone are core phenomena of health maintenance in higher organisms." (Herrmann et al., 2020) This phenomenon is the main social and ethical implication that can benefit society tremendously.

In conclusion, this article was very informative and interesting. It affirms social and ethical implications that exercise impacts the body in many ways including bone and muscle strength. I found it intriguing that exercise can counteract degenerative bone and muscle diseases. The physical forces working with the biochemical reactions in the body is a vital scientific understanding in exercise science that can provide answers to future health problems.

Excellent job.
SLJ