# Suspension Knee Brace

Facer, Madi (School: Pocatello High School)
Austin, Hayli (School: Pocatello High School )

Knee braces for someone with juvenile arthritis generally focus on comfort and support without considering the need for maintaining muscle and ligament strength. Since this and other similar diseases require life-long adjustments, the more independence of movement an individual can maintain, the better their potential quality of life. Our goal was to try to create a prototype brace using 3D printing technology that would address this issue. Gas compressed lift supports, similar to those used on a hatchback, were attached to different knee braces in order to promote movement while reducing pain from impact. The lift support was attached slightly compressed to reduce force on soft tissue consistently without weakening the ligaments and muscles. When the brace prototypes were completed, volunteers were asked to wear the brace(s) and report the experience they had while testing it. The brace is designed specifically to enable mobility while still providing pain relief that stems from impact (due to walking and/or running). The brace will be particularly useful for those suffering from knee disorders such as, but not limited to arthritis, patellar tracking disorder, and general instability. We tested the brace prototypes by performing everyday tasks and measuring the force in newtons using a force probe. When walking, running and jumping with no brace, the force exerted on the joint was reaching 18, 25, and 30 newtons respectively. Using a non-modified brace relieved the force exerted when extending the leg, but tripled the force when flexing the leg. When testing our modified brace, the force when extending was reaching barely 5 newtons (jumping) and 10 newtons on flexion (jumping).

**Awards Won:**