

Study documents trends in marching band members' workload strain

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Credit: Oregon State University

Marching band members in leadership roles are more likely to feel discomfort in the neck and upper back than their less experienced bandmates, who in turn are more susceptible to left-hand pain and cognitive strain, a new study by Oregon State University suggests.

The findings also showed that gender had no bearing on how much discomfort a musician felt or the band member's perception of workload.

"The study really seems to indicate that a player's level of experience and role within the band are what drive how much discomfort they feel," said industrial engineer and ergonomics researcher Xinhui Zhu. "This is one of the first looks at college band members' susceptibility to musculoskeletal disorders. More research needs to be done to confirm trends in the data and provide more factors to compare, such as instrument type, but this is an important early step."

Findings were published in the journal *Work*.

While pleasing to both the performer and audience, playing a [musical instrument](#) is associated with the development of a range of potentially debilitating [musculoskeletal disorders](#)

such as sprains, strains and arthritis, often abbreviated to MSDs; moreover, playing in front of a crowd has been shown to increase musicians' stress and anxiety levels.

"Developing an MSD can have a huge impact on a person's life," said study co-author Robyn Wells, an OSU Honors College graduate who works as a mechanical design engineer at Sound Devices in Madison, Wisconsin. "You can end up with pain that restricts your ability to work or participate in physical events. Any task that requires the same movement again and again is a potential cause of an MSD."

Earlier studies, the researchers say, have shown that either prolonged playing over many years or intensive playing in as little as a week can lead to musculoskeletal discomfort, joint flexibility problems, a decline in playing ability or a combination of all of those. Additionally, marching band members' physical stress is high simply because they are marching.

"The risk of developing MSDs among marching band players in college settings is high," said Zhu, a former OSU College of Engineering faculty member and now an independent ergonomics consultant. "Musicians, who are also full-time students, participate in long practices, and for band players, game day is a nine-hour commitment. They carry a wide range of instruments in terms of shape, size, weight and playing positions. But to date there has not been much research about the factors that contribute to MSDs among college players."

To help close that knowledge gap, Zhu and Wells gave 70 members of the Oregon State University marching band four different surveys before and after a football game day in September 2017. The players were categorized by gender, experience level (novice or experienced) and role (leader or non-leader).

Leaders, who are typically older and have been playing longer than non-leaders, are responsible for their section of the band, in charge of teaching them the songs and everything that goes into the performance.

"The only statistically significant difference of discomfort found between the two experience levels was the left hand," Zhu said. "Novice players had significantly more discomfort than experienced players within this body part. Both groups had relatively high discomfort in the neck, shoulders, back and feet. Leaders had higher neck discomfort and upper back discomfort than non-leaders and reported an overall higher workload."

The research did not reveal reasons for the novices' left hand pain, though one possible explanation is that novices are unaccustomed to holding their instruments for an entire day as most high school band performances are shorter.

Novices and leaders alike, musicians need to be warned about the potential for small discomforts leading to musculoskeletal disease, Wells said, and designers and manufacturers of accessories like harnesses and neck straps may need to alter their products in the name of MSD prevention.

"The accessories apply a lot of stress on the neck and upper back as shown in the results of this study," she said. "This research also has broader implications, extending to any job in which someone is working long hours with awkward postures while carrying and picking up heavy objects and executing mentally demanding tasks. Through this study and others like it, new designs can be developed to help prevent MSDs."

More information: Lenore Frost et al. Repetitive strain injury: A new definition and treatment strategy based on the client-centered practice, *Work* (2019). [DOI: 10.3233/WOR-1997-8106](https://doi.org/10.3233/WOR-1997-8106)

Provided by Oregon State University

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