

How mental math helps a lower back

July 24 2020, by Katharine Gammon

Nearly everyone is familiar with the feeling of struggling through math problems. Now, researchers are figuring out how to get people with back pain to move more like people without it—using the diversion of mental math.

K. Michael Rowley Ph.D. '18 is in the business of busting [back pain](#) with the brain. Rowley, an adjunct assistant professor of physical therapy teaches in the hybrid online/on-campus DPT program and studies [motor control](#) and cognitive ergonomics—how people arrange their attentional resources.

In a new study published in the journal *Experimental Brain Research*, Rowley and his colleagues wanted to see what happened to someone's trunk—their chest, abdomen and pelvis—during a balance task where they had to control an unstable spring with one leg. People who have back [pain](#) on and off tend to have more dissociated motion between the upper trunk and the pelvis compared to those without a history of [low back pain](#), who move their trunk in a more coordinated fashion, he explains.

When the researchers asked all the participants to do mental math problems while they balanced, they noticed that those with a history of low back pain changed their movements and started to look more like the control group without a history of pain. The improvement in the back pain group shows how the cognition influences movement, Rowley said, "because we found that if we've distracted the cognition—making them think about something else—all of a sudden that pattern sort of

looks more like the back-healthy participants."

Some clinicians and [physical therapists](#) are already starting to implement similar techniques into their work, but the research provides more evidence for the use of some cognitive dual tasking during rehabilitation, Rowley said.

One example is that if a patient has to do an exercise 10 times, asking that patient to count backwards from 10 instead of forwards or count by threes instead of count by ones, could be enough of a cognitive distraction to help them.

Part of the reason these distracting tools may work is that people who are in pain already think about their bodies more—worrying that something may cause more pain the future. "They may be doing too much," Rowley explained, so distracting them takes them back to a normal state. He wouldn't recommend the technique with dynamic tasks or large range of motions—that could lead to a higher risk of injury. But in this small range-of-motion, upright-balance task, it may be appropriate.

Changing the model of treatment

There are still future questions to be answered, for example, what happens when patients do these tasks while they are still in pain, not in symptom remission as this study examined.

Rowley added that his research is aided by the strong collaborations with other colleagues in the division—Professor Clinical Scholar-Physical Therapy Kornelia Kulig, Professor Carolee Winstein MS '84, Assistant Professor of Clinical Physical Therapy Aimee Diaz, Professor Clinical Scholar-Physical Therapy Lori Michener and Assistant Professor of Clinical Physical Therapy Jonathan Sum '01, DPT '05

His ultimate goal is decrease low back pain and to understand what should be happening, rehabilitation-wise, during periods of symptom remission.

"A lot of times people have back pain, they go to some PT appointments and the pain goes away. Then they go home and stop their rehabilitation, and a few weeks later they're going to have pain again," Rowley said.

"We would like to change the model of treatment, where people are going in for relapse prevention visits, maybe once a month to evaluate your movement even when you're not in pain."

More information: K. Michael Rowley et al. Persons in remission from recurrent low back pain alter trunk coupling under dual-task interference during a dynamic balance task, *Experimental Brain Research* (2020). [DOI: 10.1007/s00221-020-05772-4](https://doi.org/10.1007/s00221-020-05772-4)

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