

# *Boredom and Students Low Back Pain.*

## *A narrative Review*

---

---

***Phd(c). Kristi Çela***

CORRESPONDING AUTHOR

EUROPEAN UNIVERSITY OF TIRANA, FACULTY OF TECHNICAL MEDICAL  
SCIENCES, DEPARTMENT OF NURSING AND PHYSIOTHERAPY

kristi.cela@uet.edu.al

### **Abstract**

*Low back pain (LBP) affected more than 619 million individuals globally in 2020, and according to the Global Burden of Disease study, this number is projected to rise to 843 million by 2050, establishing LBP as one of the most prevalent health conditions of modern times. Among those affected, students represent a significant population, with prevalence rates reaching as high as 94% in some studies. Research suggests that prolonged lecture hours contribute to increased boredom among students, an emotion experienced universally and defined as a lack of stimulation or interest, engagement in monotonous activities, or activities perceived as unchallenging. Common causes of boredom for college students include lengthy classes, lack of activities, monotony, loneliness, and waiting periods. Boredom often manifests in altered body postures, such as slumped, hunched, or forward-leaning positions during extended sitting periods in classrooms. These postural changes are associated with a heightened risk of developing low back pain.*

**Key Words:** *Boredom, Low Back Pain, Students, Posture, Boredom Proneness.*

## Introduction

Low Back pain has affected more than 619 million individuals in the year 2020 and according to the Global Burden of Disease study the number is predicted to raise to 843 million by the year of 2050, remaining as one the most prevalent pathology of modern times (Ferrira et al., 2020). The complex pathology manifests with various of symptoms including pain, dysfunction, discomfort predominantly experienced in the lumbar area of the spine (Casiano et al., 2022). Often with the involvement of neural structures referral pain or radiculopathy may be experienced as a symptom of Low Back Pain (Baron et al, 2016). The causes are broad starting with specific Low Back pain from conditions such as herniated discs, vertebral misalignment, tumors, or nerve root pathologies and non-specific Low Back Pain commonly referred to pain that it is not associated with a known pathology (Violante et al., 2016; Maher et al., 2017). Non-specific Low Back pain lists etiological and risk factors such as prolonged sitting, standing or working, poor mental and social life, unhealthy life style, triggering distractions and also boredom (Chiarotto et al., 2022; Ehrlich 2003) Having a variety of symptoms and causations and affecting millions of individuals every year Low Back Pain also has an economic and social impact, limiting and causing disability to workers in various professions. (Fatoye et al., 2023)

Students are on of the affected population by Low Back Pain, prevalence of whom has seen to be increasing, with studies reporting a prevalence up to 94%(Taha et al., 2023; Boussaid et al., 2022; Sany et al., 2022). Academic life, high mental demand followed by sedentary life and poor ergonomic factors also contributes to this issue. (Alshehri et al., 2023) Low Back Pain disrupts student's life causing lack of concentration, lack of sleep and overall discomfort in participation. (Alsaadi et al., 2022). This leads to poor mental and social health.

Depression is noticed to have a correlation with Low Back Pain in student population caused by lack of sleep and poor academic performance as a result of pain. (Tavares et al., 2018). Students are by default forced to participate into sedentary activities as they have to seat for prolonged hours during lectures followed my studying hours that still require to be sited. (Hosteng et al., 2019; Baradaran Mahdavi et al., 2021). Prolonged sitting is considered a monotonous activity and it is associated with boredom. (Ryo Wataya et al., 2015)

Studies suggest that prolonged lecturing hours cause boredom to students. According to students one hour is the optimal time for a lecture not to be boring among other factors such as interactivity with the lecturers and engaging topics. (Ubah, 2018). Students prefer to participate more in lectures that try to engage their problem solving skills then traditional methods. (Alaagib et al., 2019). Boredom

is expressed in various ways. Students can be noticed yawning, using their mobile phones, chatting to their peers and slouching forward on their desk, fidgeting or leaning their head in one hand. (Bull et al., 1978; D’Mello et al., 2007). Slouching or leaned forward posture has been associated with Low Back Pain according to various studies. (Jung et al., 2020; Waongenngarm et al., 2025).

The aim of this Review article is to investigate what the existing literature suggests for the correlation between of Boredom and Low Back Pain, this being a direct or indirect cause to the pain.

## **What is Boredom?**

Boredom is a common emotion that almost every person has experienced. It has many definitions such as lack of stimuli or reasons to engage in certain activities, engaging in monotonous activities or activities that don’t exceed interest (Ndeti et al., 2023). Mikulas et al., define boredom as “state of relatively low arousal and dissatisfaction which is attributed to an inadequately stimulating situation” and Estwood et al., define it as “the aversive experience of wanting, but being unable, to engage in satisfying activity” (Mikulas et al., 1993; Eastwood et al., 2012).

Boredom can also be perceived in many dimensions. It involves physiological, psychological and philosophical components, it can be a negative emotion but also it can be seen as a positive one. Boredom could function as a cue to motivate, by having an adaptive effect, promoting exploration and the pursuit of new experiences by pushing people to look for more rewarding and exciting activities (Weissinger et al., 1992). According to this viewpoint, boredom is a dynamic force that motivates people to actively interact with their surroundings in quest of more satisfying experiences (Bench et al., 2013). The connection between creativity and boredom makes boredom even more complicated. It may be easier to be creative when one lets their thoughts wander during boring times, which emphasizes the advantages of accepting rather than rejecting apparent monotony ( Gomez-Ramirez et al., 2017; Craven et al., 2022).

Besides the positive traits boredom also influences negative responses. It was shown by two concurrent tests that boredom does, in fact, increase the chances for eating disorders and unhealthy eating habits (Havermans et al., 2015). Furthermore, another study that looked at the issue of self-administered shocks during boredom found that the main goal of these acts is to break up monotony rather than control unpleasant emotional feeling (Nederkoorn et al., 2016). It was also discovered that reduced task autonomy in dull circumstances resulted in elevated frustration and depression (Hoft et al., 2018). Boredom’s enduring dissatisfaction and disinterest can progressively undermine one’s sense of success and purpose, leaving one feeling empty and disillusioned (Lee et al., 2019). Long



stretches of boredom can also lead to a deficiency of mental stimulation, which can exacerbate the vicious cycle of inactivity and sluggishness. When people struggle to participate in fulfilling and interesting activities, their general well-being may suffer (Weissinger 1995). Boredom is frequently connected to stress-related physiological reactions including elevated cortisol and heart rate (Bench et al., 2013). For example, the body's reaction to the emotional distress caused by boredom might result in tension headaches, tight muscles, and exhaustion. Furthermore, prolonged screen time, mindless eating, and other sedentary activities linked to boredom can lead to weight gain, bad posture, and a decrease in cardiovascular health (Havermans et al., 2015).

Because a sedentary lifestyle is linked to a lack of stimulating activities and extended periods of low energy, chronic boredom can also impair immunity by suppressing the body's natural defenses. Long-term boredom can lead to less physical activity, which can cause problems including poor circulation, a higher chance of obesity, and even metabolic syndrome (Tam et al., 2021). Additionally, because their daily routines are unstructured, people who are bored frequently report disturbed sleep patterns, which can hinder their ability to recuperate and result in long-term health issues like weariness or hypertension (Nederkoorn et al., 2016).

Although everyone has perceived boredom not everyone has the same experience with boredom. Some individuals are more prone to experience boredom than others. This boredom proneness is associated with feelings of restlessness, fatigue, frustration, anxiety, emptiness, and sadness, along with wandering attention and a lack of challenge, motivation, or things to do. (Tam et al., 2021).

The relationship between being easily bored and mental health problems such as depression as well as unhealthy habits is supported by empirical data. It has also been connected to mortality and a hindrance to prospering ( Britton et al., 2010). There are many different ways to deal with boredom, but reading is a common coping and planning strategy. Other strategies include reflecting, fantasizing, interacting with others, watching television, exercising, and partaking in particular activities. These tactics fit into more general categories that include attentional refocusing and stimulus seeking (Harris et al., 2000).

## **Boredom and Students**

Classes, a lack of activities, monotony, loneliness, and waiting are common causes of boredom, especially for college students (Sharp et al., 2016). Given the variety of these reasons, it's possible that personal characteristics will mitigate the degree to which each circumstance leads to boredom. Individuals with high boredom

prone to mood labeling may find it difficult to create internal stimulation and may feel unchallenged and unstimulated in a variety of contexts (Sharp et al., 2015).

In addition, bored students are easily sidetracked by other activities like manipulating things, gazing out the window, or utilizing devices unrelated to the lesson (Nett et al., 2010). This lack of involvement is further highlighted by the students' inability to actively participate in class activities—they avoid contributing to debates, asking questions, or providing solutions. (Sharp et al., 2018) When students mentally check out of the classroom and lose themselves in their own thoughts or imaginations, daydreaming is a typical sign of boredom (Westgate et al., 2019). Students who are bored also tend to use procrastination as a coping strategy, which causes them to put off finishing their homework or studying (Rahimi et al., 2023).

According to research, extended boredom can have a negative effect on cognitive function, resulting in shorter attention spans and memory retention problems (Eastwood et al., 2012). These cognitive difficulties frequently make it more difficult for students to properly comprehend and apply new information, which can lead to poorer academic performance and lower grades. Additionally, when students search for meaning and purpose in their educational experiences, chronic boredom is often linked to elevated levels of irritation, anxiety, and even depression (Malkovsky et al., 2012). This emphasizes how crucial it is to design compelling and interesting learning settings that maintain students' active participation.

Furthermore, boredom can alter the dynamics of the classroom as a whole in addition to having an impact on individual students. According to Pekrun et al. (2010), a large number of uninterested students might cause a chain reaction of distractions and lower overall class efficiency. Disengaged students may, for instance, inadvertently annoy their friends by talking, fidgeting, or engaging in other off-task activities. This has a knock-on impact that could cause disengagement in the entire class. Teachers can use tactics like implementing interactive teaching methods, creating a feeling of community in the classroom, and adjusting the curriculum to fit the interests and ability levels of the students in order to offset these results.

A variety of circumstances might contribute to college students' boredom, and individual traits like mood labeling and boredom proneness can have an impact. Boredom can be easily recognized by observable actions such as procrastination, physical restlessness, changes in posture, and lack of participation. Research from a variety of sources, including Sharp, Nett, D'Mello, Bull, Mota, Witchel, and others, show how disengagement and restlessness are frequently linked to boredom in educational environments. In order to effectively address and mitigate boredom in academic situations, instructors and students must be able to recognize these behavioral signs.



## Boredom and Students Low Back Pain

The sedentary nature of activities that are frequently linked to boredom is one reasonable explanation for the correlation between boredom and low back discomfort (Citko et al., 2018). People are more inclined to sit for extended periods of time when they become bored engaging less in physical activities whether at work, in their free time, or while they are doing screen-based activities (Cleary et al., 2016). Cargnin et al., on their study investigating non-specific Low Back Pain in the nurse's work process suggests that repeated tasks associated with boredom and anger tend to increase the prevalence of Low Back Pain (Cargnin et al., 2019). Other studies also back up the findings that work or school dissatisfaction and other psychological aspects relating work activities influence musculoskeletal pain. (Puntillo et al., 2021). Students dissatisfaction with lecturing hours and the prolonged sitting also contributes to boredom and by association to Low Back Pain. Adding to the factors that correlate to Low Back Pain is also the emotional factors, especially in the student's population where stress and depression have a high prevalence (Yan et al., 2021; Barbayannis et al., 2022; Acharya et al., 2018)

Students that are prone to boredom tend to have a poor self-control. This leads to a cycle of boredom involves a struggle to initiate activities or to keep focus on said activities. This starts a vicious cycle of boredom and indecision where people struggle to decide what kind of meaningful engagement to engage in (Danckert et al., 2019). Lack of activities or participation on activities leads to lower level of dopamine releases on the body as the brain doesn't find it necessary to engage ( Kravitz et al., 2016). Dopamine is linked to pain inhibition so an individual who suffers from a Low Back Pain and has a higher proneness to boredom is more risked to experiencing more frequent pain episodes (Li et al., 2019).

Students that are bored exhibit a variety of observable actions. First of all, there is a glaring lack of participation, as students don't seem to be motivated or interested in contributing to class discussions or finishing projects (Nett et al., 2010). Another common indicator of physical restlessness is students shifting or squirming in their seats as a coping mechanism for their disinterest in the material (D'Mello et al., 2007). Changes in posture are also a common expression of boredom as suggested by Peter Bull in his experimental study. It was observed that bored students tend to lean on forward putting their head on their hand when experiencing boredom. (Bull, 1978) Another study suggests that shifts on posture from leaning back to forward or vice versa also indicate for a bored state among students. The study further implies that certain postural behaviors, likely characterized by restlessness, fidgeting, or a desire for a break, may serve as observable indicators that a student is transitioning towards a state of boredom (Mota et al., 2003). Bench et al also supports the findings with the body posture

expressing boredom as their study suggests that hunched and slumped posture is related to boredom (Bench et al., 2013). Witchel et al., in their experimental study distinguishing interest and boredom through body movement suggest that boredom is associated with sudden movements of the head and shoulders followed by period of stillness. Supporting the boredom expression through restlessness (Witchel et al., 2014).

The biomechanical strain that a hunched or slumped posture places on the spine is the primary cause of low back pain. Sitting with one's back hunched for extended periods of time can cause spinal misalignment, which puts uneven strain on the facet joints, intervertebral discs, and surrounding soft tissues. (Jung et al., 2020).

In addition to having an impact on posture, boredom interacts with psychological variables that may intensify pain perception. Due to their lack of mental activity, bored people are more sensitive to even the smallest aches and pains, which can lead to heightened awareness of physical discomfort (Li et al., 2019). The subjective perception of pain may be exacerbated by this increased focus, leading to a vicious cycle in which discomfort further diminishes interest and increases feelings of boredom. This cycle emphasizes how psychological and physical variables are intertwined in the onset and persistence of pain.

There is a complex relationship between boredom and low back pain, with sedentary activities linked to boredom having a major impact on the beginning of discomfort. Research indicates that musculoskeletal discomfort, particularly in students, may be caused by psychological variables in addition to job or school-related discontent. Student boredom and poor self-control are cyclical, which lowers dopamine release and increases the likelihood of recurrent episodes of low back pain. Students who exhibit observable behaviors—like a lack of participation or changes in posture—are likely bored. From a biomechanical perspective, low back discomfort is mostly caused by the drooping or stooped posture that is associated with boredom, as it puts strain on spinal structures and affects spinal alignment.

## Conclusions

In summary, there is a complex relationship between boredom and low back discomfort, especially when it comes to students. This association has important consequences for both physical and psychological health. Long periods of sitting lead to musculoskeletal pain because the sedentary character of activities that are associated with boredom and academic disappointment are combined. Students who are prone to boredom and exhibit poor self-control can set off a loop that impacts dopamine release and raises the possibility of recurrent episodes of low back pain. More research is necessary to create focused therapies and preventive measures that can successfully address the complex interactions between low back pain and boredom. These studies can help develop holistic strategies to improve



students' total well-being by highlighting the interdependence of mental and physical health in the face of contemporary issues and scholastic expectations.

## Literature

1. Acharya, L., Jin, L., & Collins, W. (2018). College life is stressful today: Emerging stressors and depressive symptoms in college students. *Journal of American College Health*, 66(7), 655–664. <https://doi.org/10.1080/07448481.2018.1451869>
2. Alaagib, N. A., Musa, O. A., & Saeed, A. M. (2019). Comparison of the effectiveness of lectures based on problems and traditional lectures in physiology teaching in Sudan. *BMC Medical Education*, 19(1). <https://doi.org/10.1186/s12909-019-1799-0>
3. Alsaadi, S. M. (2022). Musculoskeletal pain in undergraduate students is significantly associated with psychological distress and poor sleep quality. *International Journal of Environmental Research and Public Health*, 19(21), 13929. <https://doi.org/10.3390/ijerph192113929>
4. Alshehri, M. M., Alqhtani, A. M., Gharawi, S. H., Sharahily, R. A., Fathi, W. A., Alnamy, S. G., Alothman, S., et al. (2023). Prevalence of lower back pain and its associations with lifestyle behaviors among college students in Saudi Arabia. *BMC Musculoskeletal Disorders*, 24(1). <https://doi.org/10.1186/s12891-023-06683-5>
5. Baradaran Mahdavi, S., Riahi, R., Vahdatpour, B., & Kelishadi, R. (2021). Association between sedentary behavior and low back pain: A systematic review and meta-analysis. *Health Promotion Perspectives*, 11(4), 393–410. <https://doi.org/10.34172/hpp.2021.50>
6. Barbayannis, G., Bandari, M., Zheng, X., Baquerizo, H., Pecor, K. W., & Ming, X. (2022). Academic stress and mental well-being in college students: Correlations, affected groups, and COVID-19. *Frontiers in Psychology*, 13, 886344. <https://doi.org/10.3389/fpsyg.2022.886344>
7. Baron, R., Binder, A., Attal, N., Casale, R., Dickenson, A. H., & Treede, R.-D. (2016). Neuropathic low back pain in clinical practice. *European Journal of Pain*, 20(6), 861–873. <https://doi.org/10.1002/ejp.838>
8. Bench, S., & Lench, H. (2013). On the function of boredom. *Behavioral Sciences*, 3(3), 459–472. <https://doi.org/10.3390/bs3030459>
9. Bench, S., & Lench, H. (2013). On the function of boredom. *Behavioral Sciences*, 3(3), 459–472. <https://doi.org/10.3390/bs3030459>
10. Boussaid, S., Daldoul, C., Rekik, S., Jammali, S., Cheour, E., Sahli, H., & Elleuch, M. (2022). Low back pain among students of Medical University of Tunis. *Current Rheumatology Reviews*, 18. <https://doi.org/10.2174/1573397118666220821143041>
11. Britton, A., & Shipley, M. J. (2010). Bored to death? *International Journal of Epidemiology*, 39(2), 370–371. <https://doi.org/10.1093/ije/dyp404>
12. Bull, P. (1978). The interpretation of posture through an alternative methodology to role play. *British Journal of Social and Clinical Psychology*, 17(1), 1–6. <https://doi.org/10.1111/j.2044-8260.1978.tb00888.x>
13. Bull, P. (1978). The interpretation of posture through an alternative methodology to role play. *British Journal of Social and Clinical Psychology*, 17(1), 1–6. <https://doi.org/10.1111/j.2044-8260.1978.tb00888.x>
14. Cargnin, Z. A., Schneider, D. G., Vargas, M. A. de O., & Machado, R. R. (2019). Non-specific low back pain and its relation to the nursing work process. *Revista Latino-Americana de Enfermagem*, 27, e3172. <https://doi.org/10.1590/1518-8345.2915.3172>





15. Casiano, V., & De, N. (2023). Back pain. In *StatPearls. Treasure Island, FL: StatPearls Publishing*. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK538173/>
16. Chiarotto, A., & Koes, B. W. (2022). Nonspecific low back pain. *The New England Journal of Medicine*, 386(18), 1732–1740. <https://doi.org/10.1056/NEJMc2032396>
17. Citko, A., Górski, S., Marcinowicz, L., & Górska, A. (2018). Sedentary lifestyle and nonspecific low back pain in medical personnel in North-East Poland. *BioMed Research International*, 2018, 1965807. <https://doi.org/10.1155/2018/1965807>
18. Cleary, M., Sayers, J., Lopez, V., & Hungerford, C. (2016). Boredom in the workplace: Reasons, impact, and solutions. *Issues in Mental Health Nursing*, 37(2), 83–89. <https://doi.org/10.3109/01612840.2015.1084554>
19. Craven, A., & Frick, L. (2022). Boredom as a basis for fostering creativity in higher education: A call for pedagogical bravery. *Innovations in Education and Teaching International*, 1–13. <https://doi.org/10.1080/14703297.2022.2134171>
20. D’Mello, S. S., Chipman, P., & Graesser, A. (2007). Posture as a predictor of learner’s affective engagement. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 29(29). ISSN 1069-7977.
21. D’Mello, S., Chipman, P., & Graesser, A. C. (2007). Posture as a predictor of learner’s affective engagement. *Philpapers.org*. <https://philpapers.org/rec/DMEPAA>
22. Danckert, J. (2019). Boredom: Managing the delicate balance between exploration and exploitation. In *Boredom Is in Your Mind* (pp. 37–53). [https://doi.org/10.1007/978-3-030-26395-9\\_3](https://doi.org/10.1007/978-3-030-26395-9_3)
23. Eastwood, J. D., Frischen, A., Fenske, M. J., & Smilek, D. (2012). The unengaged mind: Defining boredom in terms of attention. *Perspectives on Psychological Science*, 7(5), 482–495. <https://doi.org/10.1177/1745691612456044>
24. Eastwood, J. D., Frischen, A., Fenske, M. J., & Smilek, D. (2012). The unengaged mind: Defining boredom in terms of attention. *Perspectives on Psychological Science*, 7(5), 482–495. <https://doi.org/10.1177/1745691612456044>
25. Ehrlich, G. E. (2003). Low back pain. *Bulletin of the World Health Organization*, 81(9), 671–676. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/14710509/>
26. Fatoye, F., Gebrye, T., Ryan, C., Useh, U., & Mbada, C. E. (2023). Global and regional estimates of clinical and economic burden of low back pain in high-income countries: A systematic review and meta-analysis. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1098100>
27. Ferreira, M. L., de Luca, K., Haile, L. M., Steinmetz, J. D., Culbreth, G. T., Cross, M., Kopec, J. A., et al. (2023). Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: A systematic analysis of the Global Burden of Disease Study 2021. *The Lancet Rheumatology*, 5(6), e316–e329. [https://doi.org/10.1016/s2665-9913\(23\)00098-x](https://doi.org/10.1016/s2665-9913(23)00098-x)
28. Gomez-Ramirez, J., & Costa, T. (2017). Boredom begets creativity: A solution to the exploitation–exploration trade-off in predictive coding. *Biosystems*, 162, 168–176. <https://doi.org/10.1016/j.biosystems.2017.04.006>
29. Harris, M. B. (2000). Correlates and characteristics of boredom proneness and boredom. *Journal of Applied Social Psychology*, 30(3), 576–598. <https://doi.org/10.1111/j.1559-1816.2000.tb02497.x>
30. Havermans, R. C., Vancleef, L., Kalamatianos, A., & Nederkoorn, C. (2015). Eating and inflicting pain out of boredom. *Appetite*, 85, 52–57. <https://doi.org/10.1016/j.appet.2014.11.007>
31. Hosteng, K. R., Reichter, A. P., Simmering, J. E., & Carr, L. J. (2019). Uninterrupted classroom sitting is associated with increased discomfort and sleepiness among



- college students. *International Journal of Environmental Research and Public Health*, 16(14). <https://doi.org/10.3390/ijerph16142498>
32. Jung, K.-S., Jung, J.-H., In, T.-S., & Cho, H.-Y. (2020). Effects of prolonged sitting with slumped posture on trunk muscular fatigue in adolescents with and without chronic lower back pain. *Medicina*, 57(1), 3. <https://doi.org/10.3390/medicina57010003>
  33. Kravitz, A. V., O'Neal, T. J., & Friend, D. M. (2016). Do dopaminergic impairments underlie physical inactivity in people with obesity? *Frontiers in Human Neuroscience*, 10. <https://doi.org/10.3389/fnhum.2016.00514>
  34. Lee, F. K. S., & Zelman, D. C. (2019). Boredom proneness as a predictor of depression, anxiety and stress: The moderating effects of dispositional mindfulness. *Personality and Individual Differences*, 146, 68–75. <https://doi.org/10.1016/j.paid.2019.04.001>
  35. Li, C., Liu, S., Lu, X., & Tao, F. (2019). Role of descending dopaminergic pathways in pain modulation. *Current Neuropharmacology*, 17(12), 1176–1182. <https://doi.org/10.2174/1570159x17666190430102531>
  36. Maher, C., Underwood, M., & Buchbinder, R. (2017). Non-specific low back pain. *The Lancet*, 389(10070), 736–747. [https://doi.org/10.1016/s0140-6736\(16\)30970-9](https://doi.org/10.1016/s0140-6736(16)30970-9)
  37. Malkovsky, E., Merrifield, C., Goldberg, Y., & Danckert, J. (2012). Exploring the relationship between boredom and sustained attention. *Experimental Brain Research*, 221(1), 59–67. <https://doi.org/10.1007/s00221-012-3147-z>
  38. Mikulas, W. L., & Vodanovich, S. J. (1993). *The essence of boredom*. *The Psychological Record*, 43(1), 3–12.
  39. Mota, S., & Picard, R. W. (2003). Automated posture analysis for detecting learner's interest level. *Proceedings of the 2003 Conference on Computer Vision and Pattern Recognition Workshop*, 49–49. <https://doi.org/10.1109/CVPRW.2003.10047>
  40. Ndetei, D. M., Nyamai, P., & Mutiso, V. (2023). Boredom—Understanding the emotion and its impact on our lives: An African perspective. *Frontiers in Sociology*, 8. <https://doi.org/10.3389/fsoc.2023.1213190>
  41. Nederkoorn, C., Vancleef, L., Wilkenhöner, A., Claes, L., & Havermans, R. C. (2016). Self-inflicted pain out of boredom. *Psychiatry Research*, 237, 127–132. <https://doi.org/10.1016/j.psychres.2016.01.063>
  42. Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored? *Learning and Individual Differences*, 20(6), 626–638. <https://doi.org/10.1016/j.lindif.2010.09.004>
  43. Puntillo, F., Giglio, M., Paladini, A., Perchiazzi, G., Viswanath, O., Urits, I., Sabbà, C., Varrassi, G., & Brienza, N. (2021). Pathophysiology of musculoskeletal pain: A narrative review. *Therapeutic Advances in Musculoskeletal Disease*, 13, 1759720X21995067. <https://doi.org/10.1177/1759720x21995067>
  44. Rahimi, S., Hall, N. C., & Sticca, F. (2023). Understanding academic procrastination: A longitudinal analysis of procrastination and emotions in undergraduate and graduate students. *Motivation and Emotion*, 47(4). <https://doi.org/10.1007/s11031-023-10010-9>
  45. Sany, S. A., Tanjim, T., & Hossain, M. I. (2022). Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study. *F1000Research*, 10, 698. <https://doi.org/10.12688/f1000research.55151.3>
  46. Sharp, J. G., Hemmings, B., & Kay, R. (2015). Towards a model for the assessment of student boredom and boredom proneness in the UK higher education context. *Journal of Further and Higher Education*, 40(5), 649–681. <https://doi.org/10.1080/0309877x.2014.1000282>
  47. Sharp, J. G., Hemmings, B., Kay, R., Murphy, B., & Elliott, S. (2016). Academic boredom among students in higher education: A mixed-methods exploration of characteristics,

- contributors, and consequences. *Journal of Further and Higher Education*, 41(5), 657–677. <https://doi.org/10.1080/0309877x.2016.1159292>
48. Sharp, J. G., Sharp, J. C., & Young, E. (2018). Academic boredom, engagement and the achievement of undergraduate students at university: A review and synthesis of relevant literature. *Research Papers in Education*, 35(2), 144–184. <https://doi.org/10.1080/02671522.2018.1536891>
  49. Taha, Y. A., Swaidan, A., Alyami, H. S., Alwadany, M. M., Al-Swaidan, M. H., Alabbas, Y. H., Dhaen, H. M., & Faidhi, A. A. (2023). The prevalence of low back pain among medical students: A cross-sectional study from Saudi Arabia. *Cureus*. <https://doi.org/10.7759/cureus.38997>
  50. Tam, K. Y. Y., van Tilburg, W. A. P., & Chan, C. S. (2021). What is boredom proneness? A comparison of three characterizations. *Journal of Personality*, 89(4), 831–846. <https://doi.org/10.1111/jopy.12618>
  51. Tavares, C., Salvi, C. S., Nisihara, R., & Skare, T. (2018). Low back pain in Brazilian medical students: A cross-sectional study in 629 individuals. *Clinical Rheumatology*, 38(3), 939–942. <https://doi.org/10.1007/s10067-018-4323-8>
  52. Ubah, J. N. (2018). Predictors of boredom at lectures: Medical students' experience. *Advances in Social Sciences Research Journal*, 5(1), 91–95. <https://doi.org/10.14738/assrj.51.4069>
  53. van Hooff, E. A. J., & van Hooff, M. L. M. (2018). The state of boredom: Frustrating or depressing? *Motivation and Emotion*, 42(6), 931–946. <https://doi.org/10.1007/s11031-018-9710-6>
  54. Violante, F. S., Mattioli, S., & Bonfiglioli, R. (2015). Chapter 21 - Low-back pain. In M. Lotti & M. L. Bleeker (Eds.), *ScienceDirect. Elsevier*. <https://www.sciencedirect.com/science/article/abs/pii/B9780444626271000202?via%3Dihub>
  55. Waongenngarm, P., Rajaratnam, B. S., & Janwantanakul, P. (2015). Perceived body discomfort and trunk muscle activity in three prolonged sitting postures. *Journal of Physical Therapy Science*, 27(7), 2183–2187. <https://doi.org/10.1589/jpts.27.2183>
  56. Wataya, R., Iwai, D., & Sato, K. (2015). Sensing of audience excitation and boredom emotion based on the synchrony of sitting body sway. *Electronics and Communications in Japan*, 98(4), 11–19. <https://doi.org/10.1002/ecj.11627>
  57. Weissinger, E. (1995). Effects of boredom on self-reported health. *Loisir et Société / Society and Leisure*, 18(1), 21–32. <https://doi.org/10.1080/07053436.1995.10715488>
  58. Weissinger, E., Caldwell, L. L., & Bandalos, D. L. (1992). Relation between intrinsic motivation and boredom in leisure time. *Leisure Sciences*, 14(4), 317–325. <https://doi.org/10.1080/01490409209513177>
  59. Westgate, E. C. (2019). Why boredom is interesting. *Current Directions in Psychological Science*, 29(1), 33–40. <https://doi.org/10.1177/0963721419884309>
  60. Witchel, H. J., Tee, C., Needham, R., Healy, A., & Chockalingam, N. (2014). A time series feature of variability to detect two types of boredom from motion capture of the head and shoulders. *Sussex Research Online* (University of Sussex), September. <https://doi.org/10.1145/2637248.2743000>
  61. Yan, L., Gan, Y., Ding, X., Wu, J., & Duan, H. (2021). The relationship between perceived stress and emotional distress during the COVID-19 outbreak: Effects of boredom proneness and coping style. *Journal of Anxiety Disorders*, 77, 102328. <https://doi.org/10.1016/j.janxdis.2020.102328>

