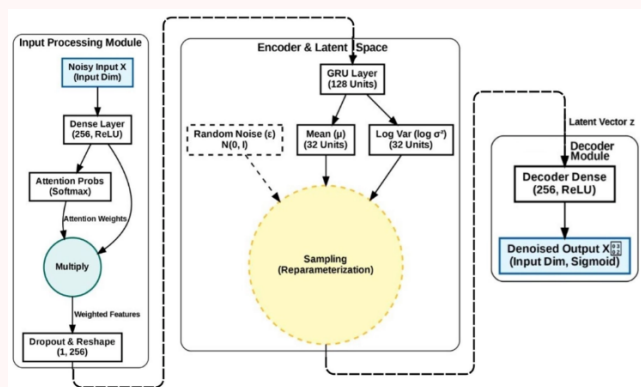


Research Bulletin

June 2026

AN AI-BASED MODEL IMPROVED STOCK PRICE PREDICTION ON BORSA İSTANBUL

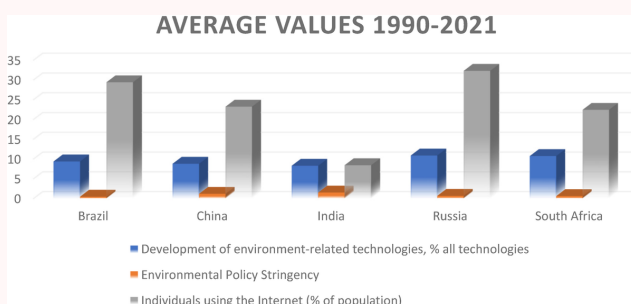
A new artificial intelligence model was developed to improve stock price prediction for companies listed on Borsa İstanbul. The approach combined an attention-based autoencoder for noise reduction with an advanced gated recurrent unit model. Tests on BIST 30 stocks showed that the proposed models achieved better trading profitability and risk-adjusted performance than conventional methods, demonstrating that noise reduction significantly improves financial forecasting accuracy.



Akkas, H., Kolukisa, B., & Bakir-Gungor, B. (2026). An attention-based autoencoder model with gated recurrent unit for stock price movement prediction. *International Journal of Computational Intelligence Systems*, 19(1), 209. <https://doi.org/10.1007/s44196-026-01250-x>

DIGITALIZATION AND GREEN INNOVATION REDUCE CARBON EMISSIONS

The factors affecting carbon emissions in the BRICS countries (Brazil, Russia, India, China, and South Africa) were analyzed for the 1990–2021 period. The results showed that digitalization, stricter environmental policies, and greater use of green energy reduced carbon emissions in both the short and long term, while economic growth increased emissions. Green innovation was also found to improve environmental quality once it exceeded a certain threshold, highlighting the importance of investing in digital technologies and environmental regulations for sustainable development.

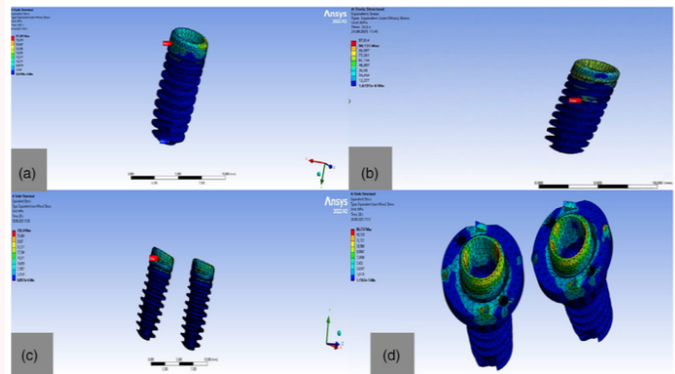


Zhang, H., Dogan, E., Khan, Z., & Binsaeed, R. H. (2024). Do digitalization and green innovation limit carbon emissions? Evidences from BRICS economies. *Energy & Environment*, 37(4), 2436–2456. <https://doi.org/10.1177/0958305X241289537>



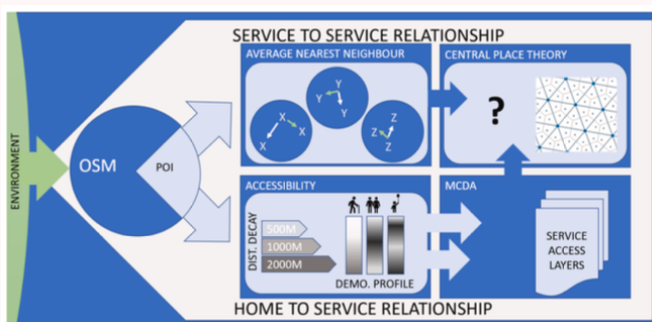
A NOVEL NUT SYSTEM WAS DEVELOPED FOR DENTAL IMPLANTS

A new nut system was developed to improve the primary stability of dental implants in patients with bone loss in the posterior maxilla. The system was evaluated through mechanical testing and finite element analysis. Implants equipped with the nut system showed significantly greater stability and a more even distribution of stress within the surrounding bone. The findings indicate promising preclinical performance, although further clinical studies are needed before routine use.



Şahin, M., Soylu, E., Demirbaş, A. E., Bal, B., & Alkan, A. (2026). A novel dental implant nut system designed to enhance primary stability: Mechanical and finite element analysis. *Journal of Prosthodontics*, 1–13. <https://doi.org/10.1111/jopr.70169>

INEQUALITIES IN ACCESS TO ESSENTIAL SERVICES WERE MAPPED ACROSS THE NETHERLANDS



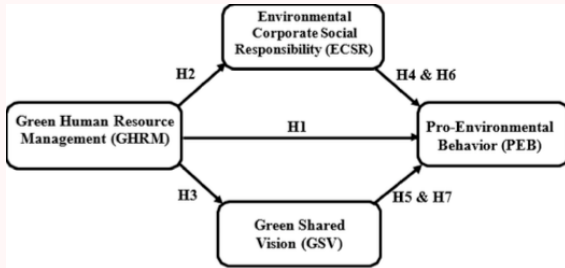
The validity of the "15-minute city" concept was evaluated at the national scale in the Netherlands. Distances from buildings to schools, grocery stores, and healthcare services were mapped and analyzed using computational methods. Access to essential services was highest in major cities such as Amsterdam, Rotterdam, and Utrecht, while rural and peripheral areas showed substantially lower accessibility. The greatest inequalities were observed among older adults relying on walking, whereas cycling significantly reduced these disparities.

Türk, U., Östh, J., Kourtiti, K., & Nijkamp, P. (2026). Spatial proximity and accessibility patterns of X-minute cities. *Journal of Urban Mobility*, 9, 100239. <https://doi.org/10.1016/j.urbmob.2026.100239>

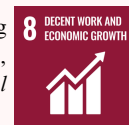


GREEN HUMAN RESOURCE PRACTICES STRENGTHEN PRO-ENVIRONMENTAL BEHAVIOR

The mechanisms influencing hotel employees' pro-environmental behavior were investigated. Survey data were collected from 449 hotel managers in Malaysia and analyzed using structural equation modeling. The findings revealed that green human resource practices directly influenced pro-environmental behavior, while this effect became stronger indirectly through employees' perceptions of environmental corporate social responsibility and a shared green vision. Employees' perception that their organization genuinely prioritizes environmental responsibility was identified as a key driver of behavioral change. The results suggest that integrating environmental values into human resource strategies can promote sustainable workplace behaviors and support the achievement of the Sustainable Development Goals.

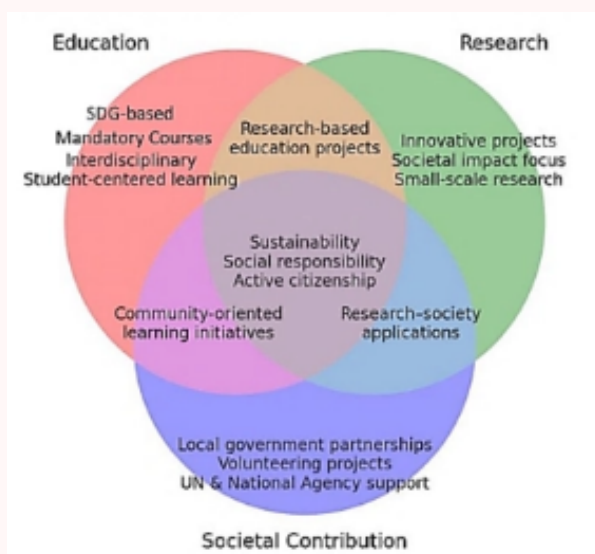


Shah, S. H. A., Bulbul, Y. E., Cobanoglu, C., Raza, G., & Rafiq, N. (2026). Driving sustainability and sustainable developmental goals in hospitality: The influence of green HRM, environmental CSR and shared green vision on pro-environmental behaviour. *International Journal of Tourism Research*, 28(3), e70375. <https://doi.org/10.1002/jtr.70375>



MANDATORY SUSTAINABILITY COURSES INCREASED STUDENT AWARENESS

The impact of mandatory university courses on the United Nations Sustainable Development Goals (SDGs) was evaluated using survey data from 325 undergraduate students. Before taking the courses, 74.5% of participants reported having no prior knowledge of the SDGs. A composite impact scale was developed to assess changes in daily life, behavior, satisfaction, and career perspectives. Female students reported significantly greater benefits than male students, suggesting that integrating sustainability into mandatory curricula can effectively strengthen sustainability awareness.



Ayten, A. M., & Gover, I. H. (2026). SDG-oriented compulsory courses in higher education: An exploratory case from Turkey. *International Journal of Sustainability in Higher Education*. Advance online publication. <https://doi.org/10.1108/IJSHE-10-2025-1315>



RESPIRATORY VIRAL INFECTIONS WERE PREDICTED USING GENE SET ENRICHMENT SCORES

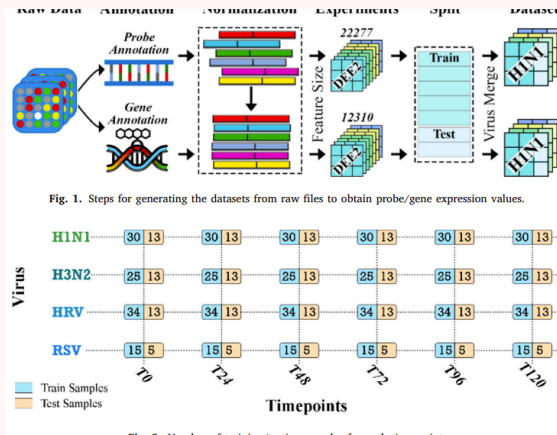


Fig. 1. Steps for generating the datasets from raw files to obtain probe/gene expression values.

Fig. 2. Number of train/test samples for each time-point.

A novel feature representation approach based on single-sample gene set enrichment analysis was developed to predict respiratory viral infections and symptom development. Enrichment scores from 36,834 gene sets were applied to gene expression data collected before and after exposure to four respiratory viruses. The proposed machine learning models outperformed the DREAM Challenge leaderboard by 17.4% in distinguishing symptomatic from asymptomatic individuals, highlighting the key role of immune-related pathways in infection prediction.

Işıık, Y. E., & Aydın, Z. (2026). Predicting respiratory infection and symptoms development using gene set enrichment scores and machine learning. *Computational Biology and Chemistry*, 124, 109147. <https://doi.org/10.1016/j.compbiolchem.2026.109147>



HOLE-MAKING PARAMETERS WERE OPTIMIZED FOR GLASS- AND BASALT-FIBER COMPOSITES

The effects of different hole-making strategies on flexural strength and delamination in S2 glass- and basalt-fiber reinforced polymer composites were experimentally compared. Four machining strategies were evaluated under different cutting conditions using Taguchi and ANOVA methods. Conventional milling increased the flexural strength of S2 glass composites by 22.2 MPa, while helical milling reduced exit-side delamination by 58.5%.

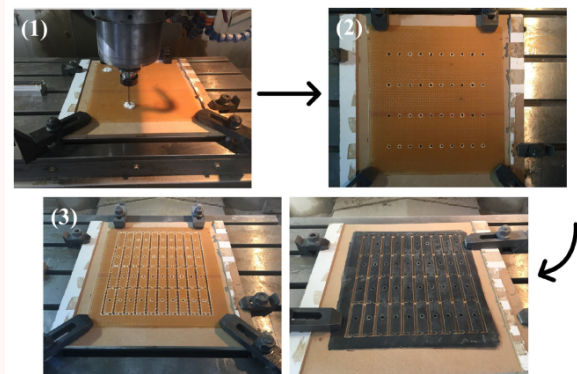


FIGURE 1 | Machining stages.

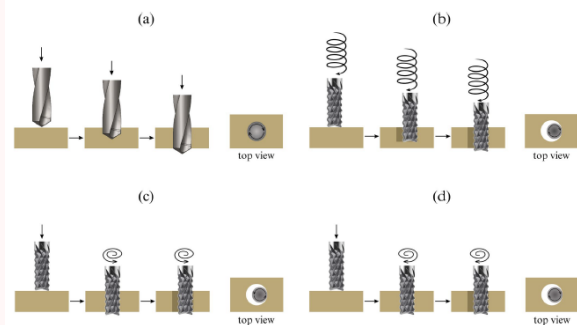
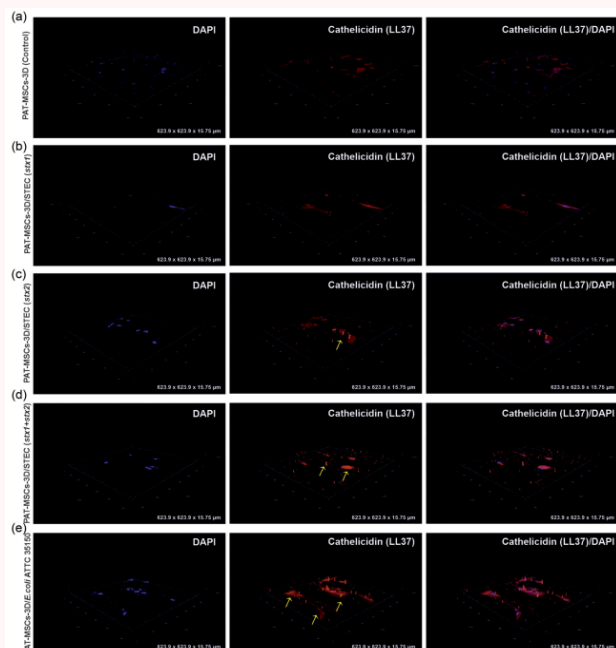


FIGURE 2 | Machining strategies (a) drilling, (b) helical milling, (c) climb milling, and (d) conventional milling.



Eltahir, S. S. A., Yilmaz, C., & Kesriklioglu, S. (2026). Experimental comparative analysis of hole-making strategies and cutting parameters on flexural properties and induced delamination in S2 glass and basalt fiber-reinforced polymers. *Polymer Composites*. <https://doi.org/10.1002/pc.71264>

STEM CELLS CULTURED IN A 3D SYSTEM WERE FOUND TO BE MORE EFFECTIVE AGAINST *E. coli*



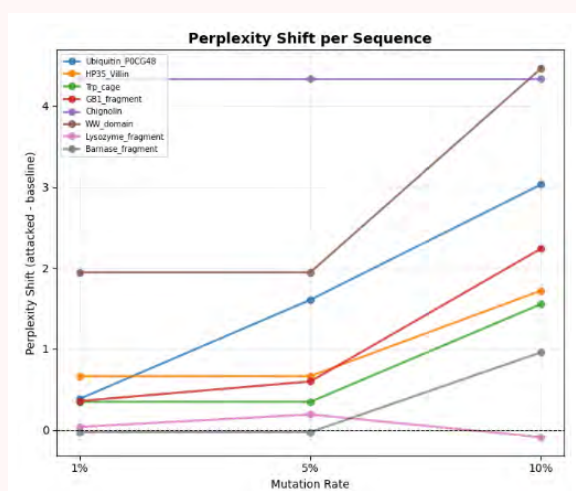
The antibacterial activity of mesenchymal stem cells derived from palatal adipose tissue against Shiga toxin-producing *Escherichia coli* O157:H7 was investigated in vitro. The cells were cultured in both conventional two-dimensional and three-dimensional nanofibrillar cellulose hydrogel systems. Stem cells grown in the 3D culture suppressed all tested bacterial strains, achieving reductions of up to 6–7 log units under specific conditions. The 3D system also significantly increased the expression of the antimicrobial peptide LL-37.

Bicer, M., Öztürk, E., Sener, F., Türkyılmaz, S., & Fidan, Ö. (2026). Three-dimensional culture enhances the antimicrobial activity of mesenchymal stem cells against Shiga toxin-producing *Escherichia coli* O157:H7 in vitro. *Journal of Applied Microbiology*, 137(5), 1xag118. <https://doi.org/10.1093/jambio/1xag118>



THE ROBUSTNESS OF PROTEIN LANGUAGE MODELS AGAINST ADVERSARIAL ATTACKS WAS SYSTEMATICALLY EVALUATED FOR THE FIRST TIME

The robustness of the ESM-2 protein language model against adversarial attacks was evaluated by introducing random amino acid substitutions into eight protein sequences. Mutation rates of 1%, 5%, and 10% increased sequence uncertainty by an average of 9.9%, 11.9%, and 23.5%, respectively, reaching up to 66.6% for individual sequences. The findings highlight the need to update international biosecurity regulations to address AI-driven protein design.



Niloy, M. R. I., Aydin, Z., & Moazzam, M. G. (2026). Probing adversarial robustness of protein language models: A reproducible case study of ESM-2 under substitution-based attacks. *AIUB Journal of Science and Engineering*, 24(2), 141–149. <https://doi.org/10.53799/gteskx50>

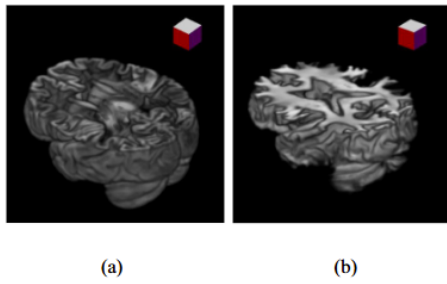


FIGURE 1 | Segmentation output of (a) white matter and (b) grey matter of an AD patient.

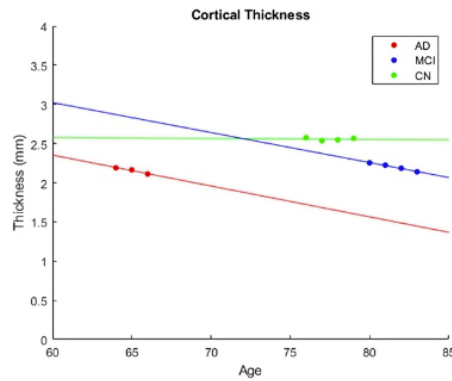


FIGURE 2 | An example of fitted lines for one patient from CN, AD, and MCI group according to their cortical thicknesses.

ALZHEIMER'S DISEASE WAS CLASSIFIED FROM MRI IMAGES WITH HIGH ACCURACY USING DEEP LEARNING

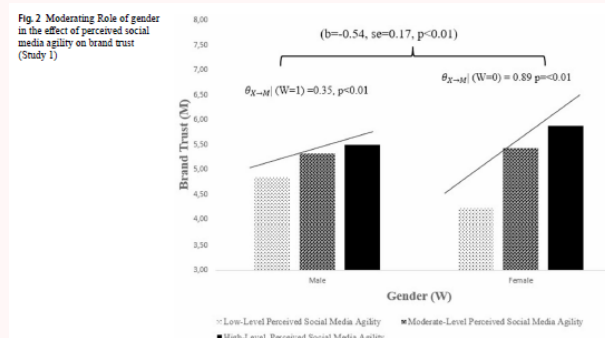
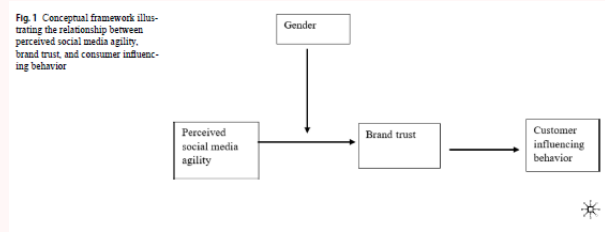
A two-stage framework was developed for the automated classification of Alzheimer's disease from MRI images. In the first stage, brain volume change slopes were used as input features for machine learning classifiers, with the Random Forest model distinguishing patients with Alzheimer's disease from healthy individuals with an accuracy of 82.5%. In the second stage, a deep learning model combining 3D ResNet-101 and LSTM networks was trained on longitudinal annual MRI sequences. This hybrid approach achieved an accuracy of 96.7% in differentiating individuals with Alzheimer's disease from healthy controls.

Dundar, M. S., & Yilmaz, B. (2026). Time distributed classification of Alzheimer's disease on MRI scans. *NMR in Biomedicine*, 39(7), e70322. <https://doi.org/10.1002/nbm.70322>



GENDER WAS FOUND TO MODERATE THE EFFECT OF SOCIAL MEDIA AGILITY ON BRAND TRUST

The impact of perceived brand social media agility on consumer behavior was examined using two independent samples. The first study included 165 young participants, while the second involved 178 adults. The findings showed that perceived social media agility enhanced brand trust, which in turn mediated consumers' willingness to influence others. Gender was tested as a moderating variable, and the results indicated that these effects were significantly stronger among women than among men in both samples.



Bozkurt, S., Sarp, S., Gligor, D., & Hollebeek, L. D. (2026). From agility to advocacy: Exploring how gender moderates the impact of social media agility on brand trust and influencing behavior. *Journal of Marketing Analytics*. <https://doi.org/10.1057/s41270-026-00484-0>

A MACHINE LEARNING–BASED PREDICTION MODEL WAS DEVELOPED FOR MANGANESE-BEARING IRON ORE

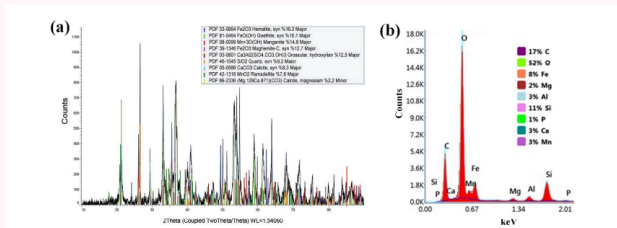


Figure 1. (a) XRD pattern and (b) EDX spectrum of the manganiferous iron ore.

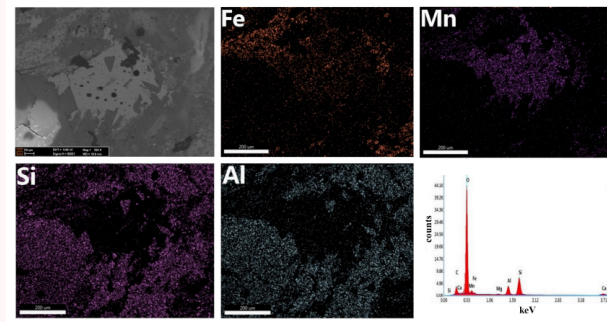


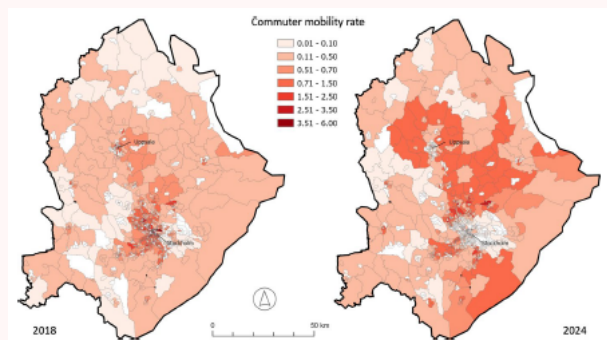
Figure 2. SEM image and corresponding EDS elemental maps of the manganiferous iron ore.

Kuzu, E., Top, S., Kursunoglu, S., & Altiner, M. (2026). Predictive modeling and SHAP-based interpretability of manganese and iron dissolution in multi-acid leaching systems using hybrid machine learning. *Processes*, 14(11), 1716. <https://doi.org/10.3390/pr14111716>



COMMUTING MOBILITY IN STOCKHOLM WAS MODELED USING MOBILE PHONE DATA

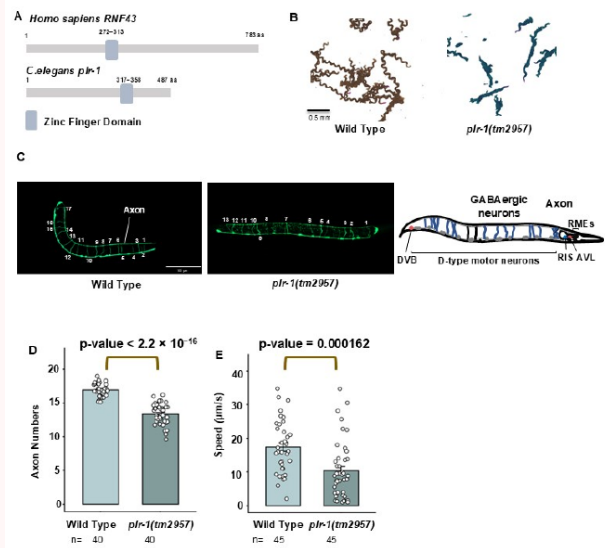
The sociodemographic and socioeconomic determinants of interregional commuting mobility in the Greater Stockholm region were investigated using mobile phone–derived data. A balanced panel dataset covering 675 regions over the 2018–2023 period was analyzed using a Bayesian spatial Durbin model. The results showed that the indirect spatial spillover effects of educational attainment and vehicle ownership on commuting mobility were greater than their direct within-region effects. The findings suggest that evaluating only direct effects would systematically underestimate the true impact of policy interventions.



Toger, M., Türk, U., Östh, J., & Fischer, M. M. (2026). Modeling commuter mobility in Stockholm: a spatial panel approach using mobile phone data. *Letters in Spatial and Resource Sciences*, 19, 15. <https://doi.org/10.1007/s12076-026-00441-6>

LOSS OF THE RNF43 GENE WAS MODELED AS A NEURODEVELOPMENTAL DISORDER

A patient carrying a homozygous RNF43 gene variant associated with neurodevelopmental disorders was identified. The functional consequences of this variant were investigated using the model organism *Caenorhabditis elegans*. Loss of function of *plr-1*, the worm ortholog of RNF43, resulted in disrupted GABAergic neuron axon organization, reduced locomotion speed, and impaired developmental growth. These findings expand the phenotypic spectrum associated with RNF43 and provide further evidence for its important role in neurodevelopment.



Sonmez, K., Güzel, S., Kazan, H. H., Ekim, B., Kaya, C., Turkyilmaz, Z., Karabulut, R., & Ergun, M. A. (2026). Functional characterization of loss of RNF43 reveals neuronal defects in a *Caenorhabditis elegans* model. *International Journal of Molecular Sciences*, 27(10), 4509. <https://doi.org/10.3390/ijms27104509>



A WIND TURBINE TOWER MADE FROM RECYCLED PLASTIC WAS DEVELOPED AND FIELD-TESTED

A novel composite system consisting of recycled thermoplastic material reinforced with steel bars was developed as an alternative to conventional steel wind turbine towers. The mechanical properties of the material were determined experimentally, with a compressive strength of approximately 32 MPa and a tensile strength of 7.8 MPa. An analytical model was validated through three-point bending tests. An 8-meter full-scale tower was then fabricated and tested under natural wind loading. The results showed that the composite tower exhibited a first natural frequency comparable to that of a conventional steel tower, while demonstrating superior damping characteristics.



Ciftci, C., & Altıkaya, H. T. (2026). A steel-reinforced recycled thermoplastic composite for wind turbine towers: Experimental and full-scale validation. *Journal of Composites Science*, 10(5), 275. <https://doi.org/10.3390/jcs10050275>

MOBILITY (ACTIVATION) IMPROVES LIFE SATISFACTION IN DEPRESSION

The roles of behavioral activation and avoidance in the relationship between depression and life satisfaction were examined in a study of 440 young adults. Higher levels of depression were associated with lower life satisfaction, with both activation and avoidance acting as mediating factors. Behavioral activation had a significantly stronger positive effect on life satisfaction than avoidance, while depression reduced activation and increased avoidance. The findings suggest that encouraging daily activity and reducing avoidance behaviors may improve life satisfaction and help alleviate depressive symptoms.

Koşan, Y., & Kaya, M. S. (2026). Activation and avoidance mediate the relationship between depression and life satisfaction: Insights from behavioral activation therapy. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 44, 31. <https://doi.org/10.1007/s10942-026-00666-w>

