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## Abstracts

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## Metacognitive training for older adults with depressive symptoms in Portugal: A pilot study

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**Keywords:** Depression; Metacognitive Training; Older Adults; Pilot Study; Portugal.

**Objective:** We carried out a pilot study of Metacognitive training for older adults (MCT-Silver) in the Portuguese population, assessing the effectiveness of MCT-Silver and its effects on depressive symptoms, metacognitive beliefs, perceived quality of life, ruminative responses, self-esteem and dysfunctional attitudes, as well as the acceptability and satisfaction of the participants with the intervention by filling in a questionnaire.

**Methods:** Eight 60-minute group sessions were held. Twenty-nine participants were divided into three groups. The sessions addressed biases, cognitive distortions, behaviors, and metacognitive beliefs common in information processing in older adults with depressive symptoms. All content is supported by studies linking these processes to depressive symptoms and depression. Blind evaluations were carried out at baseline (moment 0) and after the intervention (moment 1). The inclusion criteria were age 60 or over, no cognitive impairment and a Beck Depression Inventory (BDI-II) score of 14 or over, which indicates mild depression. The instruments used were the BDI-II to assess depressive symptoms, the PHQ-9 to assess the severity of depressive symptoms, the MCQ-30 to assess metacognitive beliefs, the WHOQOL-Bref item 1 to assess global perception of quality of life, the ERR-10 to assess ruminative responses, the Rosenberg self-esteem scale to assess self-esteem, and the DAS-18B to assess dysfunctional attitudes.

**Results:** After the intervention, the participants experienced significant improvements in depressive symptomatology. A statistically significant reduction in metacognitive beliefs was found both in the total mean score of the MCQ-30 and in the score of the three subscales assessed. Participants' overall perception of quality of life increased significantly. There was an average decrease in ruminative responses and an average decrease in ERR-10 scores, both in the overall score and in the factors assessed. There was a tendency for participants' self-esteem to improve after the intervention. In dysfunctional attitudes, there was a significant decrease in the total score of the DAS-18B as well as in the subscales evaluated. The intervention was evaluated very positively by the participants through a questionnaire assessing acceptability and satisfaction.

**Conclusions:** Our results were encouraging and suggest that MCT-Silver is effective in older people with depressive symptoms. However, more detailed studies are needed to confirm the effectiveness of this intervention, namely RCTs.

## Depressive symptoms, suicidal ideation and positive ideation: The mediation effect of unbearable psychache

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**Keywords:** Depressive Symptoms; Suicidal Ideation; Positive Ideation; Unbearable Psychache.

**Objective:** The aim of the present study is to test the relationship between depressive symptoms and high levels of suicidal ideation, as well as low levels of positive ideation (protective ideation against more severe suicidal behaviors). Additionally, the study aims to test the mediating effect of psychache and unbearable psychache.

**Methods:** A sample of 334 young adults, university students from the University of Évora, mostly female (79.6%), aged between 18 and 25 years ( $M = 20.25$ ;  $SD = 1.99$ ), mostly undergraduate students ( $N = 247$ ; 74%), and non-working students ( $N = 285$ ; 85.3%), participated in the. Participants responded to an online research protocol via the LimeSurvey platform at the end of 2022. Several measures were used: the Depression Anxiety Stress Scales, Psychache Scale and Positive and Negative suicide Ideation Inventory. A mediation model was tested by path analysis using Structural Equation Modeling (SEM), introducing depressive symptoms as an exogenous independent variable, along with demographic variables that correlated with suicidal ideation or positive ideation as exogenous covariates. The variables psychache and unbearable psychache were included as mediating variables, and suicidal ideation and positive ideation as endogenous dependent variables.

**Results:** The results show a partial mediating effect of the variable unbearable psychache in the relationship between depressive symptoms and both positive ideation and suicidal ideation. The model explains 62% of the variance in positive ideation and 51% of the variance in suicidal ideation.

**Conclusions:** The variable unbearable psychache may help explaining why the presence of depressive symptoms contributes to higher levels of suicidal ideation and, at the same time, lower levels of positive ideation. According to the results, the presence of depressive symptoms increases the experience of unbearable psychache, which in turn leads to higher levels of suicidal ideation and lower levels of protective ideation against more severe suicidal behaviors.

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## Beyond Care: Family Health Nursing as a Promoter of Family Resilience and Coping; a Systematic Literature Review

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**Keywords:** Caregivers; Coping; Elderly; Family; Family Nursing Centered Care; Resilience.

**Objective:** This review aimed to map the scientific literature on family-centered nursing interventions and their association with promoting resilience and coping in informal caregivers and families, highlighting their critical role in addressing the increasing burden on caregivers within the global aging population, enhancing the quality of life for dependent elderly individuals, caregivers, and the entire family unit.

**Methods:** Following PRISMA 2020 guidelines, this systematic literature review included studies published between March 2015 and March 2025, in English, Portuguese, French, and German. Databases consulted were CINAHL, MEDLINE, Scopus, Web of Science, and Psychology and Behavioral Sciences Collection. Methodological quality was assessed using Joanna Briggs Institute (JBI) tools, and data synthesis employed a metanarrative approach to integrate diverse epistemological and methodological perspectives.

**Results:** Seven studies were included: one systematic review, two scoping reviews, two qualitative studies, one quantitative study, and one opinion article. Interventions like psychoeducation, mindfulness, and cognitive-behavioral therapy (CBT) promoted emotional regulation, reduced caregiver burden, and strengthened relational resilience, positively impacting the care recipient's quality of life. The metanarrative identified four themes: (1) Meaning-making through adversity: Benefit Finding and Posttraumatic Growth (PTG); (2) Relational and contextual mediation of resilience: Family dynamics and interactions with health professionals; (3) Transformative potential of psychosocial nursing interventions: From technical to relational practice; and (4) The relationship between informal caregiver resilience and the care recipient's quality of life, mediated by coping and psychosocial interventions.

**Conclusions:** Family-centered nursing interventions significantly enhance the psychosocial well-being and adaptive capacities of caregivers and families. These findings underscore their importance for health system sustainability and improved quality of life in long-term care settings. Future longitudinal, methodologically robust, and culturally sensitive studies are needed to generalize these findings.

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## Empowering Citizens to Spontaneous Report of Suspected Adverse Drug Reactions - Interventions and Impact – a Systematic Literature Review

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**Keywords:** Effective; Pharmacovigilance; Population; Strategy; Underreporting.

**Objective:** To carry out a systematic literature review to identify, describe and characterize the existing interventions implemented to empower citizens to spontaneously report adverse drug reactions (ADR), and to select the most effective at international level.

**Methods:** The construction of the structured research question followed a methodological approach, according to the acronym PICO. The search expression was applied in PubMed, Web of Science and Scopus databases. This protocol follows the PRISMA guidelines and has been registered in the PROSPERO database (2025CRD42025645431).

**Results:** Of the 3843 studies obtained from the three databases after removing duplicates, 15 studies were included that described and evaluated interventions designed to empower citizens to spontaneously report ADR. Most of the interventions were aimed at the public (n = 7), including patients, parents of children, teachers and citizens in general; users supported by pharmacists (n = 5) and by doctors (n = 3). About 73% (n = 11) of the included studies showed an increase in the number of ADR notifications after the intervention, while four showed a positive impact on the knowledge, attitude and perception of participants. Interventions using digital technologies and pharmacist-led interventions that provide practical education to citizens have proven particularly effective, reinforcing the central role of education in improving pharmacovigilance. However, the methods and metrics used to assess effectiveness were highly heterogeneous, which limited direct comparisons.

**Conclusions:** Most of the interventions analyzed were effective in empowering citizens to spontaneously report ADR. These findings highlight the importance of investing in structured educational approaches to foster a culture of active pharmacovigilance among the general population. To the best of current knowledge, this is the first systematic review focused exclusively on empowering the public, rather than healthcare professionals. The results are expected to have significant implications for clinical practice and to contribute to more up-to-date recommendations for addressing underreporting of ADRs by the public.

## Benefits of Physical Activity in Menopause: Scoping Review

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**Keywords:** Menopause; Physical Activity; Woman; Women's Health.

**Objective:** To map and synthesize the existing evidence on the benefits of physical activity during menopause, highlighting the main authors and studies in the area.

**Methods:** A scoping review was conducted using the CINAHL, MEDLINE and Cochrane databases of the EBSCO host platform. Full-text articles with available references published in the last two years in Portuguese, English and Spanish were included. The PRISMA guidelines were followed in the process of serializing the studies.

**Results:** A sample of 14 studies showed that physical activity is effective in improving body composition and reducing vasomotor symptoms, bringing benefits to the mental health of women in menopause. Aerobic and resistance exercise programs contribute to bone and cardiovascular health, in addition to reducing the risk of depression. The practice of yoga and breathing exercises has shown proven benefits in reducing anxiety, insomnia and mood swings during menopause. In addition, regular physical activity helps maintain body weight, improves bone density and promotes a greater sense of well-being. Combined aerobic, resistance and stretching exercise programs demonstrate improvements in quality of life in women at this stage.

**Conclusions:** The literature consistently demonstrates that physical activity is an effective strategy for promoting physical and mental health during menopause. There is robust evidence that this practice contributes to maintaining bone density, improving cardiovascular profile, reducing vasomotor symptoms, anxiety, depression, and, in general, improving quality of life.

## Midwives/Nurse Midwives' autonomy experience in care for labouring women in health facilities – preliminary results of a Systematic Review with Meta-Synthesis

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**Keywords:** Life Change Events; Midwifery; Obstetric Nurse; Professional Autonomy; Qualitative Research.

**Objective:** To gather scientific evidence regarding the lived experience of midwives/nurse midwives in the autonomous care of women in labour in healthcare facilities.

**Methods:** Systematic review with meta-synthesis, according to the Joanna Briggs Institute methodology, conducted by meta-aggregation. Scientific evidence was analysed in primary studies published between 2016/2024 in English, French, Spanish and Portuguese. The search strategy followed the PICo acronym, with the question "What are the experiences and perceptions of midwives/nurse midwives regarding autonomy in the care of women in labour in health units? The search was conducted in the EBSCOhost (CINAHL Ultimate, MEDLINE Ultimate, Academic select references. The study selection process was based on the PRISMA-P flowchart. The Search Complete), LILACS, PubMed, Wiley, Scopus and Web of Science databases. We used the Boolean search strategy (((((nurse midwi\*) OR nurse-midwi\*) OR midwi\*) OR obstetric nurs\*)) AND (((((life change event\*) OR (life experience)) OR (experience)) OR (perception)) OR (autonomy)) OR (professional autonomy)) OR (professionalism)) OR (professional self regulation))) AND (((((parturition OR intrapartum care) OR childbirth) OR obstetric delivery) OR obstetric labor) OR labour)). Rayyan software was used to collect, organise and studies were evaluated for their rigour using critical appraisal instruments from the Joanna Briggs Institute (QARI and ConQual). A total of 2929 articles were found. After removing duplicates, 1701 remained for reading the title and abstract, of which 31 were eligible for full-text reading. Registration in PROSPERO CRD42024572542.

**Results:** Final sample of 16 articles for analysis, meeting the eligibility and methodological quality criteria. After data synthesis, the results were presented in a table and grouped according to the Joanna Briggs Institute's meta-aggregative approach. Three thematic axes emerged from the findings: 1) Safe and confident context, 2) Being and feeling a midwife, 3) Knowing by doing. The themes generated the meta-theme: Midwifery care: a safe field of childbirth.

**Conclusions:** Towards the end of the study, everything supports the idea that midwives/nurse midwives, by 'being and doing' expression of their autonomy, promote safe and confident care for women in labour, advocate the philosophy of physiological birth with scientific knowledge, competence and responsibility, transforming childbirth into a field of unique care and protection.

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### High-Intensity Interval Training in High School Physical Education to Promote Adolescent Fitness: A Randomized Controlled Trial

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**Keywords:** Health; Cardiorespiratory Fitness; Muscular Fitness; Body Composition.

**Objective:** This study aims to investigate whether 16 weeks of High-Intensity Interval Training (HIIT) implemented on Physical Education classes (PEC), can improve physical fitness in high-school adolescents, with a specific focus on gender differences.

**Methods:** This study was a two-arm randomized controlled trial design with adolescents (15-17 years). Twelve classes were randomized to either a 16 weeks of HIIT (HIIT-G, n = 106 students) implemented on PEC warm-up or a control group (CG, n = 123 students) of usual PEC warm-up. The HIIT sessions ranged from 14 to 20 all-out bouts intervals, adopting a 2:1 work-to-rest ratio.

**Results:** Post-intervention measures revealed a significant difference between groups in CRF and girls from HIIT-G increased their cardiorespiratory fitness (CRF) with significant difference between female groups and a medium to large effect size.

**Conclusions:** The main findings from this study indicate that brief whole-body HIIT of an extremely low volume, over 16 weeks, can improve CRF in adolescent girls.

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### Tributyltin at Nanomolar Levels Impairs Antioxidant Capacity and Alters the Expression of Sirtuins 1, 3 and PGC1-alpha in ex vivo cultured rat Sertoli Cells

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**Keywords:** Male Fertility; Mitochondrial Function; Obesogens; Sertoli Cells; Tributyltin.

**Objective:** Obesogens are environmental pollutants promoting weight gain and metabolic disturbances. Among them, tributyltin (TBT) is a prototypical obesogen with well-documented detrimental effects on male reproductive health. Within the testes, Sertoli cells (SCs) are essential in supporting spermatogenesis and are considered sensitive targets of reproductive toxicity. This study aimed to evaluate whether TBT induces oxidative stress in rat SCs by disrupting the regulatory pathway involving sirtuin 1 (SIRT1), sirtuin 3 (SIRT3), and peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC1- $\alpha$ ), potentially leading to mitochondrial dysfunction.

**Methods:** SCs were cultured during 24 hours in three groups: two in the presence of TBT, at concentrations of 0.1 nM and 10 nM, and one in the absence of TBT (control). Protein levels of SIRT1, SIRT3, and PGC1- $\alpha$  were assessed using Slot-Blot analysis. Antioxidant capacity was evaluated through the ferric reducing antioxidant power assay and enzymatic activities of glutathione peroxidase (GPx) and glutathione reductase (GR). Statistical significance was evaluated by one-way ANOVA, followed by Tukey post-test using GraphPad Prism 10.

**Results:** SIRT3 expression was reduced by 19% and 24% in Sertoli cells (SCs) following exposure to 10 nM and 0.1 nM tributyltin (TBT), respectively, whereas the levels of SIRT1 and PGC1- $\alpha$  remained unaltered. Antioxidant capacity in SCs exposed to 10 nM TBT decreased by 45% compared to the control group. Similarly, SCs treated with 0.1 nM TBT exhibited a 47% reduction in antioxidant capacity relative to controls. Glutathione reductase (GR) activity increased significantly in SCs, with a 135% elevation observed at 0.1 nM TBT and a 278% increase at 10 nM TBT when compared to control. In contrast, glutathione peroxidase (GPx) activity exhibited a non-significant upward trend.

**Conclusions:** These findings suggest that even nanomolar concentrations of TBT can disrupt redox homeostasis and sirtuin-mediated regulation in SCs, potentially contributing to oxidative stress and impaired male fertility.

## Tributyltin-Induced Disruption of Acetylation-Related Proteins and Epigenetic Regulation in Sertoli Cells

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**Keywords:** Acetylation; Epigenetic; Obesogens; PGC-1 $\alpha$ ; Tributyltin.

**Objective:** Acetylation-related proteins like CREB-binding protein (CBP), general control non-depressible 5 (GCN5), and P300/CBP-associated factor (PCAF) are critical for chromatin remodeling and transcriptional regulation, particularly affecting the expression of peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1 $\alpha$ ). This study examines how exposure to the environmental obesogen tributyltin (TBT) affects the expression of these key proteins in rat Sertoli cells (SCs), providing insight into potential epigenetic disruptions. TBT is a persistent organotin compound used in antifouling paints, plastics, wood preservatives, and agriculture. Human exposure occurs mainly through contaminated seafood, water, and dust.

**Methods:** SCs were exposed for 24 hours to TBT at concentrations of 0.1 nM (sub-toxic), 10 nM, or vehicle control. We assessed protein levels of CBP, GCN5 and PCAF using Slot-Blot analysis.

**Results:** Following exposure to 10 nM TBT, SCs exhibited an 8% increase in acetylated CBP (A-CBP) expression and a significant 50% reduction in total CBP levels, suggesting a disruption in the equilibrium of chromatin-modifying functions. In contrast, 0.1 nM TBT led to a modest 5% reduction in A-CBP and a 39% decrease in CBP expression, with both changes trending toward significance. GCN5 expression, a major histone acetyltransferase involved in gene activation, was markedly elevated (75%) at 10 nM TBT exposure, indicating a compensatory or stress-induced regulatory mechanism. Conversely, 0.1 nM TBT resulted in a slight, non-significant downregulation (10%) of GCN5. PCAF expression, another critical acetyltransferase and transcriptional coactivator, was reduced by 16% at 10 nM TBT and increased by 26% at 0.1 nM, with both changes showing near-significant trends.

**Conclusions:** TBT alters the expression of acetylation-regulating proteins in a dose-dependent manner, potentially disturbing the epigenetic regulation of genes like PGC-1 $\alpha$ . These findings suggest that environmental toxicants such as TBT may impair Sertoli cell function and male reproductive health by modulating the epigenetic landscape.

## Hospital admissions of children under 5 years old in Portugal (june 2010 – july 2021)

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**Keywords:** Children; Cohort Studies; Pediatric Hospitalizations.

**Objective:** Pediatric hospitalizations are an indicator of child morbidity. In 2020, a 29% decrease was recorded among children under 5 in public hospitals, yet long-term trends in Portugal remain underreported. This study explores pediatric admissions between July 1, 2010, and June 30, 2021, examining their frequency, duration, main causes, and distribution by sex, age, and region.

**Methods:** A historical cohort study including all children born in Portugal during the study period with hospitalizations in public hospitals. Children were followed until age 5 or the end of the study. Demographic and clinical data were analyzed. Time at risk was calculated based on days of life until hospitalization, end of follow-up, or both. Statistical analysis included descriptive measures and inferential tests.

**Results:** Between July 2010 and June 2021, 543,154 hospitalizations were recorded among 395,873 children under 5 in Portugal, averaging 1.4 hospitalizations per child. Admissions increased over time, especially in winter. Most occurred in the perinatal period (85%) and among infants under 1 year (1.4 per child). Boys accounted for 53% of cases and had slightly higher rates than girls (1.4 vs. 1.3;  $p < 0.01$ ). Lisbon (25.2%) and Porto (13.8%) recorded the highest numbers of hospitalizations, while Vila Real (1.58) and Évora (1.51) had the highest averages per child. The leading causes were perinatal conditions (56%), external causes (18.8%), congenital anomalies (6.9%), and respiratory diseases (4.9%), the latter more common in boys (5.1%) and in children under one (36.7%). The average hospital stay was 4.8 days, longer in neonates (7.5 days) and for eye diseases (26.7 days). Each child was at risk for an average of 2.19 days (SD = 1.05). The overall incidence rate was 0.62 hospitalizations per 1,000 days of life, or 0.23 per child-year.

**Conclusions:** Analyzing pediatric hospitalizations helps identify morbidity patterns and guides prevention strategies and pediatric healthcare planning.

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## The Progressive Power Program (PPP) for Weight Management Health: Study Protocol for a Controlled Trial in adults living with overweight and obesity

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**Keywords:** Obesity; Exercise Therapy; High-Intensity Interval Training; Clinical Protocols; Behavioural Intervention.

**Objective:** This study aimed to evaluate the efficacy of a 12-week Progressive Power Program (PPP), which combined High-Intensity Interval Training (HIIT), High-Intensity Functional Training (HIFT), and Moderate-Intensity Continuous Training (MICT) on anthropometric, and behavioral outcomes in adults living with overweight and obesity. The study also examined the feasibility of implementing the program in both face-to-face and online formats.

**Methods:** This randomised controlled study was conducted in Évora, Portugal, and included 36 adults living with overweight and obesity (mean age:  $41.7 \pm 9.7$  years; mean weight:  $90.11 \pm 13.05$  kg for males and  $82.00 \pm 11.68$  kg for females). Participants were randomly allocated to three groups: face-to-face (n = 12), online (n = 12), and control (n = 12). These 36 individuals were selected from a larger sample of 180 adults (72 males and 108 females). The intervention consisted of three 50min sessions per week over 12 weeks. Training intensity was monitored via heart rate using Polar M430 devices. Assessments included body composition, visceral fat index, blood pressure, handgrip strength, phase angle (via bio-impedance), heart rate variability (HRV), dietary intake, and body image perception. Repeated measures ANOVA and mixed-model ANOVA were used for statistical analysis. This study was registered in the ISRCTN database <https://doi.org/10.1186/ISRCTN15820243>

**Results:** The face-to-face group showed greater reductions in body weight ( $-7.63 \pm 2.23$  kg) compared to the online group ( $-5.40 \pm 0.17$  kg;  $p < 0.001$ ). Phase angle improved similarly in both groups ( $+0.18 \pm 0.40$  vs.  $+0.16 \pm 0.27$ ), as did visceral fat index ( $-1.67 \pm 3.20$  vs.  $-1.17 \pm 0.72$ ). HRV total power increased in the online group ( $+419 \pm 1125$  ms<sup>2</sup>) but decreased in the face-to-face group ( $-1877 \pm 12326$  ms<sup>2</sup>). Women showed slightly greater improvements in phase angle and visceral fat than men. Both intervention formats were feasible, with high adherence and no adverse events.

**Conclusions:** The PPP is an effective and scalable intervention that improves physiological and behavioral outcomes in overweight and obese adults. Its implementation in both face-to-face and online formats supports its applicability in diverse public health contexts.

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## Development, Validation, and Reliability of RSEFisio: A Methodological Study

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**Keywords:** Electronic Health Records; Validity and Reliability Instrument; Physiotherapy.

**Objective:** The continuous evaluation and improvement of electronic health records (EHRs) are essential, given their critical role as data sources for artificial intelligence (AI) applications. Concerns about the implementation and quality of data produced by EHRs have been increasing. Instruments capable of assessing and monitoring EHRs are therefore necessary. This study aims to develop and test the validity and reliability of the RSEFisio instrument in the context of physiotherapy practice.

**Methods:** This methodological study was conducted in three phases. The first phase involved developing the questionnaire through a comprehensive literature review and expert validation. The second phase included a pilot test which was used to preliminarily evaluate the questionnaire. The final phase assessed the instrument's validity and reliability. The sample included 122 physical therapists.

**Results:** Regarding the conceptualization of the instrument, five relevant dimensions were identified: (1) experience with EHRs, (2) digital literacy of the physiotherapists, (3) information contained in EHRs, (4) relevance of EHRs, and (5) intention to use EHRs. Internal consistency, measured by Cronbach's alpha, ranged from 0.614 to 0.917, confirming the instrument's reliability. Reproducibility of the items demonstrated fair to excellent agreement, the reproducibility of the dimensions was confirmed with intraclass correlation coefficient values ranging from 0.737 to 0.878. Regarding convergent validity, the first hypothesis was not supported ( $\rho = 0.150$ ), but the subsequent three hypotheses were confirmed ( $\rho = 0.521, 0.374$ , and  $0.361$ ;  $p < 0.01$ ).

**Conclusions:** This study addresses a significant gap in the literature by developing and validating the RSEFisio instrument, designed to evaluate physiotherapists' use of EHRs, their relevance, and intention to adopt the EHR technology. Notwithstanding the heterogeneity among RSE systems, this instrument provides a reference framework to facilitate the integration of EHRs and enhance their utility for advanced clinical practices and AI-supported digital tools in physiotherapy.

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## Incremental Impact of Depressive Symptoms on Quality-of-Life Domains in Portuguese Long-Term Care

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**Keywords:** Functional Profile; Multimorbidity; Older Adults; Long-Term Care; Depressive Symptoms.

**Objective:** To identify sociodemographic and clinical predictors of quality of life (QoL) and to quantify the incremental contribution of depressive symptoms beyond functional status and covariates in older adults in long-term care (LTC).

**Methods:** Cross-sectional study of 233 older adults in LTC in Portugal (mean age  $85.3 \pm 6.0$  years; 66.5% women). QoL was measured with the WHOQOL-Bref; functional status with the Elderly Nursing Core Set; depressive symptoms with the PHQ-9; cognition with the MMSE. Hierarchical multiple linear regression was run for each QoL domain (Block 1: functional status, age, sex, education, marital status, MMSE, cardiometabolic multimorbidity; Block 2: PHQ-9) using HC3 robust errors ( $\alpha = 0.05$ ).

**Results:** Adding PHQ-9 markedly improved model fit ( $\Delta\text{Adj-R}^2 = +0.170$  Physical;  $+0.281$  Psychological). Final models explained 33% (Physical), 34% (Psychological), 7% (Social) and 19% (Environmental) of variance. Each one-point increase in PHQ-9 reduced Physical QoL by 1.7 points and Psychological QoL by 2.1 points, remaining the strongest negative predictor; it also affected Environmental QoL (-0.4 points). Functional impairment independently predicted poorer Physical ( $\beta = -0.27$ ), Social ( $\beta = -0.22$ ) and Environmental QoL ( $\beta = -0.34$ ). Higher formal education predicted better QoL across domains ( $\beta = 0.16-0.25$ ), while female sex predicted worse Physical ( $\beta = -0.19$ ) and Psychological QoL ( $\beta = -0.16$ ). Age was positively associated only with Environmental QoL ( $\beta = 0.17$ ). No interaction terms were significant.

**Conclusions:** Depressive symptoms account for a substantial share of QoL variance and eclipse the direct effect of functional status on psychological well-being in older adults in LTC. Routine screening and treatment of depression, alongside interventions that preserve functioning and promote educational engagement, could meaningfully improve QoL in this population.

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## Childhood Tuberculosis Surveillance in Mozambique: District Performance and Case Notification Challenges (2023–2024)

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**Keywords:** Childhood Tuberculosis; Health System Performance; Mozambique.

**Objective:** Childhood tuberculosis (TB), affecting children up to 14 years of age, remains a significant challenge in low-income, high-burden settings. Early diagnosis and integrated health services are essential for effective control. In Gaza Province, Mozambique, disparities in case notification among districts may reflect inequalities in access to care, diagnostic capacity, and programmatic management of the disease. This study aims to compare childhood TB cases notified across the province's districts between 2023 and 2024.

**Methods:** A descriptive cross-sectional observational study based on secondary data extracted from the Health Information System for Monitoring and Evaluation (SISMA). The analysis included expected notification cases, and the percentage of target achievement for each of the 14 districts in Gaza Province, as well as the provincial total. The percentage variation between the two years was also calculated to identify trends and potential disparities among districts.

**Results:** In 2024, 982 childhood TB cases were notified in Gaza Province, representing a slight decrease compared to 993 cases in 2023. The target achievement rate was 80% in 2024 and 81% in 2023. The districts of Chigubo (+69%), Mapai (+52%), Massingir (+57%), and Limpopo (+32%) showed significant improvements in coverage between the two years reached the notification target above 100%. In contrast, Xai-Xai (-26%), Bilene (-19%), and Chókwé (-17%) recorded declines in performance. Despite this drop, Chókwé reached 100% of the childhood TB notification target set for 2024.

**Conclusions:** The analysis reveals significant disparities between districts, highlighting areas that require priority intervention. The findings underscore the need for targeted strategies, emphasizing strengthened active surveillance, expanded diagnostic capacity, and enhanced local management of the childhood TB program. The dissemination of best practices among districts and addressing contextual factors that limit performance are essential strategies for achieving national targets.

## Functional Profile, Quality of Life, Depression, and Loneliness Among Older Adults in Portuguese Long-Term Care

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**Keywords:** Long-Term Care; Person-Centered Care; Aged; Functional Status; Depression.

**Objective:** To assess changes over time in functional status, quality of life (QoL), depressive symptoms, and feelings of loneliness among individuals aged 65 or older living in long-term care in Baixo Alentejo.

**Methods:** This longitudinal study involved 482 participants aged  $\geq 65$  years from 11 long-term care facilities for older adults. Data was collected at two points, eight months apart, using validated instruments. Functional status with the Elderly Nursing Core Set (ENCS); QoL was measured with the WHOQOL-Bref; cognition with the Mini-Mental State Examination (MMSE), depressive symptoms with the PHQ-9, and feelings of loneliness with the UCLA Loneliness Scale. Professionals (e.g., nurses, psychologists) trained in standardized procedures conducted structured interviews. Statistical analysis included descriptive and inferential statistics, using t-tests and multivariate techniques via SPSS v28.

**Results:** A significant decline in global functionality was observed (mean ENCS score increased from  $2.9 \pm 1.0$  to  $3.1 \pm 0.9$ ;  $p < 0.001$ ), particularly in "Learning and Mental Functions" and "Relationships" domains. Autonomy in self-care remained stable ( $p = 0.387$ ). Among the 121 participants without cognitive impairment, no significant changes in QoL were found, but depressive symptoms (PHQ-9:  $13.4 \pm 6.0$  to  $15.1 \pm 5.6$ ;  $p < 0.001$ ) and loneliness (UCLA:  $31.9 \pm 10.0$  to  $35.7 \pm 11.4$ ;  $p < 0.001$ ) increased significantly.

**Conclusions:** Older adults in long term care present high levels of multimorbidity, cognitive impairment, and functional decline, which are strongly associated with depressive symptoms and loneliness. Despite the stability in QoL scores, the persistent low baseline values suggest chronic vulnerability. These findings reinforce the need for urgent reforms in care models, advocating for personalized, person-centered care strategies that promote autonomy, social interaction, and emotional well-being.

## Barriers to cervical cancer screening among hard-to-reach women in Portugal: a qualitative study

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**Keywords:** Early Detection of Cancer; Healthcare Disparities; Qualitative Research; Uterine Cervical Neoplasms; Vulnerable Populations.

**Objective:** To explore barriers to cervical cancer screening, focusing on individual and structural factors as perceived by hard-to-reach women in Portugal, to inform tailored interventions that improve screening uptake and reduce inequalities.

**Methods:** We conducted a qualitative study using focus group discussions (FGDs) with hard-to-reach women in community settings in Lisbon. Participants were sexually active women, aged 30–65, fluent in English or Portuguese, and either migrants or from low socioeconomic backgrounds, recruited through community-based organizations. Exclusion criteria included pregnancy, a history of cervical cancer, or total hysterectomy. Data collection ceased due to logistical constraints before full saturation was reached. Discussions followed a semi-structured guide informed by the Integrated Model of Health Literacy. Recordings were transcribed verbatim and thematically analyzed. Triangulation was used to enhance the credibility and depth of the analysis.

**Results:** Four FGDs were conducted with 14 participants. Structural barriers to screening included difficulties navigating health services, frequent changes in healthcare providers, staff shortages, long waiting times, and administrative burdens such as challenges booking appointments. At the individual level, participants reported that limited awareness about cervical cancer and its prevention can hinder screening uptake. Many women expressed a low perceived risk of developing cervical cancer and a general sense of indifference toward screening, which reduced motivation to attend. Sociocultural norms, including cancer stigma, fear of the procedure or results, and embarrassment, especially with male providers, also contributed to screening hesitancy or avoidance.

**Conclusion:** Cervical cancer screening uptake among hard-to-reach women in Portugal is not solely determined by individual choices but is heavily influenced by structural constraints and sociocultural dynamics. While context-specific and not widely generalizable, these findings offer valuable insights into the lived experiences of underserved populations. This study highlights the importance of awareness campaigns, culturally tailored interventions and systemic reforms aimed at improving screening accessibility and inclusiveness.

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## Outcomes and benefits of implementation an inclusive and dynamic intervention on prevention of pressure ulcers in long term care units in Portugal

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**Keywords:** Complex Intervention; Knowledge Translation; Nursing; Quality of Care; Work Environment.

**Objective:** Pressure ulcers (PU) are prevalent and costly in long-term care, negatively impacting patient quality of life. Implementing interventions for PU prevention and management in these settings is complex. This study explored implementation strategies to promote knowledge translation, capacity building, and evidence-based practice for PU prevention in long-term care units, using the Medical Research Council framework to develop and test complex interventions

**Methods:** A pilot study compared outcomes in units with and without intervention. Data on practices and outcomes (nutrition, hydration, positioning, pain, healing) were collected from a sub-sample of 58 patients with 67 pressure ulcers in the intervention units, drawing comparisons from data across all units where 1145 wounds were observed in 447 patients.

**Results:** Units with the intervention showed significantly improved adherence to practices like adequate nutrition (96.2% vs 76.1%,  $p = 0.001$ ), hydration (100% vs 84.0%,  $p = 0.002$ ), and patient-based positioning (98.2% vs 88.9%,  $p = 0.044$ ). The healing rate was significantly higher in intervention units (33.3%) compared to units without intervention (18.7%,  $p = 0.012$ ). Pain management showed no significant difference.

**Conclusions:** This nurse-led intervention demonstrates potential to enhance PU prevention and management practices and improve healing rates in long-term care, highlighting the importance of contextual adaptation and team engagement. This complex intervention demonstrated to be adjusted to achieving health gains and improving the quality of care. Future larger randomized controlled trials are needed.

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## Towards a Serum-Free 3D Human liver Model to Recapitulate MASLD Pathogenesis

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**Keywords:** 3D Human Liver Models; Biomarkers; HepaRG Cells; Inflammation; Liver Model.

**Objective:** Metabolic dysfunction-associated steatotic liver disease (MASLD) affects over 30% of adults. It ranges from simple steatosis (MASL) to steatohepatitis (MASH), which can progress to cirrhosis and hepatocellular carcinoma. MASLD pathogenesis involves complex genetic, metabolic, dietary, and inflammatory factors and remains poorly understood. Current preclinical models often fail to replicate human disease features. Our lab previously developed 3D hepatic spheroids using HepaRG cells alone or with primary non-parenchymal cells. MASH-like conditions were induced using energy substrates, resulting in lipid accumulation, oxidative and mitochondrial stress, inflammation, and hepatic dysfunction. However, control spheroids in fetal bovine serum (FBS)-containing medium also showed lipid accumulation, compromising model sensitivity. Thus, we aimed to optimize the HepaRG-based spheroid model to minimize baseline steatosis while maintaining cellular viability and hepatic functionality.

**Methods:** HepaRG-based spheroids were cultured in serum-free medium to minimize baseline lipid accumulation in FBS-containing media. Spheroids were exposed to control (serum-free or FBS), MASLD-like (oleic acid), and MASH-like (LPON: lactate, pyruvate, octanoate, ammonia) conditions, both with and without FBS. Spheroid morphology, viability, and function were assessed. Lipid accumulation was evaluated through staining and imaging. The model's responsiveness to MASLD-inducing conditions was validated by characterizing metabolic, inflammatory, and stress-related markers. Assays were performed in triplicate.

**Results:** Comparative analysis revealed a significant reduction (approximately 20%,  $p \leq 0.001$ ) in spontaneous lipid accumulation under serum-free conditions. Morphological evaluation demonstrated a more consistent spheroid compactness and diameter when compared to the usage of FBS. Key hepatic functions, such as albumin, cholesterol, bilirubin production, ROS generation, and cytokine expression, were preserved. The model responded to MASLD-inducing stimuli, showing MASL and MASH features.

**Conclusions:** These results confirm the functional integrity and improved reliability of the serum-free HepaRG spheroid model. The serum-free approach is being applied to multicellular liver spheroids to pursue enhanced physiological relevance and disease specificity of hepatic *in vitro* models.

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## Matter project: A system-wide initiative for early identification and intervention in perinatal mental health

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**Keywords:** Care Pathways; Digital Innovation; Early Screening; Integrated Care; Perinatal Mental Health.

**Objective:** Perinatal mental health disorders affect up to 30% of women and are a significant public health challenge with long-term implications for mothers, infants, and communities. In Portugal, despite increased awareness, routine screening and coordinated referral systems remain limited. The Ma(t)ter project aimed to implement and evaluate a region-wide program in Central Alentejo to strengthen early identification and care coordination through systematic screening, cross-sector training, and digital innovation.

**Methods:** The intervention included four components: implementation of automated screening at four perinatal timepoints (first and second trimesters, early and late postpartum), integrated into the national primary care software (SClinico); cross-sector training of health and social professionals, including a university-certified microcredential; monthly multidisciplinary case review meetings; and development of an online platform to support clinical decision-making and interprofessional communication. Implementation outcomes were evaluated using mixed methods, including quantitative indicators (screening rates, referral patterns, professional engagement) and qualitative interviews based on the Consolidated Framework for Implementation Research (CFIR).

**Results:** By the time of submission, 819 automated screening invitations had been sent, with a 20% response rate. Although below optimal, this rate aligns with initial projections for unsolicited digital health interventions. Strategies to improve uptake include proactive engagement by primary care professionals and public awareness materials. Among respondents, 25.4% reported a history of mental illness, and 18% screened as intermediate or high risk. Dozens of professionals had been trained, and structured referral pathways had been established. Preliminary findings suggest improved capacity for early identification and collaboration across services. However, limitations include potential response bias, lack of a comparison group, and early-stage implementation.

**Conclusions:** The Ma(t)ter project provides a promising, though preliminary, model for improving perinatal mental health care through integrated systems and digital tools. Further evaluation is ongoing to assess long-term impact and scalability.

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## Nursing Interventions in Self-Care and Quality of Life of Older Adults: Systematic Review with Meta-Analysis

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**Keywords:** Aged; Chronic Disease; Community; Domicile; Patient Care Planning.

**Objective:** To assess the effectiveness of nursing-led self-care interventions on self-care behaviors and quality of life among older adults with chronic conditions.

**Methods:** We conducted a systematic review and meta-analysis following PRISMA 2020 guidelines. Primary studies with experimental or quasi-experimental designs published between January 2013 and June 2024 were included. We searched MEDLINE, CINAHL, Scopus, and SciELO for relevant studies. Eligible studies focused on community-dwelling adults aged ≥65 years with at least one chronic condition who received nursing-led interventions aimed at enhancing self-care and/or quality of life, compared to standard care or no intervention. Two independent reviewers screened studies, extracted data, and assessed risk of bias using appropriate tools (RoB2 for randomized trials and ROBINS-I for non-randomized studies). Outcomes of interest were improvements in self-care behaviors and in health-related quality of life. Meta-analysis was performed using RevMan software with a random-effects model to calculate pooled effect sizes with 95% confidence intervals.

**Results:** The analysis of n = 28 studies demonstrated that nursing-led self-care interventions resulted in statistically significant improvements in both self-care behaviors and quality-of-life scores among aged individuals with chronic disease compared to control groups. Although included varied in intervention modalities and outcome measures, the overall effect consistently favored the intervention group, indicating a clear benefit for this population.

**Conclusions:** Nurse-led self-care interventions effectively improve self-care capacity and health-related quality of life in community-dwelling older adults with chronic conditions. These findings underscore the importance of integrating self-care promotion strategies into community and primary care nursing practice and inform evidence-based guidelines to enhance healthy aging.

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## Could Emotional Salary Be a Viable Management Strategy for Retaining Nursing Talent in Portugal?

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**Keywords:** Emotional Salary; Health Organizations; Management; Nurses; Talent Retention.

**Objective:** This study aimed to analyze the feasibility of emotional salary as a management strategy for retaining nursing talent in Portugal. It specifically sought to: (1) identify the key components of emotional salary that impact nurse satisfaction and retention; (2) identify the strategic aspects of emotional salary in effective practice in public health hospital organizations in Italy; and (3) evaluate the perceptions of Portuguese nursing managers on the feasibility and effectiveness of emotional salary practices in Portuguese public health organizations.

**Methods:** In 2022, a comprehensive literature review was conducted to identify the components of emotional salary and its implications for talent retention. This was followed by informal interviews with eight nursing managers from public hospital organizations, four Portuguese and four Italian. The interviews were crucial for obtaining qualitative insights, including a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), on the implementation of this effective strategy in Italy and the perceptions of Portuguese managers in adapting this management tool to our national reality. This mixed approach allowed for an in-depth understanding of the feasibility and effectiveness of emotional salary as a management strategy.

**Results:** The perceptions of Italian and Portuguese nursing managers are aligned with the results found in the literature review. The main components identified were: positive professional relationships; career advancement opportunities; workplace stress reduction programs; professional recognition; and health insurance covering nurses and their families. The main emotional salary strategies implemented and identified by Italian nursing managers as having an effective impact on nurses were: Free training in the nurse's area of interest; free international internships; funding for scientific articles; vouchers for cultural events (theater, opera, museum visits); discounts on local accommodation and restaurants; discounts at spas and gyms; comprehensive health insurance for nurses and their families; and organizational recognition, giving internal visibility, through the intranet, to the work done by nurses. The implementation of this tool has the support of society, in partnership with stakeholders, patrons, and sponsors. It was found that Portuguese nursing managers believe that this management tool can be easily implemented in Portugal, following the main emotional salary strategies effectively implemented in Italian public hospital organizations.

**Conclusions:** Emotional salary is a viable strategy for retaining nursing talent in Portuguese public health organizations, with greater effectiveness when supported by strong partnerships among health organizations, stakeholders, and sponsorship. Its authentic and consistent implementation can enhance job satisfaction, foster professional development, and promote a healthy work environment. In the future, emotional salary may serve as a competitive differentiator among health organizations, strengthening their capacity to attract and retain qualified nursing professionals.

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## Performance of Colorectal Cancer Screening Models and Hospital Follow-Up in a Local Health Unit

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**Keywords:** Colorectal Cancer; Screening; Early Diagnosis; Care Pathway.

**Objective:** This study aimed to assess the coverage and uptake of colorectal cancer (CRC) screening programs in primary healthcare settings in a Local Health Unit in the Lisbon area and to characterize the care pathway of patients with positive screening results.

**Methods:** Observational, cross-sectional study. Two types of screening strategies, systematic and opportunistic, were analyzed using data extracted from the SiiMA Rastreios and MIM@UF platforms. The sample included eligible individuals aged 50-74 years, without a prior diagnosis of CRC, who were screened between 2023 and 2024. Key performance indicators were analyzed by functional unit, including screening coverage, participation rates, fecal occult blood test (FOBT) positivity rates, colonoscopy completion rates and average time intervals between screening and follow-up stages. The screening models were compared and hospital follow-up of positive cases was assessed.

**Results:** The opportunistic model showed better performance, with 22.9% coverage, compared to 8.4% in the systematic model. The FOBT positivity rate was higher in the opportunistic model (5.8%) than in the systematic model (4.5%). In the opportunistic approach, only 39.8% of individuals with a positive FOBT underwent follow-up colonoscopy, with an average waiting time of 58 days, compared to 81 days in the systematic model. FOBT uptake and colonoscopy completion were more frequent among women and older individuals. Most referrals were made to gastroenterology (79.8%), with the remainder directed to surgery (20.2%). Among surgical referrals, the majority of CRC diagnoses were staged at grade II or higher, limiting the potential benefits of early detection.

**Conclusions:** The opportunistic model demonstrated greater uptake and effectiveness but lacked equity, as it relied on direct contact with primary care. The systematic model showed operational challenges and longer delays. Both models revealed gaps in coordination with hospital services. Their coexistence may be advantageous if supported by interoperable information systems and targeted strategies to engage high-risk populations.

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## The role of cytochrome P450 enzymes and oxidoreductases in the mechanisms of breast cancer drug resistance to doxorubicin

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**Keywords:** Breast Cancer; Cytochrome P450 Enzymes; Doxorubicin Resistance; Drug Metabolism; Spheroids.

**Objective:** Drug resistance is a major challenge in cancer therapy, accountable for 90% of all cancer-related fatalities. Doxorubicin (DOX), one of the most widely used chemotherapeutics in breast cancer treatment, is primarily metabolized by cytochrome P450 (CYP) enzymes and oxidoreductases. This study addresses the underexplored issue of the role of drug metabolism in resistance development at subtherapeutic levels of DOX.

**Methods:** DOX resistance was induced stepwise at concentrations of 25, 35, and 45 nM on MCF-7 cells. A breast cancer three-dimensional spheroid model was optimized using this cell model. Gene expression of 92 phase I drug-metabolizing enzymes (DMEs) was analyzed using RT-qPCR in DOX-sensitive and resistant spheroids. Microsomal fractions from sensitive and resistant spheroids were used to assess CYP enzyme activity.

**Results:** A gene signature of 24 differentially expressed phase I DMEs was identified in resistant cells. An overexpression of CYP4B1, CYP26B1, FDXR, FMO5, and PAH was detected in both 2D and 3D-cultured MCF-7 cells. Resistant spheroids also exhibited enhanced CYP3A-dependent metabolism in both systems. Comparison between monolayer and spheroid cultures revealed spatially dependent differences in both gene expression and enzyme activity, underlining the biological relevance of the 3D model.

**Conclusions:** Most differentially expressed genes in resistant cells have been previously associated with chemoresistance and tumor progression in breast cancer. Overall, our data reveal an intricate link between the expression and activity of DMEs and the development of acquired resistance to doxorubicin in MCF-7 spheroids. Additionally, our results underscore the dynamic nature of drug resistance, transiently dependent on multiple pathways such as drug-, arachidonic acid-, retinoic acid-, and vitamin D-metabolisms. While the spheroid model offers a physiologically relevant platform, the use of a single cell line limits the generalizability of the observed gene expression and enzyme activity changes associated with drug resistance, highlighting the need for validation across diverse models.

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## Exploring individual experiences on burnout drivers and coping strategies of professionals working in a Drug Consumption Room

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**Keywords:** Occupational Burnout; Coping Skills; Harm Reduction; Qualitative Research.

**Objective:** This study aimed to explore the drivers of burnout and the coping strategies adopted by professionals working in Portugal's first integrated drug consumption room (DCR), identifying context-specific stressors, protective factors, and variations in work demands across different areas of the service.

**Methods:** A qualitative descriptive study was conducted through semi-structured interviews with thirteen professionals from an integrated DCR in Lisbon, including nurses, psychosocial technicians, psychologists, social workers, and cleaning staff. Deductive thematic analysis was guided by the Shanafelt and Noseworthy burnout model and the job demands-resources theory.

**Results:** Participants reported significant emotional burden, physical insecurity, and frustration due to systemic inefficiencies, underfunding, and a lack of professional development opportunities. Younger and less experienced professionals working full-time and across high-demand areas (e.g., hygiene and food provision zones) reported greater emotional strain, fear of aggression, and difficulty in work-life separation. Conversely, more experienced, part-time staff working exclusively in consumption rooms reported fewer demands. Despite limited institutional support, peer relationships, weekly supervision meetings, and alignment with harm reduction values emerged as key protective factors. A sense of purpose, personal growth, and mutual support among colleagues contributed positively to resilience. However, moral distress linked to inadequate care conditions and limited decision-making power affected motivation and emotional well-being.

**Conclusions:** This study highlights the complexity of burnout risk among DCR professionals in Portugal, shaped by personal trajectories, intra-facility dynamics, and broader systemic constraints. Differences in emotional burden across physical work-spaces within the DCR offer a novel and relevant perspective on how the environment mediates professional well-being. The findings underscore the need for context-sensitive interventions that address both structural and interpersonal factors. To promote worker well-being and ensure the sustainability of harm reduction services, policy and organizational responses should include investment in training and supervision, strengthen team cohesion, and mitigate resource scarcity.

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## From Evidence to Practice: Advancing Behaviour Change in Healthcare for Chronic Disease and Multimorbidity

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**Keywords:** Behaviour Change Advice; Digital Health; Healthcare Professionals; Multimorbidity; Multiple Behaviour Change.

**Objective:** The increasing prevalence of multimorbidity poses complex challenges for healthcare professionals (HCPs) who must navigate fragmented systems, manage competing clinical goals, and provide tailored behaviour change advice. This research aims to advance the theoretical and practical understanding of multiple behaviour change (MHBC) approaches to support HCPs in delivering personalised care for individuals with chronic conditions and multimorbidity.

**Methods:** A multi-methods design was employed, comprising three integrated studies. Study 1 involved a systematic review and meta-analysis of 61 trials targeting MHBC in patients with chronic conditions. Study 2 was a systematic review of 17 trials focusing on interventions aimed at changing multiple clinical behaviours of HCPs. Study 3 was a qualitative study involving 32 interviews with HCPs in Ireland and Portugal, exploring their experiences in managing multiple goals and behaviours in multimorbidity care. Triangulation was conducted using a structured matrix to synthesise findings from all studies, identify overlapping insights, and generate practice and research recommendations.

**Results:** Triangulated findings revealed that few interventions targeted multimorbidity or HCPs' multiple behaviours explicitly. HCPs face challenges including competing clinical priorities, time pressures, and communication barriers in team-based care. Provision of behaviour change advice is hindered by insufficient training, limited decision-making support, and lack of referral pathways. Interventions often lack theoretical underpinning and fail to address the complexity of managing multiple behaviours and goals. Digital systems are poorly integrated, unintuitive, and increase workload. Recommendations include fostering multidisciplinary collaboration, enhancing training in behaviour change techniques (BCTs), structuring lifestyle referrals, and improving usability and interoperability of digital tools.

**Conclusions:** This research is the first to comprehensively integrate quantitative and qualitative evidence on MHBC interventions in multimorbidity care. Findings inform the development of theoretically grounded, evidence-based behavioural interventions. Practical recommendations aim to enhance clinical practice, guide future research, and support HCPs in managing the complexity of multimorbidity.

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## A General Framework for Modelling Longitudinal Psychometric Data with Ordinal Item Responses

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**Keywords:** Psychometrics; Latent Variable Models; Longitudinal Studies; Item Response Theory; Ordinal Data.

**Objective:** To introduce a flexible statistical framework for modelling psychometric instrument responses and their longitudinal evolution, with a focus on capturing latent constructs, individual heterogeneity, and distinct group latent trajectories.

**Methods:** We present a generalised approach for analysing repeated psychometric assessments where item responses are ordinal and structured by latent constructs (e.g., depression, functional health). The framework combines item response theory (IRT) models with longitudinal latent class and growth modelling strategies. It enables the decomposition of observed ordinal responses into latent traits evolving, governed by class-specific or individual-specific trajectories. This structure accommodates within-subject variability, identifies subpopulations with distinct profiles, and supports informative mechanisms for missing data. The model is implemented in a Bayesian framework, allowing flexible inference and uncertainty quantification.

**Results:** This novel methodology was applied to a longitudinal cohort study of 2,538 Portuguese adults followed over 10 years with the Hospital Anxiety and Depression Scale (HADS), allowing the estimation of a depression latent factor and the identification of four distinct trajectories of depressive symptoms. The proposed framework offers a coherent strategy for modelling longitudinal psychometric outcomes, accommodating both the ordinal structure of item responses and the dynamic nature of the latent constructs they measure. As the empirical results demonstrate, it enables the identification of clinically or behaviourally meaningful subgroups, supports improved measurement over time, and enhances interpretability relative to traditional scoring or fixed-effects models. Applications span a variety of instruments, including measures of mental health, physical function, and quality of life.

**Conclusions:** This modelling framework offers a unified and scalable approach for analysing repeated psychometric measures, supporting robust inferences about trajectories and latent states. It is well-suited for longitudinal studies in health, psychology, and the social sciences.

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## Clinical Course According to Pain Mechanism in Patients with Chronic Neck Pain Undergoing Physiotherapy Intervention

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**Keywords:** Disability; Global Perception of Change; Pain Intensity.

**Objective:** Chronic neck pain (CNP) is one of the leading causes of disability worldwide. Previous research suggests that the clinical progression of individuals with CNP may differ according to the underlying pain mechanisms (PM). This study aimed to describe the clinical course of patients with non-specific CNP, categorized by PM (nociceptive, mixed, or neuropathic), undergoing either a manual therapy and exercise program (MTE; Cohort I) or usual care (Cohort II).

**Methods:** A secondary analysis was conducted using data from 103 participants divided into two cohorts (Cohort I and II), each further stratified into three subgroups based on predominant baseline PM. Participants were assessed at baseline, after 3 and 6 weeks of treatment, and at 3- and 6-months post-discharge. Primary outcomes included pain intensity, disability, and global perception of change (GPC).

**Results:** Overall, participants showed improvement in clinical outcomes over time. In Cohort I, significant differences were found in GPC among PM subgroups at 3 and 6 weeks and at 3 months post-treatment ( $p < 0.024$ ), favoring the neuropathic pain subgroup. In Cohort II, significant differences were observed in GPC across all time points ( $p < 0.022$ ), and in pain intensity at 3 weeks and 6 months ( $p < 0.026$ ), favoring the nociceptive subgroup. When comparing the same PM subgroups across cohorts, significant differences in pain intensity, disability, and GPC were found, with better outcomes in the MTE cohort ( $p < 0.035$ ).

**Conclusions:** The clinical course of patients with non-specific CNP improves over time, regardless of the underlying PM. However, those receiving MTE appear to experience a more favorable trajectory compared to those receiving usual care.

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## Incentives to attract and retain physicians to underserved areas - a case study from Portugal

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**Keywords:** Attraction; Physicians; Policies; Retention; Underserved Areas.

**Objectives:** Physician shortages in underserved areas are a common challenge for governments and policymakers worldwide, including in Europe. Meanwhile, a knowledge gap exists on effective measures to address the issue. According to WHO

Europe, one of ten actions to strengthen the healthcare workforce is to develop strategies to attract and retain health workers in rural and remote areas. Portugal faces geographical asymmetries in the distribution of physicians, and difficulties in retaining them in certain areas of the country. This case study seeks to describe and analyse the impact of an incentives package introduced in 2015 that aimed to attract and retain physicians in underserved areas.

**Methods:** Document analysis was conducted to understand the scope of the incentives package and its amendments. Financial incentives data was gathered via a national health human resources information system. Non-financial incentives data was reported by health institutions through an online form.

**Results:** The incentives package implemented in Portugal effectively deployed physicians to underserved areas, since it led to a fourteen-fold increase in physicians settling in underserved areas. In terms of retention, 59% of the physicians that took up the incentives package are still practicing in the same underserved area. However, the difference between the retention levels of physicians under the incentives package and those not covered is minimal.

**Conclusions:** To further reduce health inequities and achieve universal health coverage, a need exists to review the financial and non-financial incentives to better suit physicians' needs and expectations, as well as those of the National Health Service. The incentives package introduced in Portugal makes it clear that flexibility in the design of attraction and retention measures is crucial. It requires a long-term commitment and a recognition that each intervention should be assessed and adapted to local circumstances and context.

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## Bioethical and Practical Challenges of Involuntary Treatment under the New Portuguese Mental Health Law

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**Keywords:** Advance Directives; Community Care; Bioethics; Human Rights; Legislation.

**Objective:** The investigation analyzed the complex bioethical and practical challenges emerging from the implementation of Portugal's new Mental Health Law (Law no. 35/2023), with a specific focus on the domain of involuntary treatment.

**Methods:** A narrative review was conducted, synthesizing evidence from the new legislative text, peer-reviewed articles from scientific databases (PubMed, SciELO, Scopus), and key ethical-legal opinions from national bodies, including the National Council of Ethics for the Life Sciences (CNECV).

**Results:** The law introduced significant rights-based innovations, including a preference for community-based treatment over hospitalization and the creation of patient empowerment tools such as advance directives and the designated trusted person. However, the analysis identified barriers to its effective

implementation. These included chronic insufficiency of community care resources, the need for profound cultural and procedural shifts among health and judicial professionals, and significant ethical concerns regarding the subjectivity of legal criteria for intervention, such as “foreseeable future danger.” The review highlighted a central tension between the law’s progressive, rights-based aspirations and the systemic and structural obstacles hindering their realization in practice.

**Conclusions:** It was concluded that while the new law represents a critical legislative advance towards a human rights-centred mental health model, its successful implementation is contingent on substantial investment in community services, continuous professional training, and a fundamental cultural shift towards person-centred care. These findings from Portugal reflect the broader international challenge of translating rights-based legislative reforms into practice, underscoring a universal gap between legal aspirations and the systemic realities of healthcare delivery.

### **White Tea Intake Mitigates SIRT1 Suppression in Prediabetes Skeletal Muscle: A Nutraceutical Approach to Redox Balance**

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**Keywords:** Sirtuins, Skeletal Muscle, Prediabetes (PreDM), Type 2 Diabetes Mellitus (T2DM), Oxidative Stress, White Tea Extract (WTEA).

**Objective:** Type 2 diabetes mellitus (T2DM) impairs skeletal muscle function, reducing metabolic flexibility and mitochondrial efficiency while increasing oxidative stress due to excess reactive oxygen species (ROS) and weak antioxidant defenses. Sirtuin 1 (SIRT1) and Sirtuin 3 (SIRT3), NAD<sup>+</sup>-dependent deacetylases, support mitochondrial health and activate ROS-detoxifying enzymes. We hypothesized that prediabetes (PreDM) reduces SIRT1 and SIRT3 expression in muscle, contributing to redox imbalance and mitochondrial dysfunction. White tea (WTEA), known for its anti-hyperglycaemic and antioxidant properties, may counteract these effects. This study investigates the impact

of PreDM on SIRT1/SIRT3 expression in rat skeletal muscle and whether WTEA supplementation offers protective benefits.

**Methods:** All rats were provided with *ad libitum* access to a standard chow meal. At one month of age, the streptozotocin (STZ)-treated rats were divided into two groups: the PreDM+WTEA group (N = 6) consumed white tea (WTEA) for the subsequent two months, while the other STZ-treated group (PreDM group, N = 6), and the control group (control group, N = 6) consumed water. Relative mRNA expression levels of SIRT1 and SIRT3 in skeletal muscle were quantified via quantitative polymerase chain reaction. Statistical significance was evaluated by one-way ANOVA, followed by Tukey post-test using GraphPad Prism 10.

**Results:** PreDM significantly reduced mRNA SIRT1 expression in skeletal muscle. Notably, WTEA supplementation restored SIRT1 transcript levels to those comparable with non-PreDM controls. No significant differences were detected in SIRT3 expression between PreDM, WTEA-treated, and control groups.

**Conclusions:** These findings suggest that PreDM selectively downregulates SIRT1 expression in skeletal muscle, potentially contributing to oxidative stress and metabolic impairment. WTEA supplementation appears to reverse this effect, highlighting a possible therapeutic role. In contrast, SIRT3 expression remained unchanged, indicating a possible differential regulatory response to PreDM in muscle tissue.

### **Self-care in preventing loneliness in people aged 55 to 74: results of a systematic literature review**

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**Keywords:** Adult; Self-Care; Elderly; Loneliness; Systematic Review.

**Objective:** Systematize self-care models and interventions for preventing loneliness in people aged 55-74 based on scientific evidence.

**Methods:** A systematic literature review was conducted following Joanna Briggs Institute methodology and PRISMA guidelines. The research question used the PICO framework targeting the population (55-74 years), intervention (self-care), and outcome (loneliness prevention). Nine databases were systematically searched for primary observational articles published during the post-COVID period.

**Results:** 13 cross-sectional studies included, 2 longitudinal studies and 1 mixed methods outcome evaluation. Self-care interventions identified: social interaction - larger social networks and greater social support are associated with reduced loneliness; internet use for communication- negatively associated with loneliness; information acquisition- negatively associated with loneliness but may be linked to a decline in family ties, suggesting a complex interplay; evidence-based health promotion programs at a distance: participants reported reduced social isolation

and loneliness; loneliness literacy and the adoption of problem-focused (rather than emotion-focused) coping strategies were associated with a lower likelihood of increased loneliness during the pandemic; caring for grandchildren: can reduce loneliness; physical activity- maintaining physical activity is generally associated with lower loneliness, but with different results in different contexts and types of activity; leisure activities - were associated with lower levels of subjective loneliness.

**Conclusions:** Social engagement, physical activity, managing health problems and using technology to communicate are self-care interventions that have a positive impact on preventing loneliness and on the quality of life of people in this demographic group.

### Anxiety and Mental Health Literacy in Adolescents

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**Keywords:** Adolescence; Anxiety; Help-Seeking; Stigma; Well-Being.

**Objective:** Adolescents' knowledge about mental health, or their mental health literacy (MHL), has been suggested as an important factor in limiting the development of mental health problems in these young people. In this context, the present study aimed to examine gender and age-related differences in several dimensions of MHL and anxiety in adolescents, as well as to explore the relationship between MHL dimensions and anxiety problems.

**Methods:** Ninety students enrolled in two secondary schools (10th, 11th and 12th grades) in the South of Portugal, mean age of 16.03 years ( $SD = 1.06$ ), 59% female, answered a Sociodemographic Questionnaire and the *Mental Health Promoting Knowledge, Mental Health Literacy Questionnaire - Sort version* and the anxiety scale of the *Depression Anxiety Stress Scales - 21*. The LSM dimensions measured were knowledge about how to promote good mental health, knowledge about mental health problems, erroneous beliefs/stereotypes, help-seeking and first aid skills, and self-help strategies. Statistical analysis involved a series of independent sample *t*-tests and Spearman correlations.

**Results:** Girls presented higher levels of anxiety ( $p = .024$ ) but also of knowledge about how to maintain good mental health (positive MHL;  $p = .038$ ) and about mental health problems ( $p = .036$ ), as well as MHL in general ( $p = .042$ ). In contrast, boys reported more favorable levels of beliefs and stereotypes about mental health ( $p = .012$ ). Age tended to be positively associated with first-aid skills and help-seeking behaviors ( $rs = .19$ ,  $p = .078$ ). Anxiety was negatively associated with first-aid skills and help-seeking behaviors ( $rs = -.024$ ,  $p = .025$ ).

**Conclusions:** Gender differences suggest a higher prevalence of anxiety problems and better levels of LSM in girls, although boys reported less stigmatizing beliefs. Additional research is warranted to examine whether enhancing adolescents' MHL can contribute to the prevention of anxiety problems in adolescents.

### Adapting the ALSFRS-R to Reduce Patient Burden and Avoid Confrontation with Future Decline

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**Keywords:** Amyotrophic Lateral Sclerosis; Self Report; Mobile Applications; Monitoring, Physiologic; Surveys and Questionnaires.

**Objective:** The ALS Functional Rating Scale-Revised (ALSFRS-R) is a key instrument to evaluate functionality in patients with Amyotrophic Lateral Sclerosis (ALS). ALSFRS-R has 12 items and was designed to be administered by neurologists during appointments. The ALSFRS-R has been recently integrated into apps for patients to enable remote monitoring. However, answering the complete ALSFRS-R represents a burden and potentially confronts patients with their future condition state against their will, something which neurologists avoid.

**Methods:** We developed an adaptive protocol for administering the ALSFRS-R that dynamically adjusts the number of questions based on patient input. Rather than requiring responses to all items, patients are first asked screening questions regarding perceived changes in each domain since the last assessment. Functional domain questions are presented only if changes are reported. Longitudinal self-reported ALSFRS-R scores were collected at home from nine ALS patients (mean age:  $70 \pm 12$  years; 4 females, 5 males) using the HomeSenseALS app. These scores were compared against neurologist-administered ALSFRS-R scores collected during clinic visits, using Pearson's correlation. ALSFRS-R trajectories were modeled using linear mixed-effects models. Patient experiences were gathered through end-of-trial interviews.

**Results:** The self-reported and in-clinic total ALSFRS-R scores were strongly correlated ( $r = 0.74$ ,  $p \leq .001$ ). Average decline for the individual models in the ALSFRS-R total was 0.63 ( $SE = 0.22$ ) points per month for the in-clinic group and 0.51 ( $SE = 0.20$ ) for the self-reported group. On average, participants completed  $5 \pm 3$  items per session, which represents a substantial reduction from the complete scale. Patients reported a low burden with the app, which is a potential consequence of the adapted instrument.

**Conclusions:** The proposed adaptive protocol reduced patient burden and confrontation of patients with future symptoms, while maintaining strong agreement with clinician-assessed ALSFRS-R scores. These findings support the feasibility of adaptive, self-administered ALSFRS-R assessments in remote settings and warrant further validation in a larger cohort.

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## Outdoor worker's risk of developing squamous cell carcinoma: the MEAOW study

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**Keywords:** Epidemiology of Occupational Exposures; Outdoor Workers; Squamous Cell Carcinoma (SCC); Solar Ultraviolet Radiation (UVR).

**Objective:** This study aimed to calculate the excess risk of SCC among gardeners, gravediggers, pavers, asphalters, sanitation workers and sailors in Lisbon based on measured solar UVR doses. **Methods:** A prospective observational study using personal electronic dosimeters was conducted to assess solar UVR in 91 outdoor workers from Lisbon Municipality, from April to October 2023. This data was used to calculate the relative risk (RR) of SCC for each of the investigated occupations as well as for each individual using a formula developed by Milon *et al.*

**Results:** Solar UVR exposure was associated with an increased risk of developing SCC. Individual relative risk values

for developing SCC, which range from 22% (Paver) to 437% (Asphalther) over 25 years, and from 36% to 921% over 40 years of outdoor work. These minimum and maximum values reflect the range of doses recorded by individual dosimeters and illustrate inter-individual variability within each occupation. Pavers had an increased risk of developing SCC by 65%, Asphalters by 133%, Sanitation Workers by 179%, Gravediggers by 187%, and Gardeners by 193%. Despite some limitations, the novel approach and relevance of the study provide valuable insights for public health interventions aimed at reducing UVR exposure and SCC risk among outdoor workers.

**Conclusion:** Outdoor work is associated with an increased risk of SCC, which can improve the current understanding of the health risks associated with solar UVR exposure and the prevention of non-melanoma skin cancer, more specifically SCC, among individuals engaged in outdoor work; this also in view of climate change. However, the current model needs to be refined to improve the accuracy of risk assessment and to support the development of targeted prevention interventions.

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## Automated AI-driven Framework for Remote Assessment of Speech Function in Amyotrophic Lateral Sclerosis

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**Keywords:** Amyotrophic Lateral Sclerosis; Mobile Applications; Artificial Intelligence; Quality of Life; Monitoring; Physiologic.

**Objective:** This study aimed to develop and validate an artificial intelligence (AI)-based system for remote, automated assessment of speech function in ALS, enabling continuous monitoring in free-living conditions between clinical evaluations.

**Methods:** We analyzed two speech datasets: one from an open-access English-language cohort comprising 851 ALS patients and another from a Portuguese-language cohort with 23 patients. The participants were asked to read aloud a selected sentence, and their speech was recorded using a mobile application. We trained a deep learning model to evaluate the patient's speech on a 0–4 scale based on the ALS Functional Rating Scale-Revised (ALSFRS-R) speech score, where 0 indicates no useful speech and 4 indicates normal speech. We also examined performance across age and sex subgroups and tested whether the model could be applied to the Portuguese dataset without additional training (zero-shot evaluation).

**Results:** On the English-language dataset, the model achieved an F1-score of 84.3% and an overall accuracy of 86.6% in predicting the ALSFRS-R speech score. The predicted scores showed a strong correlation with patient-reported ALSFRS-R speech ratings ( $r = 0.80$ ,  $p < 0.001$ ). Subgroup analyses revealed minimal performance differences across demographic groups, with negligible effect sizes between younger and older patients ( $g = 0.08$ ) and between male and female patients ( $g = -0.16$ ). In the Portuguese-language

dataset, the model was evaluated in a zero-shot setting (i.e., without fine-tuning), yielding a slightly stronger correlation between predicted and reported speech function scores ( $r = 0.83, p < 0.001$ ), supporting the system's potential cross-linguistic generalizability.

**Conclusions:** The proposed AI-based framework demonstrated strong agreement with ALSFRS-R speech scores and consistently performed across demographic subgroups and both English and Portuguese languages. These findings support the use of automated speech analysis for remote ALS monitoring, enabling earlier detection of speech decline and more personalized care.

## Tracing Research-to-Policy Pathways: Insights from Overton on NOVA NSPH Contributions

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**Keywords:** Policy Footprint; Evidence-based Research; Health Policies; Research Impact.

**Objective:** This study investigates the policy footprint of CHRC researchers affiliated with the NOVA National School of Public Health (NOVA NSPH) using Overton. It aims to identify patterns of citation in policy documents, highlight areas of strongest influence, and uncover potential gaps in research-to-policy translation.

**Methods:** We extracted citation data for NOVA NSPH-affiliated researchers from the Overton database available until June 2025, analyzing document count, source types (e.g., government versus non-governmental organization) and geographic reach. Network analysis and keyword mapping were used to contextualize the influence.

**Results:** Using the Overton platform, the presence of researchers, publications, and institutions within policy documents was quantified. The analysis identified 24 researchers from NOVA NSPH referenced in Overton preliminary findings reveal that individual researcher mentions range from a minimum of three to a maximum of seventy policy documents. The health policy impact of NOVA NSPH is predominantly concentrated in the areas of non-communicable disease prevention and health systems governance, with significant uptake observed among Portuguese and European Union institutions.

**Conclusions:** These results underscore both the tangible policy contributions of NOVA NSPH researchers and the need for strategic engagement with international policy actors. Tools like Overton can inform institutional strategies to enhance policy-relevant research dissemination.

## Self-Reported Functionality and Its Association with Perceived Barriers and Physical Performance in Active Elderly

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**Keywords:** Aged; Barriers; Physical Functional Performance; Physical Activity; Sarcopenia.

**Objective:** This study investigated the relationship between perceived barriers to physical activity, self-reported functionality (SARC-F), and physical performance in a sample of active older adults.

**Methods:** A cross-sectional study was conducted with 188 older adults ( $71.9 \pm 6.4$  years) who regularly participated in physical activity programs. Perceived barriers were measured using the QBPAFI questionnaire, self-reported functionality through the SARC-F, and physical performance was evaluated using handgrip strength, Timed Up and Go (TUG), gait speed, 2-minute step test, and five-times sit-to-stand test. Spearman correlation and multiple linear regression analyses were applied to identify predictors of functionality.

**Results:** The physical barriers subscale showed a significant correlation with SARC-F scores ( $\rho = 0.278, p < 0.001$ ), whereas other subscales showed no significant associations. The SARC-F score correlated significantly with all physical performance measures, indicating that higher scores (worse functionality) were linked to lower strength, slower gait speed, reduced aerobic endurance, and poorer performance on functional tests. Multiple linear regression revealed that physical and personal barriers, along with age and sex, significantly predicted SARC-F scores ( $R^2 = 0.269$ ). Furthermore, SARC-F predicted performance on the TUG ( $R^2 = 0.168$ ) and gait speed ( $R^2 = 0.206$ ).

**Conclusions:** Perceived barriers, especially physical and personal ones, were associated with functional impairments in active older adults. The SARC-F was sensitive to these barriers and demonstrated predictive ability for motor performance in physical tests. These findings suggest that strategies targeting barrier reduction and physical capacity improvement are crucial to promote functional independence among older adults.

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## Loneliness and Self-Care of People Over 65 in Long-Term Care\_ Results of a Literature Review

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**Keywords:** Healthy Aging; Elderly; Well Being.

**Objective:** Systematize evidence on interventions and/or intervention models that mitigate loneliness in people over 65 years of age in long-term care based on scientific evidence.

**Methods:** This systematic literature review follows the Joanna Briggs Institute methodology. The PICO framework addressed: Population (P) - adults  $\geq 65$  years in long-term care facilities; Intervention (I) - self-care interventions; Comparison (C) - usual care; Outcome (O) - loneliness reduction. Studies were selected using JBI Critical Appraisal Tools for different study designs, evaluating methodological quality. Eight databases were systematically searched: EBSCOhost (MEDLINE Ultimate, CINAHL Ultimate, Academic Search Complete, Psychology and Behavioral Sciences Collection, Nursing Allied Health Complete, PsyInfo), PubMed, Scopus, and Web of Science. Primary articles from January 1, 2019 to December 31, 2024 were included. Findings reported using PRISMA extension guidelines.

**Results:** From 1377 initially identified articles, 10 studies met inclusion criteria after rigorous quality assessment, predominantly from 2022-2023, demonstrating growing research interest in loneliness interventions. Study distribution included 6 observational studies (Level IV evidence) and 4 randomized controlled/quasi-experimental trials (Level II-III evidence), with geographic concentration in China (5 studies). Long-term care contexts included nursing homes, assisted living facilities and day centers. Most effective interventions identified were: bi-directional interaction promote by online courses (effect size  $d=0.80$ ), structured group activities including singing groups, recreational activities, intergenerational connection, adapted physical activities. Study limitations include small sample sizes, short follow-up periods, and predominance of observational designs.

**Conclusions:** Evidence demonstrates moderate-to-strong effectiveness of multicomponent self-care interventions in reducing loneliness among older adults in long-term care. Self-care emerges as fundamental framework for identifying, monitoring, and managing health-promoting behaviors in this population.

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## The Effectiveness of Body and Movement-Oriented Interventions in Reducing PTSD Symptoms:

### A Scoping Review

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**Keywords:** PTSD; Body and Movement-Oriented Interventions; Scoping Review.

**Objective:** Post-Traumatic Stress Disorder (PTSD) is a debilitating mental health condition characterized by persisting symptoms that require targeted interventions. In recent years, there has been increasing interest in innovative therapeutic approaches for PTSD, particularly Body and/or Movement-Oriented Interventions (BMOIs). Although research has already begun to demonstrate the potential of BMOIs in trauma interventions, knowledge regarding their effectiveness in reducing specific PTSD symptoms remains limited. This scoping review seeks to address this gap by synthesizing the existing literature and evaluating the effectiveness of BMOIs in alleviating PTSD symptoms, namely: 1) re-experiencing, 2) avoidance, 3) negative cognitions and mood, and 4) hyperarousal.

**Methods:** A comprehensive search was conducted across multiple databases to identify relevant studies published between 2018 and 2023. From an initial pool of 95 studies, 15 met the inclusion criteria. These studies were analysed in terms of their design, intervention characteristics and outcomes related to PTSD symptom reduction.

**Results:** Among the 15 included studies, 9 reported significant changes at post-test or follow-up, demonstrating a general reduction or remission of PTSD symptoms in general. Regarding specific symptom clusters, one study reported a reduction in intrusiveness (re-experiencing symptoms) following the intervention. With respect to avoidance, one study showed a decrease in this symptom domain after the intervention. Regarding negative cognitions and mood, six studies indicated that BMOIs reduce anxiety, and two reported a reduction in depressive symptoms. Four studies reported positive effects of BMOIs on variables such as optimism, hope, and positive beliefs about the future. Concerning hyperarousal, one study found a decrease in nervous system arousal patterns.

**Conclusion:** This review suggests that BMOIs may represent promising approaches for the treatment of several PTSD symptoms domains. However, despite being encouraging, these findings constitute preliminary evidence. Further rigorous research is necessary to clarify the role and mechanisms of BMOIs in PTSD treatment.

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## Effects of a 9-month multicomponent program on body composition in children with overweight or obesity

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**Keywords:** Adiposity; Exercise; Health Promotion; Motor Activity; Public Health.

**Objective:** Childhood obesity increases the risk of developing noncommunicable diseases such as type 2 diabetes and cardiovascular conditions. The *Programa de Educação para a Saúde em Movimento* was created to support children aged 6–12 years with overweight or obesity through structured physical activity and health education, within a community-based initiative in partnership with the Municipality of Évora. This pilot study aimed to assess the preliminary effects of a 9-month multicomponent intervention on body composition.

**Methods:** Fifteen children (10 girls, 5 boys;  $8.9 \pm 2.2$  years) participated in three weekly supervised sessions (two land-based and one aquatic), each lasting 60 minutes. Body composition was evaluated pre- and post-intervention using a SECA scale and stadiometer (for BMI and BMI percentile), SECA tape (waist circumference), and DXA (fat mass %, lean mass %, and bone mineral density – BMD). Based on session attendance, participants were divided into two groups: low adherence (<70%; n = 6) and high adherence ( $\geq 70\%$ ; n = 9). Within-group differences were analyzed using the Wilcoxon test, and effect sizes (r) were calculated.

**Results:** In the low adherence group, significant improvements were observed in height (+3.5%), BMI (−4.4%), fat mass (−4.8%), and lean mass (+4.6%),  $p < 0.05$ . The high adherence group showed significant gains in height (+3.9%), BMI (−7.5%), BMI percentile (−5.0%), fat mass (−9.2%), lean mass (+8.0%), and BMD (+4.5%),  $p < 0.05$ . Large effect sizes (r > 0.5) were found in both groups, indicating meaningful changes despite the small sample.

**Conclusions:** This pilot study suggests that a long-term, community-based multicomponent program can induce clinically relevant improvements in body composition in children with overweight or obesity. High adherence appears to amplify the benefits. These findings highlight the importance of sustained participation in structured health-promotion programs targeting pediatric populations. Further research with larger samples is required to validate these results.

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## Multicomponent program enhances motor competence and cardiorespiratory fitness in children with overweight or obesity

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**Keywords:** Aerobic Exercise; Health Promotion; Motor Skills; Physical Fitness; Public Health.

**Objective:** This study was included in the community-based initiative *Programa de Educação para a Saúde em Movimento*, supporting children with overweight or obesity through structured physical activity and health education. Motor competence (MC) encompasses the ability to effectively perform various motor skills, critical during childhood for physical, cognitive, and social development. Cardiorespiratory fitness (CRF) is equally important, serving as a strong indicator of cardiovascular health in pediatric populations. This pilot study evaluated the effects of a 9-month multicomponent program on MC and CRF in children with overweight or obesity.

**Methods:** Fifteen children with overweight or obesity (10 girls, 5 boys; mean age  $8.9 \pm 2.2$  years) participated in three weekly supervised sessions (two on land, one aquatic; 60 minutes each). MC was measured via Motor Competence Assessment (MCA), which includes stability, locomotor, and manipulative domains. CRF was evaluated using the 20m Shuttle Run test. Participants were grouped by attendance: low (<70%, n = 6) and high ( $\geq 70\%$ , n = 9). Changes were analyzed with Wilcoxon tests and effect sizes (r).

**Results:** Significant MC improvements were observed only in the high adherence group, with stability percentiles increasing from 16.3 to 28.7 and total MCA from 23.7 to 30.7,  $p < 0.05$ , both with large effect sizes. CRF improved significantly in both groups: low adherence increased laps from 11.2 to 15.8 (+41.1%) and high adherence from 8.9 to 19.8 (+122.5%),  $p < 0.05$ , both with large effect sizes.

**Conclusions:** These preliminary results highlight the crucial role of sustained adherence in community-based multicomponent programs to improve MC in children with overweight or obesity. While moderate participation may enhance cardiorespiratory fitness, consistent attendance is essential for meaningful MC's development, which supports lifelong physical activity and better health. Strategies to increase engagement are needed to maximize program benefits. Larger studies are needed to confirm these findings.

## Associations between sleep duration and lifestyle behaviors in Portuguese children: preliminary results from RUN UP study

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**Keywords:** Childhood; Dietary Habits; Nutritional Status; Screen Time; Sedentary Behaviour.

**Objective:** To characterise lifestyle behaviours and clinical factors potentially associated with inadequate sleep duration in Portuguese children.

**Methods:** The RUN UP study included 864 children (46.4% girls; mean age  $7.91 \pm 1.22$  years). Anthropometric measurements were evaluated using standard protocols by trained researchers. Parents reported sleep duration, screen time, physical activity, and diet using questionnaires adapted and validated for Portuguese children from the national IAN-AF survey. Participants were categorised based on sleep duration (<9 vs  $\geq 9$  hours/night). Chi-square tests and odds ratios (95% confidence intervals) were used to analyse the associations between sleep duration, lifestyle behaviours, and clinical factors.

**Results:** Insufficient sleep was significantly associated with excessive screen use ( $\geq 2$  hours/day) both for television (unadjusted OR = 1.89, 95%CI [1.33-2.68]) and computer games (unadjusted OR = 2.55, 95%CI [1.54-4.23]). Sedentary behaviours, including lack of sports participation (unadjusted OR = 1.73, 95%CI [1.24-2.41]) and limited active play ( $< 60$  min/day) (unadjusted OR = 1.57, 95%CI [1.14-2.25]) were also linked to shorter sleep. Children who slept less than 9 hours/night had 1.5 times the odds of frequently consuming sweet and savoury snacks (unadjusted OR = 1.52, 95%CI [1.09-2.11]), and 1.8 times the odds of consuming sugar-sweetened beverages (unadjusted OR = 1.82, 95%CI [1.24-2.68]), compared to children who met the recommended sleep duration. From a clinical perspective, children with shorter sleep duration had significantly higher waist ( $P = 0.023$ ) and hip circumferences ( $P < 0.001$ ). In addition, children with overweight (unadjusted OR = 1.43, 95%CI [1.01-2.02]) and those with cardiometabolic risk (unadjusted OR = 2.13, 95%CI [1.27-3.59]) exhibited higher odds of inadequate sleep duration.

**Conclusions:** Insufficient sleep duration in children was associated with excessive screen time, sedentary habits, poor dietary habits, and adverse adiposity-related outcomes. This analysis highlights key behavioral risks and supports targeted prevention. School and family-based interventions should address sleep, screen time, and physical activity. Regional results can guide larger studies and inform child health policies.

## Poor dietary habits are associated with higher screen exposure in children: preliminary results from the RUN UP study

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**Keywords:** Child; Eating Habits; Screen Time.

**Objective:** To analyse the association between screen time, food consumption and health indicators in Portuguese school-aged children.

**Methods:** Data were collected from the cross-sectional RUN UP study, involving 862 children (53.6% boys; mean age  $7.9 \pm 1.2$  years). Children were grouped according to weekday screen time: <2 hours/day (n = 618) and  $\geq 2$  hours/day (n = 244). Lifestyle behaviours, including screen time, and dietary habits were parent-reported. Food consumption was assessed using a 45-item food propensity questionnaire. Health indicators included hip and waist circumferences and waist/height ratio.

**Results:** Children with screen time  $\geq 2$  hours/day had significantly higher hip circumference (mean  $71.1 \pm 8.59$  cm), spent less time in sports (mean  $1.5 \pm 1.74$  hours) and fewer sleep hours (mean  $9.2 \pm 0.81$  hours/night). Cardiometabolic risk (waist/height ratio  $\geq 0.55$ ) was associated with a 78% increase in the odds of excessive screen time compared to those without risk (unadjusted OR = 1.78; 95%CI [1.08-2.95]). Poor dietary habits were also strongly associated with higher screen time exposure ( $\geq 2$  hours/day). Notably, children who frequently consume sweet and salty snacks ( $> 4$  times/week) had 55% higher odds of high screen exposure (unadjusted OR = 1.55; 95%CI [1.14-2.09]), while those who frequently consume sweetened juices/soft drinks ( $> 4$  times/week) had 87% higher odds (unadjusted OR = 1.87; 95%CI [1.30-2.68]), compared to children who consumed these foods and beverages less frequently. Conversely, insufficient leafy vegetables, and oil-seeds consumption ( $< 3$  times/week) were significantly associated with high screen time (unadjusted OR = 1.64; 95%CI [1.19-2.22] and unadjusted OR = 1.92; 95%CI [1.10-3.33], respectively).

**Conclusions:** Excessive screen time exposure was associated with inadequate dietary behaviours. While these associations do not imply causality, it highlights important behavioural patterns. A key limitation of this study is the reliance on parent-reported data, which may introduce reporting bias. Nonetheless, the results highlight the need for greater parental awareness and targeted efforts to reduce screen time and promote healthier habits in children.

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## Costs of health-related behaviours: Health resources' consumption in Portuguese middle-aged and older adults

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**Keywords:** Health Behaviour; Health Expenditures; Health Services Utilization; Aged.

**Objective:** Co-existence of unhealthy behaviours may increase healthcare use, but their associated costs, particularly among older individuals are still unknown. This study aims to determine the costs of clusters of health-related behaviours (HRB) to the Portuguese National Health Service (NHS).

**Methods:** This study analysed 5969 participants aged 50 and over from the Epidemiology of Chronic Diseases Cohort – a nationwide, prospective population-based study conducted between 2011 and 2021. Five clusters of HRB - alcohol consumption, smoking habits, physical activity and diet - were derived with Two-Step Cluster at baseline and fixed through the analysis. A Framework for Imputation and Cluster Analysis was adapted ensuring statistical difference in final memberships. HRB, information on frequency, duration, and reasons for hospitalizations and medical consultations were self-reported. Healthcare costs were estimated by applying nationally legislated official tariffs, adjusted and expressed in 2021 euros. Healthcare costs associated with behavioural clusters were estimated using zero-inflated mixed-effects gamma models with a log link adjusted for age, sex, education, NUTSII, body mass index and multimorbidity.

**Results:** Clusters' classification considered their main characteristics: "Healthy" (n = 1203), "Healthy but Inactive" (n=1506), "Low Fruit and Vegetables" (n = 1683), "Inactive Occasional Drinkers" (n = 1035) and "Unhealthy but High Fruit and Vegetables" (n = 543). Compared to the "Healthy" cluster, with an average cost of 105€ per person, there was statistically significant cost increases of 20% in "Healthy but Inactive" [1.14 - 1.28]; 19% in "Unhealthy but High FVeg" [1.10- 1.29]; and 12% in "Low FVeg" [1.06 - 1.19], with adjusted average costs of 127€, 126€ and 118€, respectively. There was no meaningful difference between clusters in hospitalization costs.

**Conclusion:** Clustered HRB are associated with significant costs to the Portuguese NHS showcasing the need for comprehensive approaches. Considering the observational and self-reported nature of the data, the direction and magnitude of these associations should be interpreted with caution.

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## Innovations in Monoclonal Antibody Manufacturing: The impact of Ionic Liquids

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**Keywords:** Biopharmaceuticals; Downstream Processing; Supported Ionic Liquids; Aqueous Biphasic Systems.

**Objective:** This study investigated the extraction and purification of mAbs (monoclonal antibodies) from real serum-free mammalian cell culture supernatants containing anti-hepatitis C virus (anti-HCV) mAbs, using IL (Ionic Liquid)-based ABS (Aqueous Biphasic Systems) and SILs (Supported Ionic Liquids).

**Methods:** An ABS composed by two polymers, polyethylene glycol (PEG) and dextran, and the IL: 1-butyl-3-methylimidazolium bromide ([C<sub>4</sub>mim]Br) as adjuvant was used to extract and purify mAbs from the cell culture supernatant. Affinity chromatography performed on ÄKTA™ pure system, utilizing two distinct pre-packed SIL columns: [SSi][C<sub>3</sub>mim]Cl and [SSi][N<sub>3888</sub>]Cl employed two distinct purification strategies to address mAbs purification. At the end, mAb's integrity was assessed using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) protocol.

**Results:** The IL-ABS using [C<sub>4</sub>mim]Br allowed a selective partition of mAbs to the top phase, enabling a recovery yield of 85.4% and a purity level of 92.4%. In parallel, by using two chromatographic columns packed with either [SSi][C<sub>3</sub>mim]Cl and [SSi][N<sub>3888</sub>]Cl, it was possible to selectively purify anti-HCV mAbs: (i) in flowthrough mode with [SSi][C<sub>3</sub>mim]Cl; and (ii) in a bind-and-elute mode with [SSi][N<sub>3888</sub>]Cl. In the flowthrough mode protein impurities were adsorbed to the column while mAbs were eluted whereas in the bind-and-elute mode the opposite occurred. In both modes, the protein profile and integrity of anti-HCV mAbs were unaltered. Recovery yield and purity levels analysis are still undergoing.

**Conclusions:** This study demonstrates that ILs, both in ABSs or SILs, allowed the development of an alternative single-step purification strategy for anti-HCV mAbs. Consequently, this shows promise as a substitute for existing downstream processing of mAbs within the industry.

## How does Pearl millet supplementation affect animal welfare in K14-HPV16 transgenic mice?

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**Keywords:** Human Papilloma Virus; *Pennisetum Glaucum*; 3R's Principle.

**Objective:** K14-HPV16 transgenic mice expressing the HPV16 early genes in squamous epithelia are a suitable model for the study of HPV-induced diseases in animals. Monitoring of animal welfare is of paramount importance to the success of an experiment. This study assessed the impact of Pearl millet (*Pennisetum glaucum*) dietary supplementation in the welfare of K14-HPV16 mice.

**Methods:** Ten wildtype and 15 transgenic male K14-HPV16 mice, 19-20 weeks of age, were randomly assigned to the groups (n = 5): I - HPV<sup>-/-</sup> standard diet (4RF21, Mudecola, Itália); II - HPV<sup>-/-</sup> 29% millet diet; III - HPV<sup>+/+</sup> standard diet; IV - HPV<sup>+/+</sup> 29% millet diet; V - HPV<sup>+/+</sup> 36% millet diet. The experimental protocol lasted four weeks and followed European and Portuguese National legislation. Throughout the experiment, the following humane endpoints were assessed once a week and expressed as scores (from 0 to 3): body condition, body weight, food and water intake, posture, coat and grooming, mucosal, eyes, ears and whiskers, mental status, response to external stimuli, hydration status, respiratory rate, body temperature, feces appearance and presence of cutaneous papillomas.

**Results:** Body mass, weight gain, and food and water consumption were similar among groups ( $p>0.05$ ). No alterations in humane endpoints were observed in groups I and II throughout the experiment ( $0.00 \pm 0.00$ ). The score increased from the first to the last week of the experiment in groups IV and V ( $p>0.05$ ). No animals reached the value indicated for euthanasia.

**Conclusions:** *Pennisetum glaucum* does not cause mortality or behavioral changes (changes in posture or response to external stimuli) in K14-HPV16 mice, appearing to be safe in terms of animal welfare.

## Ethics in Dementia Care: Findings from Portuguese family carers

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**Keywords:** Decision Making; Ethical Dilemmas; Informal Caregivers; Neurocognitive Disorders; Qualitative Research.

**Objective:** Dementia is an increasingly pressing global public health issue, with a substantial rise in prevalence anticipated by 2050. This study, conducted within the framework of the European initiative COST Action EDEM (Ethics in Dementia), focuses on the ethical dilemmas reported by family caregivers in Portugal. It aims to examine the ethical challenges, decision-making dynamics, and cultural factors that shape the caregiving experience.

**Methods:** This is a descriptive qualitative study following the Interpretative Phenomenological Analysis approach and guided by Kitwood Patient and Family-Centered Care theoretical framework. It is based on in-depth, semi-structured interviews with family caregivers of people with dementia in Portugal, conducted in July 2024. The data were analyzed using thematic analysis to elicit meaning and explore participants' perspectives.

**Results:** Three major themes emerged from the data, each of which comprises several categories. The first theme, *Progression of Dementia and Challenges in Care Provision*, includes participants' reflections on symptoms and disease progression, the evolving responsibilities of caregivers, their emotional experiences and perceptions, as well as their expectations for the future. The second theme, *What is good dementia care?*, encompasses participants' understanding and definition of good dementia care and the main characteristics of a good caregiver. The third theme, *Ethical Dilemmas in the context of Dementia*, addresses the concept of ethical responsibility and explores the dilemmas participants encounter during care, including their challenges in ethical decision-making, the perceived need for ethical support, the role of values and principles in dementia care, and caregivers' reflections on their own care competencies.

**Conclusions:** The findings highlight the multifaceted ethical challenges faced by family caregivers of people with dementia. These challenges are deeply rooted in personal values, emotional burden, and the complexity of care decisions. The results contribute to a deeper understanding of ethical caregiving, inform guidelines and support strategies for caregivers in Portugal.

## Impact of nanocelluloses on genome-wide DNA methylation pattern of human pulmonary and intestinal cells

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**Keywords:** Gene Ontology; Nanomaterial; Pathway Analysis; RRBS.

**Objective:** Nanocellulose is an innovative nanomaterial with interesting physicochemical properties for several industrial and biomedical applications and its safety for human health must be ensured. This study aimed to identify DNA methylation changes in human pulmonary and intestinal cells after exposure to two fibrillar celluloses with different physicochemical properties, both derived from *Eucalyptus globulus*. Their cellular effects were investigated *in silico* by functional pathway and gene ontology (GO) analysis.

**Methods:** We applied Reduced Representation Bisulfite Sequencing to analyze the methylation differences in DNA CpG-rich regions from human bronchial (BEAS-2B) and intestinal (Caco-2) cells exposed for 24h to 14.3 µg/mL of cellulose nanofibrils (CNF) or microfibrils (CMF) *versus* non-exposed ones. A bioinformatics pipeline was implemented to identify the significant genes ( $p < 0.05$ ) present in regions with a methylation frequency difference  $\geq 75\%$  as compared to the controls, the functional pathways enriched by these differentially methylated genes (DMGs), and GO associations.

**Results:** CNF and CMF exposure resulted in 11 and 14 DMGs, respectively, in BEAS-2B cells, 6 being common to both nanocelluloses. In Caco-2 cells, 36 and 31 DMGs were identified, sharing 12 DMGs. No DMGs were shared between these cell lines. Hypomethylation predominated in BEAS-2B cells, and hypermethylation in Caco-2 cells. In BEAS-2B cells, both nanocelluloses affected similar pathways and GO terms (e.g., regulation of DNA replication, damage repair and senescence, telomere maintenance, and D-glucose transport). In Caco-2 cells, both CNF and CMF enriched, for instance, signal transduction, glycosylation, and cytoskeletal dynamics. Each nanocellulose type also affected other different pathways and terms.

**Conclusions:** Nanocellulose may have a wide impact on the metabolism and survival of pulmonary and intestinal cells through several regulatory pathways, which depend on nanocellulose physicochemical properties. Cell type also influences the outcome, suggesting tissue-specific effects. These findings highlight the relevance of DNA methylation in nanotoxicology, providing insights into underlying molecular mechanisms of action.

## Genotoxic effects of *Alternaria* mycotoxins in human liver HepG2 cells

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**Keywords:** Genotoxicity; Micronucleus Assay; Toxicology; Toxins.

**Objective:** Mycotoxins are natural toxic compounds produced by filamentous fungi as secondary metabolites. Human exposure to mycotoxins occurs predominantly through ingestion of contaminated food, and have been associated with nephrotoxicity, hepatotoxicity, immunotoxicity, carcinogenicity, and teratogenicity. *Alternaria* mycotoxins are produced by black moulds of the genus *Alternaria*, which are common plant pathogens and saprophytes widely distributed in the environment. However, limited toxicological data exists on *Alternaria* mycotoxins. Within the scope of the European Partnership for the Assessment of Risks from Chemicals (PARC; <https://www.eu-parc.eu/>) these toxins were considered as priority substances, and several studies are underway with the aim of filling knowledge gaps regarding their genotoxicity, among other toxic effects.

**Methods:** Genotoxicity was evaluated using the In Vitro Mammalian Cell Micronucleus Assay with cytokinesis block (CBMN) according to the OECD TG 487. HepG2 liver cells were exposed for 48 h to a concentration-range of each *Alternaria* mycotoxin following dose-range finding based on cytotoxicity testing (MTT assay). Vinblastine was used as a positive control.

**Results:** All tested mycotoxins were cytotoxic in the MTT assay and genotoxic in the CBNM assay. In addition to the significant increase in micronucleated binucleated cells, some mycotoxins also induced a significant increase in other nuclear anomalies in HepG2 cells, showing a dose-response relationship.

**Conclusions:** These results indicate that the studied *Alternaria* mycotoxins induce chromosomal damage, which can lead to genomic instability, a key driver in cancer. Therefore, this study contributes to PARC objectives, providing critical toxicological data for their hazard assessment following human oral exposure. The data will contribute to support their risk assessment and management by regulators and policy makers in order to protect human health from these emerging food contaminants.

## The adaptation role of RNase in different *Legionella pneumophila* serogroups from Portuguese clinical isolates

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**Keywords:** Infection; Legionnaires Disease; Ribonucleases; RNA Metabolism; Stress Conditions.

**Objective:** This work aims to study clinical isolates of *Legionella pneumophila* (Lp), recovered from Portuguese patients, to characterize the genetic variability of genes coding for RNases and evaluate the role of RNases in *Legionella* adaptation and survival.

**Methods:** Growth curves were performed at 37°C and 15°C for 7 serogroups 1, 8, 10, 12, and 14 and different allelic profiles of Lp isolates. Sequencing was carried out to assess changes in the *rnr*, *pnp* and *rnc* genes, which code for RNase R, PNPase and RNase III, respectively. The impact of the identified genetic variability on the activity of these proteins will be assessed through activity assays.

**Results:** The findings from the growth curve analysis showed that *Legionella* grows at 15 °C, entering the exponential phase at least 70 hours later than at 37 °C. Revealing different adaptation patterns depending on the serogroup.

The sequence results showed the presence of genetic variability between isolates, resulting in amino acid changes. Initial results of PNPase activity for sgl showed that this enzyme is functional at 15°C.

**Conclusions:** The results of this work will enable us to understand the role of RNases in Lp and the impact that these proteins have in environmental adaptation.

## Hepatitis A in Portugal: Epidemiological Trends in Reported Cases, 1993–2023

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**Keywords:** Hepatitis A; Trend Analysis; Disease Outbreaks; Incidence Rate.

**Objective:** Hepatitis A is a preventable viral infection that continues to cause outbreaks in Europe. In Portugal, long-term data are essential to understand its epidemiology and guide prevention efforts. This study aimed to characterize the epidemiology of hepatitis A in Portugal and identify changes in temporal trends of notified cases between 1993 and 2023.

**Methods:** Retrospective observational study analyzed notified hepatitis A cases in Portugal using data from the Portuguese

Direcção-Geral de Saúde (1993–2016) and ECDC (2017–2023). Descriptive analysis and Joinpoint Trend Analysis (ver.5.4.0) were used to assess temporal trends.

**Results:** Between 1993 and 2023, Portugal reported 4,393 cases of hepatitis A, the majority occurring in males (60.8%) and in individuals aged 0–14 years (45.5%). Hepatitis A incidence declined from 6.3/100,000 inhabitants in 1993 to 0.38/100,000 inhabitants in 2023. The average annual percentage change (AAPC) indicated a significant decrease trend of -4.6% per year ( $p = 0.01$ ) between 1993 and 2023. Joinpoint analysis identified periods of significant decline during 1993–2002 (AAPC: -22.1%;  $p < 0.001$ ), 2005–2013 (AAPC: -38.5%;  $p = 0.006$ ), and 2017–2023 (AAPC: -44.4%;  $p < 0.001$ ), alongside a significant increase from 2013–2017 (AAPC: +217.9%;  $p = 0.025$ ). An increase between 2002–2005 (+37.9%) was not statistically significant ( $p = 0.642$ ). Females experienced a significant decrease (AAPC: -9.56%;  $p < 0.001$ ), while males showed a non-significant decline (-1.90%;  $p = 0.325$ ). All age groups demonstrated significant decrease trends, ranging from -5.1% in 45–64 age group to -12.3% in children aged 5–14 years.

**Conclusions:** Hepatitis A incidence in Portugal has markedly declined over the past three decades, reflecting effective public health measures and changing epidemiological patterns. However, periodic outbreaks underscore the need for continued surveillance and targeted prevention strategies, particularly in vulnerable groups, to prevent occurrences like the outbreak observed in 2017. Sustained efforts are essential to maintain progress and prevent resurgence, especially as natural immunity in the population wanes and vaccination is not included in the national immunization program.

## Integrated Self-Care Nursing Model for Middle-Aged Adults (45–64 years): A Cross-Sectional Study in Alentejo Central

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**Keywords:** Self Care; Middle Aged; Quality of Life; Health Promotion; Community Health Nursing.

**Objectives:** This research aims to develop a Nursing Self-Care Model through the integration of multidimensional health variables, namely: functionality, quality of life, self-care practices, and the impact of nursing care on adults aged 45–64. This age group, often overlooked in scientific research and public health policy development, represents a strategic target for preventive interventions aimed at promoting active and healthy aging.

**Methods:** A quantitative, cross-sectional, and descriptive study was conducted. Validated and structured questionnaires were administered at a single point in time to explore the interrelationships among the health dimensions considered. A stratified random sample was drawn from individuals registered in primary health care units within the Alentejo Central Local Health Unit

(ULSAC). Data were collected using anonymized, self-administered questionnaires and underpin three sequential and integrated studies currently in development.

**Results:** The final sample consisted of 531 participants aged between 45 and 64 (average age: 53), mostly women (77.78%), married (66.1%) and living independently in the community (93.79%). The geographical coverage included the 14 municipalities of Central Alentejo, with the highest representation from the municipalities of Évora (29.38%) and Arraiolos (28.81%). In terms of education, 35.59% had higher education and 30.51% had completed 12th grade. The preliminary overall results for the multidimensional health variables point to: only mild functional problems in self-care among older respondents, average quality of life above 55%, adequate response to self-care practices, but decreasing with age.

**Conclusions:** The data collected are crucial to identifying the nursing care needs of middle-aged adults based on their self-care capacities. The robust sample size and characterization support ongoing statistical analyses. The sequential study design will enable a comprehensive multidimensional analysis, providing an empirical foundation for developing evidence-based public health strategies tailored to promoting active and healthy ageing in Alentejo Central.

### Sleep as a Developmental Mechanism: A Systematic Review of Its Mediating and Moderating Roles in Children Aged 6–12 Years

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**Keywords:** Behavioral Outcomes; Child Development; Emotional Regulation; Screen Time; Sleep Patterns.

**Objective:** This systematic review aimed to synthesize recent empirical findings on the associations between sleep duration, quality, and patterns, and developmental outcomes in typically developing children aged six to twelve years. It also explored whether sleep acts as a mediator or moderator of the effects of contextual factors such as screen time, gender, and socioeconomic status.

**Methods:** Following PRISMA guidelines, a comprehensive search was conducted in the EBSCO, Scopus, and Web of Science databases for studies published between 2019 and 2024. Inclusion criteria required that studies focus on children aged 6–12 years, report on sleep-related variables and developmental outcomes, and investigate potential mediating or moderating roles of sleep. Of the 99 studies initially identified, only 20 met the inclusion criteria, revealing a gap between the volume of research and the specificity needed to address this topic. Most selected studies were cross-sectional and relied on self-reported measures, limiting causal inferences.

**Results:** The review identified consistent associations between higher sleep quality and improved cognitive performance, emotional regulation, and fewer behavioral issues. Several studies supported the mediating role of sleep in the relationship between screen exposure and behavioral outcomes, as well as its moderating

effect on vulnerabilities related to gender and environmental factors. Despite methodological limitations, the findings highlight the potential of sleep-related variables to guide clinical practice and parental interventions, especially in a post-pandemic context where sleep routines may be disrupted.

**Conclusions:** Sleep appears to be a dynamic and modifiable developmental mechanism. Its mediating and moderating roles suggest a valuable opportunity for early detection of risk and implementation of preventive strategies. Future studies should prioritize longitudinal designs and objective assessments to strengthen the evidence base and promote actionable insights in pediatric care and parental guidance.

### Barriers and Facilitators to Clinicians' Recommendations of Care in Rare Tumour Risk Syndromes: A Mixed-Methods Study

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**Keywords:** Behaviour Analysis; Cancer Screening; Hereditary Cancer Syndromes.

**Objective:** Although strategies exist to prevent cancers in individuals with rare tumour risk syndromes (RTRS), healthcare systems often prioritise treatment of manifest cancers over prevention. PREVENTABLE, an EU-Horizon-funded project, aims to assess the clinical, social, and economic impact of implementing preventive care pathways for families affected by RTRS. This study aimed to identify factors influencing clinical teams' recommendations of RTRS-care pathways.

**Methods:** A cross-cultural mixed-methods study was conducted in six European countries (Portugal, Spain, France, Germany, the Netherlands, and Norway) in two phases: (1) a quantitative web-based survey (7-point Likert scale) of RTRS-specialised clinical teams ( $n = 113$ ); and (2) six qualitative focus groups ( $n = 35$ ) to explore barriers and facilitators identified in the survey. Both phases were guided by the COM-B model of behaviour change, categorising behavioural factors into physical and psychological capability (e.g., knowledge), physical and social opportunity (e.g., access, support), and reflective and automatic motivation (e.g., goals, emotions). Survey data were analysed descriptively and inferentially; focus groups underwent thematic analysis.

**Results:** Survey findings highlighted automatic motivation ( $mean = 6 \pm 1$ ) and psychological capability ( $mean = 5.9 \pm 0.8$ ) as the most important COM-B domains. Key barriers included lack of guidelines (42%) and healthcare system complexity (36%),

while facilitators included guideline availability (71%) and access to specialised centres (44%). Qualitative preliminary results supported these findings: psychological capability (n = 338 codes) was reflected in constructs related to professionals' knowledge (n = 59) and communication (n = 116); physical opportunity (n = 163 codes) involved organisational structures (n = 58) and resources (n = 71); social opportunity (n = 135) included interprofessional relations (n = 32); reflective motivation (n = 114 codes) included outcome expectancies (n = 30), professional role (n = 22), and confidence (n = 20); and automatic motivation (n = 30 codes) involved emotional responses (n = 24).

**Conclusions:** These findings highlight factors influencing clinical teams' recommendations for RTRS care pathways, emphasising the need to enhance clinical knowledge, develop clear guidelines, and improve organisational structures and resources to support preventive care implementation.

### Attachment to peers and body experience: The perception of young adults

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**Keywords:** Relational Health; Peers; Interoception; Body Connection; Adults.

**Objective:** The Self originates in the body, and bodily experiences develop from and through relationships. Theorists claim that it is through the ability to feel the body that individuals create a semiology of affect, with relationships being fundamental for internal homeostasis. However, empirical research is still needed to enrich such an assumption. This study aimed to explore how relationships, through attachment to peers, correlate with the body experience of young adults.

**Methods:** Four hundred and forty-three (348 women; 78%) young adults from Portuguese universities (age range 18-25) participated in the study in May 2022, filling out the Peer Scale of the Inventory of Attachment to Parents and Peers, the Multidimensional Assessment of Interoceptive Awareness questionnaire and the Scale of Body Connection. Data was collected using a non-probabilistic, unintentional approach and convenience sampling method. Correlations between the variables and subscales were examined, using biological sex as covariate.

**Results:** Attachment to peers correlated positively with interoceptive body awareness (Self-regulation,  $r = .276$ ;  $p < .01$ ; Trusting,  $r = .365$ ;  $p < .01$ ; Noticing,  $r = .169$ ;  $p < .01$ ; Attentional Regulation,  $r = .212$ ;  $p < .01$ ; and Emotional Awareness  $r = .191$ ;  $p < .01$ ), and negatively with bodily dissociation ( $r = -.359$ ;  $p < .01$ ). In particular, young people with a secure attachment to their peers were more aware of their interoceptive sensations, more able to self-regulate their emotions (based on body signals) and tended to feel their bodies as a safe place. On the other hand, young adults with insecure attachments to their peers showed higher levels of bodily dissociation and lower interoceptive awareness, having difficulty recognizing their emotions and body sensations.

**Conclusions:** Secure attachment to peers is related to being more able to feel the body, to self-regulate and to feel connected with it. Our results encourage the study of interventions that combine and integrate body awareness and relational quality has promising approaches to young adults' emotional health.

### Embodying the Self: Belly Dance as a Pathway to Interoceptive Awareness in Women

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**Keywords:** Body Awareness; Dance; Health, Intervention; Mind-body.

**Objective:** To analize the effects of a belly dance – based intervention on interoceptive awareness in adult women.

**Methods:** This quasi experimental within-subjects study comprised a six-week control period with no intervention followed by a twelve-week intervention period involving a belly dance-based program. The intervention utilized belly dance practice as a mediator, not only to enhance bodily awareness in space—by promoting perception of the body axis, spatial awareness of body segments, and movement imagery—but also to foster self-perception of bodily sensations, emotional expression through the body and movement, and the development of participants' self-concept. Thirteen Portuguese women (20-50 years) were assessed at baseline (B), at post-control (PC) and at post-intervention (PI) by using the Multidimensional Assessment of Interoceptive Awareness. The inclusion criteria were: a) Adult women, b) Absence of motor and/or cognitive impairment, c) Willingness to participate in the intervention, and d) Not having participated in belly dancing classes for at least 6 months.

**Results:** Alternative to parametric tests comparison analysis using the Friedman test followed by pairwise post-hoc testing revealed that the intervention induced improvement in the following MAIA subscales: Noticing (PC:  $3.51 \pm 0.62$  vs. PI:  $4.08 \pm 0.65$ ),  $p = 0.033$ ; Attention Regulation (PC:  $2.64 \pm 1.08$  vs. PI:  $3.52 \pm 0.84$ ),  $p = 0.001$ ; Emotional Awareness (PC:  $3.97 \pm 0.71$  vs. PI:  $4.60 \pm 0.55$ ),  $p = 0.002$ ; Self-Regulation (PC:  $1.05 \pm 0.39$  vs. PI:  $1.46 \pm 0.29$ ),  $p = 0.008$ ; and Trusting (PC:  $3.77 \pm 0.79$  vs. PI:  $4.23 \pm 0.60$ ),  $p = 0.002$ .

**Conclusions:** The belly dance mediated intervention emerged as a pleasurable and engaging practice that significantly enhanced interoceptive awareness in adult women. These results highlight its potential to encourage the adoption of active behavioral patterns, and also demonstrate an effective strategy to promote mind-body health. Limitations include the small sample size, limited literature on belly dance as a psychomotor mediator, and the lack of a separate control group, although a self-control period was incorporated.

## Respiratory Adaptations: Yoga versus Military Aviation Training

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**Keywords:** Respiratory Function Tests; Yoga; Military Personnel; Breathing Exercises; Pulmonary Ventilation.

**Objective:** This study aimed to compare the differential effects of standard military training versus Ashtanga Vinyasa Yoga Supta practice on respiratory functions, specifically FEV1%, FEV6%, and lung capacity, in military aviation pilot trainees.

**Methods:** A randomized controlled trial design was used with military aviation pilot trainees assigned to either a yoga intervention group or a control group. Spirometry measurements (FEV1%, FEV6%, and lung capacity) were collected pre- and post-intervention. Between- and within-group comparisons were performed using estimation plots and 95% confidence intervals.

**Results:** Military training alone (control group) led to significant post-intervention increases in FEV6%, reflecting an enhanced capacity for prolonged forced expiration, likely due to increased general physical conditioning and thoracic robustness. However, no significant gains were observed in FEV1% or lung capacity. In contrast, the yoga group showed a significant improvement in FEV1%, suggesting enhanced control of rapid expiratory function. Interestingly, FEV6% decreased in the yoga group, potentially reflecting a shift toward more economical and less forced breathing, with reduced recruitment of accessory muscles. Lung capacity showed a near significant increase in the yoga group, pointing to improved thoracoabdominal mobility and diaphragmatic activation.

**Conclusions:** Military training alone enhances prolonged expiratory effort (FEV6%) but appears limited in promoting rapid expiratory efficiency or overall lung capacity. In contrast, integrating Ashtanga Vinyasa Yoga Supta fosters respiratory pattern reprogramming toward more efficient, controlled breathing—evident in increased FEV1% and a trend toward greater lung capacity. These findings suggest that yoga may complement military training by improving respiratory readiness for the high-demand conditions faced in military aviation, such as the anti-G maneuvers.

## AI-based Rheumatic and Musculoskeletal Disease Detection with Smartphone-based Digital Biomarkers

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**Keywords:** Artificial Intelligence; Digital Health; Early Diagnosis; Primary Care; Rheumatic Diseases.

**Objective:** This study aimed to evaluate whether smartphone-based digital biomarkers could accurately detect rheumatic and musculoskeletal diseases (RMDs), supporting early diagnosis and referral. Given the complex motor impairments associated with RMDs and the reliance on subjective assessments in clinical settings, this study focused on assessing the diagnostic and stratification potential of digital and objective data from smartphone keyboard and inertial sensors (IMU).

**Methods:** The analysis was conducted using COTIDIANA dataset, which includes clinical, behavioral, and smartphone data from 59 adults (31 with RMDs). Data were collected across three modalities: (1) questionnaires and functional tests (HAQ, EQ-5D-5L, HADS, MPUT), (2) keystroke dynamics retrieved during a smartphone keyboard typing exercise, and (3) IMU data from three walking tasks (Timed Up and Go, Daily Living Activity, Simple Walk). Binary (RMD vs. No RMD) and multi-class (No RMD vs. Inflammatory RMD vs. Non-inflammatory RMD) predictive models were trained per modality, optimised via 5-fold cross-validation and a held-out test set, and evaluated using balanced accuracy, AUROC, and F1 scores.

**Results:** In binary classification, all modalities performed well, with the IMU model on step-segmented TUG data achieving the highest test accuracy. Keystroke models showed high accuracy, especially via flight-time variability features. In multi-class classification, the IMU model outperformed keystroke and questionnaire models, which had lower accuracy and struggled to distinguish RMD subtypes. Feature-importance analysis revealed RMD patients exhibited longer typing and walking latencies than controls.

**Conclusions:** Digital biomarkers derived from keystroke dynamics and inertial sensors demonstrated strong potential for identifying RMDs and stratifying disease types. These findings highlight the value of objective metrics based on smartphone-collected data, combined with AI-driven approaches for enhancing RMD detection and optimising clinical decision-making.

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## Digital health interventions for musculoskeletal conditions in Portugal: use and acceptability of physiotherapists

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**Keywords:** Digital Health; Musculoskeletal Diseases; Physical Therapists.

**Objective:** To determine and characterise the levels of use and acceptability of Digital Health Interventions (DHI) and identify barriers and facilitators to their use by physical therapists managing patients with musculoskeletal conditions.

**Methods:** A cross-sectional observational study was conducted with 166 Portuguese physical therapists between January and November 2024. An online survey, piloted before data collection, was used to gather information on sociodemographic and clinical characteristics, use of DHI across different phases of the clinical intervention, levels of acceptability, and perceived barriers and facilitators to the use of DHI. Descriptive statistics were applied to analyse the data.

**Results:** DHI were most frequently used for clinical documentation (n = 87, 52.4%), and to a lesser extent, for obtaining clinical information (n = 52, 31.3%) and assisting in treatment (n = 40, 24.1%), with electronic messages being the most used DHI method. High acceptability levels of DHI were reported for functions such as recording clinical information (n = 162, 97.6%) and session scheduling (n = 159, 95.8%). The main barriers identified to DHI use in clinical practice were patients' characteristics and the inability to deliver hands-on techniques. Conversely, key facilitators included the improvement in the quality of the service provided and the possibility of complementing the face-to-face format.

**Conclusions:** Given the rising burden of musculoskeletal conditions and limitations in the Portuguese healthcare system, DHI represents a promising avenue to support and enhance care delivery. This study addresses critical knowledge gaps by showing that, although physical therapists report high acceptability, DHI integration into clinical practice remains limited. The identified barriers and facilitators underscore the need for digital solutions that complement, rather than replace, traditional care. Therefore, these findings emphasize the importance of developing user-centred, contextually adapted digital solutions, co-designed with healthcare professionals and patients. Such an approach may improve the quality, equity, and sustainability of DHI for musculoskeletal care in Portugal.

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## Smartphone Use and Tear Film Instability as Risk Factors for Digital Eye Strain in Health Technology Students

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**Keywords:** Accommodation; Binocular Vision; Convergence; Ocular Surface; Tear Break-up-time.

**Objective:** Digital Eye Strain Syndrome (DESS) is becoming increasingly prevalent among university students, largely due to extended use of digital devices and reduced working distances. DESS is considered a multifactorial condition, potentially linked to binocular vision disorders and ocular surface instability. Symptoms such as blurred vision, ocular discomfort, and headaches may negatively impact academic performance. Despite the heightened vulnerability of this population, there is a lack of comprehensive research on the subject. This study assessed the frequency of DESS among health technology students and examined its association with binocular vision anomalies and ocular surface alterations.

**Methods:** This cross-sectional observational study was conducted among undergraduate students at the Lisbon School of Health Technology. Students aged 18-35 from the first three years of the Clinical Physiology, Medical Imaging and Radiotherapy, Orthoptics, and Vision Sciences programs were included due to higher digital device use in clinical training. Demographic data and patterns of digital device usage were recorded, along with clinical assessments of binocular vision (visual acuity, cover test, stereopsis, near point convergence, near point accommodation, accommodative facility and fusional vergence) and ocular surface stability [tear film break-up time (BUT)]. Participants completed three validated questionnaires: Computer Vision Syndrome Questionnaire, Convergence Insufficiency Symptom Survey and Dry Eye Questionnaire-5. Multivariable logistic regression was employed to identify risk factors associated with DESS symptoms.

**Results:** A total of 146 students were enrolled (78.8% female, mean age of  $20.43 \pm 2.78$  years). Participants reported a mean daily screen time of  $11.05 \pm 3.52$  hours. DESS was present in 76.0% of participants, 50.5% of whom exhibited abnormal binocular vision and 97.3% showed ocular surface alterations. Multivariable logistic regression showed that smartphone screen time  $\geq 6$  hours was associated with higher odds of DESS symptoms (OR 2.44, 95% CI = [1.04 to 5.74]), while higher BUT was protective (OR 0.85, 95% CI = [0.72 to 0.99]).

**Conclusions:** A high frequency of DESS symptoms was observed among health technology students. Smartphone use  $\geq 6$  hours and reduced BUT were significant risk factors. No significant associations were found between binocular vision parameters assessed and DESS symptoms. Key limitations of this study include a smaller-than-anticipated sample size and lack of sampling randomization, which limits the representativeness of the study population.

## Discriminative Protein Markers of Second-Hand Smoke Exposure Identified by Shotgun Proteomics

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**Keywords:** Second-Hand Smoke; Plasma and Nasal Epithelium; Shotgun Proteomics; Systemic Inflammation; Response Biomarkers.

**Objective:** Chronic exposure to second-hand smoke (SHS) increases the risk of developing tobacco-related pathologies such as lung cancer and cardiovascular diseases. This study aimed to identify potential protein biomarkers for response and risk assessment of SHS exposure.

**Methods:** A shotgun proteomics approach was employed by using an ESI-LTQ-Orbitrap XL to analyse protein expression profiles in nasal epithelium and plasma samples from healthy, non-smoking restaurant workers (n=40). Participants were categorized based on their exposure to SHS in the workplace into two groups: "non-smokers exposed to SHS" (NSE, n = 21) and "non-smokers not exposed to SHS" (NS, n = 19), the latter serving as the control group. A label-free quantification strategy (PatternLab platform) was used to measure differential protein expression between the two groups. Logistic regression modelling was applied to identify the proteins that best discriminated SHS exposed individuals from non-exposed, with the goal of establishing an expression profile indicative of SHS-related response.

**Results:** In the nasal epithelium, SHS exposure was associated with modulation of proteins involved in HIF1 $\alpha$ -regulated glycolytic pathways, xenobiotic metabolism, cell proliferation, and differentiation. In plasma, differentially expressed proteins were related to systemic inflammation and atherosclerosis. Multivariate logistic regression identified three proteins: Histidine-rich glycoprotein (HRG), Vitamin D-binding protein (GC), and Leucine-rich alpha-2-glycoprotein (LRG1); as significant discriminators of SHS exposure. HRG showed positively associated with exposure (OR = 7.470, p = 0.0067), while GC (OR = 0.214, p = 0.0328) and LRG1 (OR = 0.194, p = 0.0169) showed inverse associations. The combined model achieved a high discriminative performance (AUC = 0.854, Sensitivity = 0.753, Specificity = 0.835).

**Conclusions:** The identified proteins, particularly HRG, GC, and LRG1, are promising response biomarkers for SHS exposure. Their expression profiles may support the development of molecular tools for individual response assessment associated with environmental tobacco smoke.

## Rural-Urban Disparities in Healthcare Access Among Individuals with Osteoarthritis in Portugal

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**Keywords:** Healthcare Access; Inequities; Osteoarthritis; Rural.

**Objective:** This study aimed to examine healthcare access disparities between rural and urban areas among individuals with self-reported OA living in Portugal.

**Methods:** This study involves a cross-sectional secondary analysis of data from the 2019 Portuguese National Health Interview Survey (NHIS), focusing on individuals who self-reported OA. The prevalence of variables related to healthcare access was estimated, including the frequency of healthcare visits, waiting times for medical care, and the impact of financial factors. The odds ratio (OR) for healthcare access between rural and urban residents, adjusted for confounding, was estimated using multivariable logistic regression models. An age-stratified analysis was also performed.

**Results:** A total of 4095 individuals with self-reported OA were included. Confounder-adjusted OR estimates revealed that living in rural areas was associated with a higher likelihood of not accessing physiotherapy treatments (OR 0.680, 95% CI 0.518–0.892), particularly among individuals under 65 years old. Additionally, rural residents were more likely (OR 1.775, 95% CI 1.197–2.633) to experience delays in healthcare services due to distance or transportation issues, with this disparity most pronounced among individuals aged 65 to 79 years.

**Conclusion:** These findings highlight disparities in healthcare access between rural and urban residents with OA, underscoring the need for targeted interventions to improve healthcare availability and reduce inequities.

## Relationship between motor competence (actual and perceived) and parental alliance in school-aged children

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**Keywords:** Childhood; Coparenting; Motor difficulties; Motor performance; Self-report.

**Objective:** To examine the relationship between actual and perceived motor competence and parental alliance in children

aged 6 to 7 years attending the first and second years of schooling in the central interior region of Portugal.

**Methods:** Twenty-six children (46.2% boys and 53.8% girls) and their families participated in the study. Movement Assessment Battery for Children – 2 (MABC-2) and Test of Gross Motor Development – 2 (TGMD-2) were used to measure motor competence in school context. Parental alliance was evaluated through the Parental Alliance Inventory (PAI), completed by parents at home.

**Results:** Descriptive statistics indicate that mothers reported a mean parental alliance score of 87.35 (SD = 10.75; n = 23), while fathers reported a mean of 89.71 (SD = 7.41; n = 21). Manual dexterity (M = 45.23, SD = 28.83) had the highest average percentile score in the M-ABC test, while locomotion (M = 18.15, SD = 11.98) had the highest average percentile score in the TGMD-2 test. Perceived motor competence showed an average score of 40.04 (SD = 5.42), indicating high levels. A significant positive correlation between maternal and paternal parental alliance was found ( $r = 0.714$ ,  $p < 0.05$ ). No significant correlations were found between parental alliance and perceived and actual motor competence. However, mothers of children at risk of motor difficulties reported a mean score regarding parental alliance of 80.33 (SD = 2.08), and fathers 88.33 (SD = 5.51), compared to higher scores in parents of children without motor difficulties (mothers: M = 87.89, SD = 11.22; fathers: M = 90.53, SD = 7.61). Despite only one child being identified with motor difficulties, parental alliance scores in this case showed variability, with the mothers scoring 98.00 and the fathers 80.00.

**Conclusions:** The parental alliance is not significantly associated with either actual or perceived motor competence in this age group (6–7 years). We suggest that future studies consider other age groups and additional variables, such as parenting styles, family environment, as well as individual characteristics of the child and school experiences, among others.

## Burnout in Portuguese Psychomotor Therapists: Socio-Professional Determinants and Association with Health

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**Keywords:** Mental Exhaustion; Well-Being; Mental Health; Portugal; Health Professionals.

**Objective:** The current study was motivated by the lack of research on burnout among Portuguese psychomotricians. Its objectives were to analyze burnout levels and how health, sociodemographic and professional variables relate to burnout.

**Methods:** Seventy Portuguese psychomotricians volunteered to complete the General Health Questionnaire, the Maslach Burnout Inventory-Human Services Survey, a sociodemographic questionnaire, and a questionnaire on professional practices.

**Results:** In this sample, “high” levels of burnout predominate in all three dimensions (emotions exhaustion, 64%; depersonalization, 60%; and personal accomplishment, 100%). Higher levels of emotional exhaustion were associated with high levels of somatic symptoms ( $r_s = .59$ ,  $p < .001$ ), anxiety and insomnia ( $r_s = .55$ ,  $p < .001$ ), social dysfunction ( $r_s = .56$ ,  $p < .001$ ) and severe depression ( $r_s = .35$ ,  $p = .003$ ). Higher levels of depersonalization were associated with higher levels of emotional exhaustion ( $r_s = .52$ ,  $p < .001$ ), personal accomplishment ( $r_s = .60$ ,  $p < .001$ ) and working in intervention with adolescents ( $U = 408.000$ ,  $p = .074$ ). Higher levels of personal accomplishment were associated with fewer somatic symptoms ( $r_s = .32$ ,  $p = .007$ ), anxiety and insomnia ( $r_s = .38$ ,  $p < .004$ ), working in intervention with adults ( $U = 279.500$ ,  $p = .056$ ) and in the nontherapeutic domains ( $U = 84.5000$ ,  $p = .023$ ). The results also indicated that psychomotrician who work in more than three intervention domains have higher levels of anxiety and insomnia ( $U = 99.500$ ,  $p = .052$ ;  $U = 319.000$ ,  $p = .078$ ) and those who have more than five years of service also had higher levels of somatic symptoms ( $U = 225.500$ ,  $p = .021$ ;  $U = 175.000$ ,  $p = .099$ ).

**Conclusion:** It’s essential to carry out new studies with representative samples to enlighten risk and protective factors of psychomotricians burnout in personal, professional and institutional context.

## Shaping the Future of Sports Tech: Perceptions from Young Athletes and Non-Practitioners

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**Keywords:** Sport Technology; Digital Platforms; User Expectations; Technology Adoption; Personalization.

**Objective:** This study explores young people’s perceptions of technology in sports, focusing on its perceived impact on performance, challenges in its use, and expectations for future features.

**Methods:** An online survey was conducted with 86 participants (mean age: 21 years), including 51 regular sports practitioners and 35 non-practitioners. The questionnaire included multiple-choice and ranking questions (order the options to preference) across four dimensions: perceived importance of technology in sports performance, preferred application features, usage challenges, and valued aspects of digital sports platforms.

**Results:** Most sports practitioners (45%) felt that technology supports their sports performance, while 12% saw no benefit. The most desired application features were personalized training plans (81%), personal progress tracking (76%), and daily individual challenges (65%). Among non-practitioners, interactive training challenges and video-based exercises were particularly valued (60%). Key barriers to technology use included cost (53%), lack of technical support (31%), and limited customization (27%). Personalization and price were the most valued features overall (22%). Privacy was the top concern for non-practitioners (23%), regular practitioners prioritized personalization (31%).

**Conclusion:** Technology is perceived as useful in sports, especially by regular practitioners. The most valued features are personalization and progress tracking. Personalization and progress tracking are key expectations, while cost and support remain major barriers. Differences between user profiles suggest a need for differentiated digital solutions.

### Differences between spontaneous behavior during recess and externalizing problems

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**Keywords:** Spontaneous Behavior; Externalizing Behaviors; Playground; Global Navigation Satellite System; Socio-Emotional Competence.

**Objective:** The research aimed to examine the relationship between spontaneous behavior and externalizing problems in first-year elementary school students.

**Methodology:** Spontaneous behavior was represented by the distance from the center of the group, measured through positional data collected by Global Navigation Satellite System (GNSS) devices used by the participants for 5 days in a week during recess. Externalizing problems were measured through the Strengths and Difficulties Questionnaire (Goodman, 1997), from the combination of behavioral problems and hyperactivity subscales (Veiga et al., 2017). The study included 52 children (23 girls) with a mean age of 6.25 years ( $SD \pm .44$  years), from three first-year elementary school classes from a public school in Évora, Portugal. To calculate the associations between spontaneous behavior and externalizing problems, non-parametric correlation tests of Kendall's Tau\_b and Spearman's R $\rho$  were used.

**Results:** The results showed a significant positive correlation between externalizing problems and distance from the center of the group ( $p = .435$ ;  $p < .01$ ;  $\tau = .308$ ;  $p < .01$ ).

**Conclusions:** Our results demonstrate a clear association between externalizing problems and children's tendency to position themselves farther from their peers during recess. Children who exhibit higher levels of externalizing problems are more likely to isolate themselves at the periphery of group activity, thereby

missing valuable opportunities for social interaction and the development of socio-emotional skills. These findings underscore the value of monitoring spontaneous play patterns as an early, non-intrusive indicator of socio-emotional difficulties. Moreover, they highlight the necessity of implementing targeted interventions, both behavioral and environmental, within the playground context to foster inclusion, reduce antisocial conduct, and prevent the emergence of loneliness among young students.

### Grief Intensity and Meaning Reconstruction Among Portuguese Nurses: Psychometric Validation of the TRIG-R

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**Keywords:** Grief, Bereavement, Psychometrics, Nurses, Cross-Cultural Comparison.

**Objective:** This study aimed to translate, culturally adapt and validate the TRIG-R for use among Portuguese nurses.

**Methods:** A cross-sectional psychometric study was conducted with a convenience sample of 407 nurses working in various clinical settings in Portugal. The TRIG-R was translated using forward-backward procedures, followed by a pre-test. For construct validity, the sample was randomly split into two subsamples. An Exploratory Factor Analysis (EFA) was conducted on the first subsample ( $n = 204$ ), and a Confirmatory Factor Analysis (CFA) was performed on the second subsample ( $n = 203$ ) to test the resulting structure. Internal consistency, test-retest reliability and convergent validity were also assessed.

**Results:** The EFA, conducted on the first subsample, supported a two-factor structure (Past and Present Grief), which explained 65.2% of the variance. The CFA, performed on the second subsample, confirmed good model fit indices ( $\chi^2/df = 1.98$ , CFI = 0.963, TLI = 0.949, RMSEA = 0.065). Cronbach's alpha was 0.93 for the full scale. Test-retest reliability was high (ICC = 0.89), and convergent validity with the Grief Experience Questionnaire and the Meaning Reconstruction Inventory was moderate to strong.

**Conclusion:** The Portuguese version of the TRIG-R demonstrates robust psychometric properties and is suitable for assessing grief intensity among Portuguese nurses. Its use may facilitate early identification of those at risk of complicated grief and inform targeted interventions to support psychological well-being and meaning reconstruction.

## Cognitive and Emotional Patterns in Nurses' Experiences of Death: Textual Analysis

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**Keywords:** Grief; Cognitive Patterns; Death; Nurses; Text Analysis.

**Objective:** To identify latent cognitive-emotional structures in nurses' discourse regarding patient death and bereavement care.

**Methods:** This is an exploratory qualitative study based on 22 semi-structured interviews with shift coordinator nurses from a hospital unit. The interview script addressed types of death, grief experiences, emotional regulation, communication with bereaved families, and support from the healthcare team. Interviews were transcribed and formatted to build the textual corpus processed by ALCESTE software. The software conducted lexical analysis, organizing semantic patterns into stable classes.

**Results:** ALCESTE processed 96% of the total corpus, generating 8 stable lexical classes: Class 1 (18.13%), Class 2 (7.84%), Class 3 (16.67%), Class 4 (12.75%), Class 5 (14.22%), Class 6 (9.80%), Class 7 (12.75%), and Class 8 (7.84%). These were interpreted and named as: "Perception of Death", "Nurse's Emotional Ecology", "Humanization of Death", "Coping Strategies", "Communicational Aspects", "Peer Support Dynamics", "Communication with Families", and "Suffering Associated with Death". Data saturation was supported by the semantic stabilization of the lexical classes.

**Conclusion:** Findings highlight the need for (1) ongoing training in end-of-life communication and emotional coping, (2) emotional support structures like peer groups and supervision, and (3) institutional policies for grief management, including symbolic rituals and mental health protocols.

## Effect of an 8-week exercise program under hypoxia in Type II Diabetes and Prediabetic patients in body composition

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**Keywords:** Type II Diabetic; Prediabetic; Hypoxia; Exercise; Body Composition.

**Objective:** This study aims to investigate the effect of an exercise intervention performed under hypoxic conditions on body composition i.e., fat-free mass (FFM) and skeletal muscle mass (SMM).

**Methods:** Forty-nine type II diabetics and prediabetics, divided into 3 groups: Hypoxic group (HG, N = 16), normoxia group (NG, N = 15) and control group (CG, N = 18) voluntarily participated in an eight-week combined exercise study. Training groups trained in either a hypoxic or normoxic environment. HG sessions are divided into 3 phases:  $\text{FiO}_2$  at 17.4%, 16.8% and 16.1%. The subjects underwent two laboratory tests to determine body composition with Medical Body Composition Analyser. The significance level was set at  $p \leq .05$ .

**Results:** ANOVA revealed no significant differences between groups ( $p = 0.59$ ). However, paired t-tests showed significant intra-group changes in HG and NG over time ( $p \leq .05$ ) but no significant change was observed in the control group ( $p > 0.05$ ). Both groups that exercised improved SMM (HG:  $21.21 \pm 6.85$  VS  $21.77 \pm 7.12$  kg; NG:  $21.36 \pm 7.50$  VS.  $21.71 \pm 7.17$  kg  $p \leq 0.05$ ) and FFM (HG:  $47.18 \pm 12.14$  VS  $47.78 \pm 12.85$  kg; NG:  $47.50 \pm 12.94$  VS  $48.31 \pm 12.41$  kg  $p \leq 0.05$ ). HG showed a greater relative increase in SMM (2.7% VS 2.0%) while FFM increase more in NG group (2.0% VS 1.3%). When comparing the magnitude of changes (Cohen's  $d$ ) were clear changes with significant impact ( $d \geq 0.8$ ).

**Conclusions:** The 8-week combined exercise program increases SMM and FFM in type II diabetics and pre-diabetics. Reducing oxygen availability during exercise allows muscle mass gains to be achieved, making it more effective than normoxia environment. We need to consider whether the type and timing of intervention is most appropriate for this population under hypoxic conditions and it would be important to control food intake.

## Red Blood Cell Multiomics Profiling Reveals Potential Biomarkers for Venous Thromboembolism Diagnosis

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**Keywords:** Venous Thromboembolism (VTE); Biomarkers; Proteomics; Metabolomics; Red Blood Cell (RBC).

**Objective:** Venous Thromboembolism (VTE) remains the leading cause of cardiovascular mortality. The diagnosis of acute VTE is based in complex imaging exams. Our goal was to investigate whether patients with acute venous thromboembolism (VTE) exhibit distinct proteomic and metabolomic profiles, which can be proposed as candidate blood-based biomarkers for early diagnosis in emergency settings.

**Methods:** The cohort studied included 62 patients admitted to the emergency room with clinical suspicion of deep vein thrombosis (DVT) or pulmonary embolism (PE). After confirmation of VTE status via gold-standard imaging, plasma and red blood cells (RBCs) were collected from 50 acute VTE and 12 non-acute VTE patients. Proteomic profiling was performed using SomaScan 7K (7,596 proteins), and our previous RBC metabolomics dataset was integrated. Differential analysis and enrichment analysis were conducted.

**Results:** A total of 186 proteins were significantly differentially abundant ( $p < 0.05$ ), including proteins previously associated with cardiovascular conditions, such as Apolipoprotein E, Afamin, Tumor necrosis factor-inducible gene protein 6, and Fibroblast growth factor 16. Previous RBC metabolomics revealed a consistent acute VTE signature, where three metabolites—adenosine 3',5'-diphosphate (AUC 0.983), glutathione (AUC 0.923), and adenine (AUC 0.910)—showed a ROC curve with an Area Under the Curve (AUC) higher than 0.9. Joint multiomics analysis highlighted enrichment in pathways related to coagulation, cytokine signaling, hematopoiesis, PI3K-Akt, and glutathione metabolism.

**Conclusions:** Our findings show that RBCs represent a promising source of biomarkers for early VTE detection. A significant modulation in the proteome/metabolome of that RBCs from VTE patients was observed. The identified proteins and metabolites show diagnostic potential and warrant further validation for use in clinical practice.

## Disability, Functionality, and Health in the School Context: Portuguese Teachers' Attitudes Towards Inclusion and the ICF Framework

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**Keywords:** Disability; Functionality; Health; ICF; Functional Assessment; Teachers' Attitudes.

**Objectives:** This study examined the attitudes of Portuguese teachers toward the inclusion of students with disabilities, with particular attention to the role of the International Classification of Functioning, Disability and Health (ICF) as a framework for understanding functionality and guiding educational responses aligned with inclusive and health-informed approaches.

**Methods:** The study employed a quantitative, descriptive, and correlational design. It was carried out using a structured questionnaire completed by 417 teachers from public schools across mainland Portugal. The instrument comprised demographic variables, Likert-scale items regarding inclusive education and ICF-related perceptions, and one open-ended question. Correlational analyses were conducted to explore associations between participants' professional backgrounds and their perspectives on inclusion and the use of the ICF.

**Results:** Participants generally recognized the ICF's potential to support functional assessment, foster interdisciplinary collaboration, and inform inclusive educational planning. Despite these positive perceptions, several barriers to implementation were reported, including inadequate training, scarce institutional resources, and limited coordination between the education and health sectors. The majority of teachers favored partial inclusion models over full-time integration. Those with specialized training in special education expressed more nuanced views, frequently emphasizing the importance of flexible, context-sensitive strategies informed by student functionality.

**Conclusions:** The findings underscored the relevance of the ICF as a shared biopsychosocial framework capable of aligning educational practices with a broader and more functional understanding of disability. To advance inclusive education, investment in ICF-focused professional development and enhanced intersectoral collaboration appeared essential. Strengthening these areas could contribute to the creation of more equitable and responsive learning environments for all students.

## Effects of a Sensorimotor Training Program on Gait, Balance, and Mobility in Older Adults

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**Keywords:** Gait; Sensorimotor Training; Balance; Mobility; Older Adults.

**Objective:** This study aimed to investigate the effects of a structured sensorimotor training program on gait performance in older adults, focusing on step count, cadence, gait variability, and sample entropy as indicators of motor control and adaptability.

**Methods:** A randomized experimental design was used with 16 community-dwelling participants aged 55 to 80 years. The intervention consisted of a sensorimotor exercise program delivered twice a week for 24 weeks, with progressive increases in intensity. Each session included exercises targeting balance, lower limb strength, coordination, and proprioception. Gait assessment was conducted using the “Phyphox” mobile application and inertial sensors attached to the tibia, providing data on step count, cadence (steps/min), coefficient of variation (CV%) for gait variability, and sample entropy (SaEn) for complexity. Pre- and post-intervention measurements were compared using paired-sample t-tests, and effect sizes were calculated using Cohen’s d.

**Results:** Participants showed significant improvements in multiple gait parameters after the intervention. Mean step count and cadence increased significantly ( $p < 0.01$ ) with moderate-to-large effect sizes ( $d \approx 0.76$ ), indicating enhanced gait speed and mobility. Gait variability (CV%) decreased significantly ( $p = 0.007$ ;  $d = 0.78$ ), reflecting greater consistency and stability during walking. Additionally, sample entropy increased significantly ( $p < 0.001$ ;  $d = -1.08$ ), suggesting improved gait complexity and adaptability, which are key factors for maintaining functional mobility and reducing fall risk in older adults.

**Conclusions:** The sensorimotor training program demonstrated significant positive effects on gait control, stability, and adaptability in older adults. These findings highlight the potential of structured sensorimotor interventions to promote safer and more efficient mobility, contributing to fall prevention and improved quality of life in aging populations.

## Symptom burden, physical activity levels, and awareness of WHO recommendations in people with COPD – findings from the CO[PD]-Pilot project

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**Keywords:** COPD; Exercise; Health Literacy; Patient Education; Physical Activity.

**Objective:** To characterize individuals living with COPD in terms of symptom burden, physical activity levels (PA), and awareness of WHO PA recommendations.

**Methods:** This cross-sectional study was approved by the Ethics Committees of the NOVA National School of Public Health and four Local Health Units in Portugal. Data were collected between April and June 2025 via online survey. Recruitment occurred through national patient and professional associations and referrals by healthcare professionals in the collaborating units. Participants were community-dwelling adults with COPD diagnosis. Instruments included were mMRC, CAT™, IPAQ-SF, and a questionnaire adapted from previous studies to assess knowledge of PA’s recommendations. The questionnaire was cognitively validated through four interviews with individuals living with COPD. No psychometric testing was conducted.

**Results:** Eighty-six individuals (mean age  $65.6 \pm 12.8$  years; 55.8% female) completed the survey. Most were retired (66.3%) and lived in the Lisbon region (61.6%). Among those with spirometry data ( $n = 54$ ), 47.7% were classified as GOLD 1 or 2. The mean mMRC score was 2 ( $SD = 1$ ), and 79.1% reported moderate to very high symptom impact (between 10-40 points on CAT™). Based on the ABE classification, most were classified as B (40.7%) or E (39.5%). Half were classified as minimally active (according to IPAP-sf). Although 77.9% had heard about WHO’s PA recommendations, more than a half could not correctly identify the targets for moderate (51.2%), vigorous (62.8%), or strength training (57%) activities. A significant association was found between PA and correct knowledge of WHO recommendations for moderate-intensity PA ( $\chi^2 = 8.153$ ,  $p = 0.017$ ), with higher knowledge among more active individuals.

**Conclusions:** Although participants met minimum PA levels according to IPAQ-sf, knowledge gaps persist, reinforcing the need for targeted education. Interpretation should consider potential selection bias toward digitally literate individuals.

## Integrated Care Models in the First 12 Months After Birth: Systematic Literature Review

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**Keywords:** Care Model; Postpartum Period; Midwife; Maternal-Child Nursing.

**Objective:** To review available evidence on existing integrated care models that respond to women's needs in the first 12 months after childbirth.

**Methods:** Systematic review of the literature, with the starting question "What are the existing integrated care models that respond to the needs of women in the first 12 months after childbirth?" The PICo strategy was used, in which P-Women, I-integrated care models, Co-postpartum period (up to 12 months). The search was carried out in the EBSCHOhost databases (CINAHL, MEDLINE, Nursing & Allied Health Collection: Comprehensive Edition, Cochrane Plus Collection Database of Abstracts of Reviews of Effects, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, MedicLatina), SCOPUS, ISI WEB SCIENCE, Wiley Online Library. Use of Boolean operators AND and OR. All primary studies published in full text, in English, Portuguese and Spanish, were included. A methodological evaluation of the studies found was carried out, according to the Joanna Briggs method.

**Results:** The first results show that there are few integrated care models in the first 12 months after childbirth. However, those that exist show significant health gains, especially in promoting women's quality of life and well-being during this period. It is worth highlighting the importance that the WHO attaches to the operationalization of these models, where the Specialist Nurse in Maternal and Obstetric Health Nursing (EESMO) assumes the main role in their management, with positive results in relation to women's satisfaction and the quality of care offered.

**Conclusions:** The few models identified demonstrate positive results, with significant gains in women's health, quality of life and well-being. The literature reinforces the relevance of an integrated and continuous approach in this critical period, in line with WHO guidelines, which highlight the importance of EESMO's role in leading and managing this care. Thus, it is imperative to promote the construction, adaptation and implementation of integrated care models that effectively respond to the needs of women in the postpartum period, contributing to the humanization of care and improving maternal health outcomes.

## CID-Sudden or Traumatic Bereavement: An Integrative Dynamic Model of Bereavement Care after Death

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**Keywords:** Bereavement; Bereavement Care; Self-Care; Sudden Death; Theoretical Models.

**Objective:** To propose and justify a new theoretical model – CID-Bereavement (Dynamic Integrative Bereavement Care) – for structuring interventions aimed at adults bereaved by sudden or traumatic death.

**Methods:** Seventeen empirical studies were included based on predefined inclusion/exclusion criteria. Only studies involving adults grieving the sudden death of a loved one were considered. Excluded were studies on anticipatory, prolonged, or complicated grief, perinatal or child loss, and grief over pets. Studies lacking full data (e.g., conference abstracts, reviews) were also excluded. The model was inductively theorized by triangulating key frameworks (Orem, Riegel, Stroebe, and Schut). Interventions were grouped into three axes: clinical-stabilizing (e.g., medication, psychoeducation), relational-symbolic (e.g., support groups, creative writing), and dynamic self-care (e.g., mindfulness, emotional monitoring).

**Results:** Clinical interventions help manage acute symptoms in the short term. Non-clinical approaches foster meaning-making, social connection, and emotional processing, crucial for long-term adaptation. Self-care strategies empower the bereaved to handle emotional and physical fluctuations, promoting resilience and existential growth. The model highlights the therapeutic potential of synchronizing these axes over time.

**Conclusion:** The CID-Bereavement Model advocates for integrated and person-centered bereavement care. It reframes the bereaved as active agents navigating loss across clinical, relational, and symbolic dimensions. This paradigm shifts the focus from symptom control to holistic meaning reconstruction.

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## Monitoring the Mental Health of Portuguese University Students: Insights from Three Academic Years

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**Keywords:** Depressive Symptoms; Anxiety Symptoms; University Students.

**Objective:** To assess the prevalence of depressive and anxiety symptoms in university students across three academic years and the factors contributing to these symptoms.

**Methods:** A repeated cross-sectional study was conducted using independent samples each academic year. An online questionnaire was administered to students from seven higher education institutions during the academic years 2022/2023, 2023/2024, and 2024/2025. Depressive symptoms were assessed using the PHQ-9, and anxiety symptoms using the GAD-7. Descriptive and correlational analyses were performed.

and 2024/2025. Depressive symptoms were assessed using the PHQ-9, and anxiety symptoms using the GAD-7. Descriptive and correlational analyses were performed.

**Results:** The samples included 3399, 2136, and 2212 students, respectively. The prevalence of depressive symptoms was 23.7% in the first year, 24.9% in the second, and 23.4% in the third. Rates of moderately severe symptoms were 30.6%, 31.7%, and 33.1%, respectively, and severe symptoms were reported by 6.9%, 7.2%, and 7.9%. For anxiety symptoms, mild levels were reported by 37.9%, 37.7%, and 36.8%; moderate by 22.8%, 23.5%, and 24%; and severe by 14.3%, 15.7%, and 16.3%. No significant differences were observed across academic years.

Higher levels of depressive and anxiety symptoms were significantly associated with being female ( $p < 0.001$  across all years) and reporting lower socio-economic status ( $p < 0.001$  across all years, except for anxiety in the first year:  $p < 0.05$ ). Conversely, more frequent visits home ( $p < 0.05$  in the first year;  $p < 0.001$  in the second and third) and better perceived academic performance ( $p < 0.05$  in the first year;  $p < 0.001$  in the second and third) were associated with fewer symptoms.

**Conclusions:** There is a persistently high prevalence of depressive and anxiety symptoms among Portuguese university students over the three-year period, with no significant variation over time. Female sex and lower socio-economic status were consistent risk factors, while more frequent home visits and better academic self-perception emerged as protective factors. These findings underscore the urgent need for sustained and targeted mental health interventions in higher education settings, particularly for the most vulnerable student populations.

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