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Contents

1-1 Body Mass Index and Non-invasive Cardiovascular Parameters

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Abstract

Study Aims: Epidemiological studies on body mass index (BMI) and non-invasive cardiovascular parameters are limited and inconsistent. To provide more informative data for further prevention and control, we examined associations between BMI, as well as overweight/obesity, and non-invasive cardiovascular parameters and their dose-response relationships in North Carolina Appalachian adults.

Methods: A total of 71 participants were included in this cross-sectional analysis. Non-invasive cardiovascular parameters included pulse wave velocity for measuring arterial stiffness, augmentation index at 75 bpm for gauging peripheral arterial stiffness, ejection time for indicating left ventricular performance, and Buckberg index for measuring coronary microvascular circulation. Logistic regression models were used for analysis.

Results: Every unit (kg/m^2) increase in BMI was associated with a 25% statistically significant increased multivariable-adjusted odds of higher arterial stiffness (odds ratio: 1.25; 95% confidence interval: 1.04-1.51), a 31% increased adjusted odds of higher peripheral arterial stiffness, a 23% statistically significant increased adjusted odds of worse left ventricular performance, and a 25% statistically significant increased adjusted odds of worse coronary microvascular circulation. Overweight/obesity was associated with a 532% statistically significant increased odds of higher arterial stiffness (6.32; 1.42-28.09), and a 704% statistically significant increased odds of worse left ventricular performance after adjusting for age, sex, physical activity, and body fat percentage.

Conclusions: Increased BMI, especially overweight/obesity, was significantly associated with the increased risk of worse cardiovascular health, measured by non-invasive cardiovascular parameters. Efforts need to be focused on improving interventions to lower BMI/reduce overweight and obesity in North Carolina, especially in Appalachian populations.

Keywords: body mass index, cardiovascular health, pulse wave velocity, AIx75, ejection time, Buckberg

Conflicts of interest: the authors have no conflicts of interest.

1-2 Effect on all-cause mortality of the trajectory of COPD and diabetes: a longitudinal population-based study

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Abstract

Objective

The coexistence of chronic obstructive pulmonary disease (COPD) and diabetes is prevalent but neglected, it is crucial to understand how coexisting diseases develop over time and their associated impacts on all-cause mortality. This study aimed to explore the effect of different trajectories of COPD and DM on all-cause mortality.

Methods

Within the UK Biobank, 499,127 participants (mean age 57.0±8.1 years, 54.4% female) were followed up to detect the onset dates of COPD and diabetes. A multistate model was constructed to model the trajectory from COPD and DM to death. The Cox proportional hazards model was performed to explore the association of temporal sequences of the multimorbidity of COPD and diabetes with all-cause mortality.

Results

During a median of 12 years follow-up, 2493 of 4846 individuals with multimorbidity of COPD and DM were diagnosed with COPD before diabetes (COPD→diabetes). In the multistate model, the transition probability from different states to death throughout the lifespan is in descending order as follows: multimorbidity of COPD and diabetes > COPD > diabetes > no COPD or diabetes. Transition probabilities of all adverse events increased rapidly after 45 years of age. Compared to individuals with diabetes→COPD, those with COPD→diabetes were at a lower risk of all-cause death in never-smokers (HR:0.60, 95%CI: 0.45-0.81; *P*-heterogeneity for smoking<0.001), but no difference in total population and previous/current smokers.

Conclusions

In the presence of multimorbidity of COPD and diabetes, the order in which individuals develop COPD and diabetes can substantially affect all-cause mortality among never-smokers, among whom individuals with COPD→diabetes versus diabetes→COPD have a lower risk of all-cause death. The temporal order of diseases should be considered in the futural study.

Key words: temporal order; COPD; diabetes; all-cause mortality

1-3 Global, regional, and national survey on burden and quality of care index (QCI) of childhood cancer: A systematic analysis of the Global Burden of Disease Study 1990-2019

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Abstract

Background:

Improving the quality of care is vital to enhance outcomes for childhood cancer patients. This study estimated the temporal and geographic distribution of quality of childhood cancer care at global, regional, and country level.

Methods:

Our research collected the data from the GBD 1990-2019, and constructed the Quality of Care Index(QCI) for children with leukemia and brain and central nervous system(CNS) tumors. Estimated average percentage change(EAPC) and 95% confidence interval(CI) were calculated to quantify the temporal trends of QCI, and the gender disparity ratio(GDR) was used to explore differences in QCI across children of different genders.

Results:

In 2019, childhood neoplasms caused 132,194 deaths, and Leukemia and CNS tumors are the two most common malignant cancers in children. From 1990 to 2019, the QCI of CNS tumor displayed an increasing temporal trend with an EAPC of 1.45 (95%CI: 1.41, 1.50), however, QCI of leukemia was steady across years, with an EAPC of -0.05 (95%CI: -0.07, -0.03). In 2019, Western Europe and South Asia was of the highest(94.50) and lowest(57.64) QCI for leukemia, separately; for CNS tumors, High-income Asia Pacific and Central Sub-Saharan Africa was of the highest and lowest QCI, separately. Childhood cancers' QCI was positively correlated with social development level. It was observed a decreasing trend in the middle and low-middle SDI regions, with EAPC of -0.13 (95%CI: -0.16, -0.09) and -0.19(95% CI: -0.20, -0.18), respectively. For CNS tumor, the QCI in low SDI level was only 35.74% of that in high SDI countries. Overall, Boys' QCI was lower than girls and the gender disparity was expanding.

Conclusion:

The results emphasized the urgent need to focus on the vulnerable areas and populations and apply integrated measures to increase access to quality health services to improve the health outcomes for childhood cancer patients.

Keywords:

Childhood cancer; Leukemia; Brain and central nervous system tumors; Quality of Care Index; Estimated average percentage change; Gender disparity ratio

1-4 Screening Key Genes in the Progression of Mild Cognitive Impairment and Type 2 Diabetes: A Comprehensive Analysis

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Abstract

Aim(s) To provide a basis for further research on the molecular mechanisms underlying type 2 diabetes-associated mild cognitive impairment (DCI) using two bioinformatics methods to screen key genes involved in the progression of mild cognitive impairment(MCI) and type 2 diabetes.

Design and Methods: RNA sequencing data of MCI and normal cognition groups, and expression profile and sample information data of clinical characteristic data GSE63060, which contains 160 MCI samples and 104 normal samples, were downloaded from the GEO database. Hub genes were identified using weighted gene co-expression network analysis (WGCNA). Protein-protein interaction (PPI) analysis, combined with least absolute shrinkage and selection operator (LASSO) and receiver operating characteristic (ROC) curve analyses, was used to verify the genes. Moreover, RNA sequencing and clinical characteristic data for GSE166502 of 13 type 2 diabetes samples and 13 normal controls were downloaded from the GEO database, and the correlation between the screened genes and type 2 diabetes was verified by difference and ROC curve analyses.In addition, we collected clinical biopsies to validate the results.

Data Sources: We used two data sets from the GEO database GSE63060 and GSE166502.

Results: Based on WGCNA, 10 modules were integrated, and six were correlated with MCI. Six hub genes associated with MCI (TOMM7, SNRPG, COX7C, UQCRQ, RPL31, and RPS24) were identified using LASSO algorithm. The ROC curve was screened by integrating the GEO database, and revealed COX7C, SNRPG, TOMM7, and RPS24 as key genes in the progression of type 2 diabetes.

Conclusions: COX7C, SNRPG, TOMM7, and RPS24 are involved in MCI and type 2 diabetes progression. Therefore, the molecular mechanisms of these four genes in the development of type 2 diabetes-associated MCI should be studied.

Implications for the profession and/or patient care: Results of this study will help nurses identify diabetic subjects at high risk of cognitive dysfunction based on protein expression in blood, and make nursing plans accordingly.

Keywords: Chronic Illness; Clinical Decision-Making; Dementia; Diabetes; Genetics; Weighted Gene Co-expression Network Analysis, LASSO, Key Genes

Conflict of Interest Statement

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as potential conflicts of interest.

1-5 Longitudinal evidence on transitions of hypertension care stages in six high-income and middle-income countries

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Objective:
To investigate the cross-sectional distributions of hypertension care stages and their longitudinal transitions among high- and middle-income countries.
Methods:
Data from HRS (waves: 2014, 2018; US), ELSA (2012, 2018; England), MARS (2018, 2020; Malaysia), ELSI (2015, 2019; Brazil), HAALSI (2015, 2019; South Africa) and CHARLS (2013, 2015; China) were analyzed. Baseline distributions of hypertension care stages were estimated accounting for the sample weight. We also calculated the weighted probability of transitions between these care stages across two waves, which can be summarized as becoming diagnosed, starting treatment, reaching blood pressure (BP) control, stopping treatment and losing BP control.
Results:
There were higher proportion of undiagnosed hypertension and lower proportion of controlled hypertension in middle-income countries, compared to that in high-income countries (Figure 1). The proportion of people who became diagnosed during follow-up was higher in Malaysia (53.6% [95% CI:48.1 to 59.0]) and Brazil (55.2% [51.3 to 59.0]). The proportions of individuals started treatment were higher in Malaysia and Brazil. The probability of reaching BP control ranged from 19.2% to 42.9%. Among individuals under treatment in baseline, about 5% to 8% discontinued treatment. Additionally, a considerable proportion of individuals lost their control of BP, which is high in Brazil (44.1% [40.4 to 47.8]) and China (42.6% [38.5 to 46.7]) (Figure 2). Large heterogeneity was noted in the proportion of treatment initiation following diagnosis and the achievement of blood pressure control post-treatment, particularly in middle-income countries, where longitudinal management is superior to cross-sectional ones (Figure 3).
Conclusions:
Longitudinal study on hypertension care stage transitions provided additional insight, highlighting that cross-sectional estimations may not accurately depict the true scenario. Our findings suggested that the transitions of hypertension care stages vary widely across different countries.

Keywords:
Hypertension care stage transition; hypertension management; high- and middle-income countries.

Competing Interests:
The authors declare no competing interests.

Acknowledgements:
This study is based on publicly available data from The Health and Retirement Study (HRS), The English Longitudinal Study on Ageing (ELSA), Malaysia ageing and retirement study (MARS), The Brazilian Longitudinal Study of Aging (ELSI), Health and Aging in Africa: A Longitudinal Study of an INDEPTH Community in South Africa (HAALSI) and The China Health and Retirement Longitudinal Study (CHARLS). We would like to thank the research team members, field survey participants and respondents of these survey.

1-6 Benefits of Standardized Chronic Disease Management Programme on Mortality in a Population-based Cohort in China

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Abstract

Background: In China, Basic Public Health Service (BPHS) provides standardized chronic disease management free of charge accessible to all citizens with diabetes and hypertension. However, its benefits on mortality lacks empirical evidence.

Methods: Utilizing health records from around 26 million residents in Shenzhen, Guangdong Province, this study focused on adults diagnosed with diabetes or hypertension at baseline. All-cause and cause-specific mortality data were collected as outcomes. Cox regression models were employed to compare mortality risks between enrollees and non-enrollees, as well as between non-participants, well-controlled and poorly-controlled participants of these programmes, based on average fasting blood glucose or blood pressure levels.

Findings: Among 325117 diabetes and 702913 hypertension patients, programme enrollment was correlated with lower all-cause mortality (diabetes: HR=0·85, 95% CI, 0·79-0·92; hypertension: HR=0·91, 95% CI, 0·86-0·96). Participants also exhibited lower cause-specific mortality rates, particularly from cardiovascular disease, diabetes, and kidney disease. Well-controlled patients demonstrated a significant decrease in mortality compared to their poorly-controlled counterparts. The mortality benefits were especially pronounced among women, migrants, the elderly (aged above 65), and individuals without comorbidities at baseline.

Interpretation: Enrollment in BPHS's chronic disease management programmes markedly decreases the risk of all-cause and cause-specific mortality for diabetes and hypertension patients. This underscores the potential of such government-sponsored, population-wide and standardized project in extending healthy lifespans and preventing premature deaths, providing references to other countries.

Funding: The National Natural Science Foundation of China, the Research Fund of Vanke School of Public Health in Tsinghua University, the Sanming Project of Medicine in Shenzhen.

1-7 Uncontrolled Blood Pressure and Associated Risk Factors among Older Adults under Hypertension Treatment: A Cross-Sectional Survey in Six Low- and Middle-Income Countries

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Objective:
This study aimed to evaluate risk factors for uncontrolled blood pressure (BP) in individuals with treated hypertension, stratified by sex.
Methods:
We used the World Health Organization's Study on global AGEing and adult health (SAGE) in wave 1 (2007-10) conducted in China, India, Ghana, South Africa, Mexico and Russia. The individual-level data from adults aged ≥50 years were pooled in this study. Hypertension was defined as mean systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or controlled hypertension under medication. Sex-specific adjusted multivariable logistic regression models accounting for sample weight were conducted to evaluate the association of socioeconomic and lifestyle behavior risk factors with uncontrolled BP in treated hypertension individuals.
Results:
In 7556 participants who received hypertension treatment, the average age was 66.0 years. The overall prevalence of uncontrolled BP was 73.0% (95% CI, 70.7–75.2), with males having a prevalence of 71.7% (95% CI, 67.5–75.5) and females 73.8% (95% CI, 71.0–76.4). In both sexes, we did not observe the significant association of age with severe uncontrolled BP, except for stage 2 among female (Figure 1). Across sexes and uncontrolled BP stages, persistent risk factors included low income (adjusted odds ratio (aOR), 1.98; 95% CI, 1.22-3.21; and aOR, 2.79; 95% CI, 2.00-3.88, respectively), rural living (aOR, 1.66; 95% CI, 1.07-2.60; and aOR, 1.65; 95% CI, 1.14-2.38, respectively), and overweight or obese (aOR, 2.11; 95% CI, 1.44-3.10; and aOR, 1.68; 95% CI, 1.28-2.20, respectively) (Figure 2, and Figure 3).
Conclusions:
Socioeconomic and behavioral characteristics serve as risk factors for uncontrolled hypertension, varying across different sexes and stages of the condition. Weight and physical activity may be pivotal in effective hypertension management.
Keywords:
Epidemiology; uncontrolled hypertension; lifestyle behavior; Socioeconomic; Low- and middle-income countries
Acknowledgments:
We sincerely thank those who participated in the data collection and management of SAGE.
Conflicts of Interest:
The authors declare no conflict of interest.

1-8 Association of age of onset of hypertension with prediabetes and diabetes[1]

Abstract：Objective To examine the associations of hypertension onset age with prediabetes and diabetes, and to provide evidence for further improving the health care management of hypertension patients. **Methods** Based on the sub-project of "Early Screening and Intervention of Population with High Risk of Cardiovascular Disease", carried out in Changning and Baoshan Districts of Shanghai from 2016 to 2020, we collected data from the survey questionnaire, physical examinations and laboratory tests. Multivariate logistic regression analysis was used to analyze the associations between age at onset of hypertension and the risk of diabetes and prediabetes. **Results** Among 25 228 finally included participants, 14 177 were in the normotensive group, 1 779 in the hypertensive age group <45 years old, 3274 in the 45-54 age group, 3781 in the 55-64 age group, and 2217 in the ≥65 age group. The risk of diabetes and prediabetes decreased with increasing age of hypertension onset. Compared with the normotensive group, the risk of diabetes was significantly higher in the hypertension onset age group <45 years old, 45-54 years old, 55-64 years old and ≥65 years old group, with OR (95%CI) 2.30 (1.91 ~2.77), 2.35 (2.02~2.73), 1.91 (1.67~2.18), 1.31 (1.13~1.53), respectively, the risk of prediabetes was also significantly higher in these hypertensive age groups, with OR (95%CI) of 1.34 (1.16-1.55), 1.36 (1.21-1.54), 1.38 (1.24-1.53), 1.11 (0.99-1.25), respectively. **Conclusion** Hypertensive patients with earlier onset age are at high risk of diabetes. Therefore, during the regular health management for these hypertensive patients, other factors such as the onset age should also be considered, so that the high-risk groups of diabetes might be identified, and more targeted blood pressure/blood glucose intervention could be carried out to further lower their risks of cardiovascular complications.

Keywords : Hypertension；Prediabetes；Diabetes；High-risk population

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1-9 A cross-sectional analysis of associations between visceral adipose tissue area (VATA)， subcutaneous fat area (SFA) and cardiovascular diseasesins: NHANES 2015-2018.

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Introduction: Obesity is a significant factor in the development of various diseases and is a primary contributor to chronic health issues. Despite this, the specific impact of visceral adipose tissue area (VATA) and subcutaneous fat area (SFA) on cardiovascular diseases remains understudied. This research aims to delve into the connection between fat distribution patterns and cardiovascular disease.

Methods: Utilizing data from the National Health and Nutrition Examination Survey spanning 2011 to 2018 (comprising 8916 individuals), we conducted a secondary analysis. Key variables investigated included VATA, SFA, and the prevalence of cardiovascular diseases. Our analytical approach involved multifactor logistic regression model, smoothing curve fitting, and weighted Generalized Additive Model (GAM) regression to explore the relationship between cardiovascular diseases and VATA, SFA, as well as waist circumference. Subgroup analyses and interaction tests were additionally conducted.

Results: Upon adjustment for various factors, the association between VATA and cardiovascular diseases remained robust, with an odds ratio (OR) of 1.12 95 % CI: 1.06, 1.26). Conversely, we did not observe statistically significant relationships between SFA and cardiovascular diseases. Notably, VATA exhibited a stronger association with cardiovascular diseases than BMI (OR = 1.04, 95 % CI: 1.03–1.06) and waist circumference (OR = 1.03, 95 % CI: 1.02–1.03). Individuals in the highest quartile (Q4) of VATA had a 14 % higher likelihood of cardiovascular diseases compared to those in the lowest quartile (Q1) (OR = 1.14, 95 % CI: 1.12-1.34). Subgroup analyses and interaction tests revealed a consistent relationship between cardiovascular diseases and VATA.

Conclusion: Our findings highlight a positive association between VATA and cardiovascular diseases, surpassing the predictive power of BMI and waist circumference. This underscores the potential significance of VATA in the prevention of cardiovascular diseases and the enhancement of prognosis within the population.

Keyword: Obesity, cardiovascular diseases , VATA, SFA

Conflict of Interest: The authors declare that they have no conflict of interest.

1-10 Body composition derived subtypes with distinct metabolic signatures and cardiovascular risks in Tibetan Adults

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Abstract:

Objective: To subtype Tibetan adults (n=1248) by cluster analysis based on body composition indicators and to determine whether the subgroups carry distinct metabolic features associated with cardiovascular risks.

Methods: We did k-means cluster analysis on 1248 participants from the community-based open cohort of Tibetan populations in the Golmud City suburb (2800 m above sea level). Subtypes were based on age and 7 non-invasive body composition variables, i.e., BMI, skeletal muscle index (SMI), visceral fat level (VFL), basal metabolic rate (BMR), waist-hip ratio (WHR), fat mass index (FMI), and lean mass index (LMI). Distinct metabolite signatures of subtypes were derived using Least absolute shrinkage and selection operator (LASSO) regression, and their associations with cardiovascular outcomes were assessed using logistic regression analysis.

Results: Five distinct subtypes with significantly different characteristics were identified. Subtypes 1, 2, and 4 had average age >40, which were characterised by moderately high-fat mass and low BMR (n=348), severely high BMI and fat mass (n=158), and high lean mass and BMR (n=235), respectively. Subtype 3 and 5 had average age < 40, with Subtype 3 presenting with high fat mass and Subtype 5 with high lean mass. Subtypes 2 and 4, as well as their representative metabolites, are positively associated with hypertension, hypertriglyceridemia, hypercholesterolemia, metabolic syndrome, prediabetes, and type 2 diabetes. Opposite associations were observed for Subtypes 3 and 5. Associations with cardiovascular outcomes were strengthened among participants living at ultra-high altitude (>4000 m above sea level), whilst Subtype 1 demonstrated a strong association with metabolic syndrome, specifically under ultra-high altitude conditions.

Conclusion: Body composition-derived subgroups in Tibetans had distinct metabolite signatures related to varying cardiovascular risks, possessing an actionable approach to stratify the heterogeneous population for precision interventions.

Keywords: Body composition, K-means, distinct subtypes, lipoprotein metabolites, Tibetans

Conflict of interest: None declared.

1-11 Prediagnosis Depression Rather Than Anxiety Symptoms Is Associated with Decreased Ovarian Cancer Survival: Findings from the Ovarian Cancer Follow-Up Study (OOPS)

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Abstract

Background: The relationship between prediagnosis depression, anxiety symptoms, and ovarian cancer (OC) survival is unknown. We aimed to explore these associations to provide further epidemiological evidence.

Methods: We investigated the relationship between prediagnosis depression, anxiety symptoms, and OC survival in a prospective cohort study of newly diagnosed OC patients aged 18–79 years. Depression and anxiety symptoms were assessed using the Patient Health Questionnaire 9 and Generalized Anxiety Disorder 7 at diagnosis, respectively. Deaths were ascertained until 31 March 2021 via medical records and active follow-up. Multivariable-adjusted Cox proportional hazards regression was used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) with prediagnosis depression and anxiety symptoms and all-cause mortality of OC.

Results: We found 56 (9.4%) and 235 (39.3%) OC patients with depression and anxiety symptoms, respectively. During a median follow-up of 37.2 months (interquartile range 24.7–50.2 months), 130 deaths were confirmed. Compared with non-depression symptoms, patients with prediagnosis depressive symptoms showed a significantly increased risk of OC mortality (HR = 2.10, 95% CI: 1.20–3.70). Of note, the association was still robust when focusing on the OC patients with severe depressive symptoms (HR = 2.10, 95% CI: 1.07–4.12). However, we observed no association between prediagnosis anxiety symptoms of different severity and OC mortality. Interestingly, OC patients with combined moderate depression and anxiety symptoms had a significantly increased risk of OC mortality (HR = 3.23, 95% CI: 1.14–9.11) compared to those with no symptoms of depression and anxiety. Notably, Wilms's tumor 1 was significantly associated with depression and anxiety symptoms ($p < 0.05$).

Conclusions: Prediagnosis depression increases the risk of OC mortality. Large multicenter studies are required to confirm this finding.

Keywords: anxiety; cohort; depression; ovarian cancer; survival

1-12 Association of visceral fat-to-muscle mass ratio and exacerbation in chronic obstructive pulmonary disease patients: A prospective cohort study

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Abstract

objective Visceral fat and muscle mass might be related to the prognosis of chronic obstructive pulmonary disease (COPD). We investigated the associations of the visceral fat-to-muscle mass ratio (VMR) with COPD exacerbation.

Methods This prospective cohort study of patients with COPD was performed between May 2018 and December 2023. The numbers of COPD exacerbations were monitored. Cox regression analyses were applied to assess the associations of obesity with COPD exacerbation. Harrell's concordance statistic (C-statistic), receiver operating characteristic curves utilized to evaluate the predictive performance of each obesity index. In addition, the relationships between VMR for COPD exacerbation by restricted cubic spline analysis. Zero-inflated Poisson regression were used to analyze VMR and exacerbation times.

Results In total, 631 patients with COPD were included. Of these, 186 (29.48%) and 304 (48.18%) patients experienced COPD exacerbation within 1 and 5 years. Compared with body mass index, visceral fat area, and waist circumference, VMR had stronger associations with COPD exacerbation. The area under the curve of VMR for predicting 5-year exacerbation was 0.703(95% CI =0.665-0.739). Harrell's concordance statistic was 0.746 (95% CI = 0.699–0.793). VMR had a positive linear correlation with COPD exacerbation. With each one-standard deviation increase in VMR increasing the risk of 1-year exacerbation (odds ratio= 1.912, 95% confidence interval [CI] = 1.042–1.463), 5-year exacerbation (hazard ratio [HR] = 1.234, 95% CI = 1.042–1.463). And the number of COPD exacerbations increased by 48% for each one-point increase of VMR. The major results remained unchanged in the sensitivity analyses.

Conclusions VMR had stronger associations with COPD exacerbation than other obesity indices in patients with COPD. Strategies to control visceral fat and increase muscle mass should be considered in COPD management.

Keyword Visceral fat, muscle mass, exacerbation, chronic obstructive pulmonary disease

Competing interests This paper does not have any competing interests.

1-13 A Mouse Model for Targeting Macrophage Clearance Based on Ultrasound

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Background: Ultrasound boasts high spatial resolution, low cost, good biosafety, and excellent portability. Leveraging these advantages, researchers are dedicated to designing and developing ultrasound-responsive biomedical materials, utilising the characteristics of ultrasound such as cavitation, sonodynamics, and thermodynamics to treat and diagnose diseases. Macrophages are a type of critical immune cell primarily involved in phagocytosis, playing a key role in inflammatory responses, immune regulation, and tissue repair. They are closely associated with the development and modulation of various diseases. Consequently, macrophage clearance can help control disease progression and improve clinical outcomes.

Objective: To design an ultrasound-responsive hydrogel for the clearance of exogenous macrophages in bone marrow-transplanted C57 mice.

Methods: Bone marrow cells from 6-8 week-old female C57 mice carrying green fluorescent protein (GFP) were harvested and transplanted non-competitively into recipients via tail vein injection, with untreated wild-type mice serving as controls. Peripheral blood samples were collected from the mice at 1, 2, 3, and 4 weeks post-modeling (upon model completion). Flow cytometry was employed to compare and observe changes in the number of GFP-positive cells in the peripheral blood of wild-type and bone marrow-transplanted mice. Mice were injected with GelMA hydrogel loaded with CCL2, GM-CSF, and the sonosensitizer Ce6, followed by ultrasound treatment. Changes in the number of GFP-positive cells in the peripheral blood post-treatment were observed.

Results: (1) The non-competitive mouse bone marrow transplant model was successfully established through tail vein injection of bone marrow cells, with the proportion of GFP-positive cells in the peripheral blood of bone marrow-transplanted mice gradually increasing; (2) The proportion of GFP-positive cells in the mice decreased following the injection of the hydrogel and ultrasound treatment.

Conclusion: The use of ultrasound-responsive hydrogel can effectively target and clear exogenous macrophages in mice, laying the groundwork for subsequent experiments.

Keywords: Ultrasound, Hydrogel, Macrophages, Bone Marrow Transplantation

1-14 Aortic Stiffness Measured by Carotid Femoral-Pulse Wave Velocity at Different Stages of Normal Glucose, Prediabetes, and Diabetes Mellitus: A Systematic Review and Meta-Analysis

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Abstract

Objective: To explore aortic stiffness measured by carotid femoral-pulse wave velocity (cf-PWV) at different stages of normal glucose, prediabetes, and diabetes mellitus (DM). **Methods**: The literature comparing aortic stiffness (AS) with cf-PWV between DM and non-DM samples was systematically retrieved from Pubmed, Ovid Medline, Web of Science, Embase, Scopus, CNKI, and Wanfang databases. The Newcastle–Ottawa Scale was used to assess the quality of the literature. The primary endpoint was the mean difference (MD) of cf-PWV between the normal glucose and DM samples and normal glucose and prediabetes samples. The secondary endpoints were the MD of carotid intima-media thickness (cIMT) and carotid-radial pulse wave velocity (cr-PWV). Aggregated MD and 95% confidence intervals were calculated. When the I^2 value was >50% or $p < 0.01$, the heterogeneity was considered large, and the random-effect model was used; otherwise, the fixed-effect model was used. A sensitivity analysis was conducted to identify the source of heterogeneity, and a funnel plot and the regression Egger test was utilized to assess the publication bias. **Results**: A total of 37 studies were finally enrolled. Samples with DM had a higher cf-PWV value and cIMT value than those without DM, and the differences were statistically significant. The cr-PWV measurements tended to be higher in the DM group than in the non-DM group, but the difference was not significant. Samples with prediabetes also had a significantly higher cf-PWV value than samples with normal glucose. **Conclusions**: Samples with DM and prediabetes were associated with a higher cf-PWV value, indicating that DM patients had a higher central AS. Central AS progresses at the prediabetes stage. These data provide insight into understanding the mechanism of adverse effects of DM and prediabetes on artery stiffness.

Keywords

aortic stiffness; carotid-femoral pulse wave velocity; diabetes mellitus; prediabetes; systematic review

1-15 Investigation of arterial stiffness and its influencing factors in prediabetic population

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【**Abstract**】 **Objective** To explore the level of arterial stiffness and its influencing factors in prediabetic population. **Methods** From June 2021 to June 2022, 207 prediabetes patients were randomly recruited from the physical examination center and outpatient clinic of Tangdu Hospital of Air Force Military Medical University to be the prediabetic group and 130 healthy volunteers with the same gender and age as the healthy controls. The carotid-femoral pulse wave velocity (PWV), brachial-radial PWV, and femoral-ankle PWV were measured by an automatic ultrasonic arterial stiffness measurement technology. The common carotid artery wall intima-media thickness (IMT) and left heart function were routinely evaluated. A questionnaire was designed to investigate the subjects' smoking, drinking, diet, staying up late, exercise and other living habits. Comparison between groups and multivariate linear regression analysis were used to analyze the relevant data. **Results** The carotid-femoral PWV and common carotid artery wall IMT in prediabetic group were significantly higher than those in healthy controls [(7.10±2.00)m/s vs (6.26±1.14)m/s and (0.57±0.11)mm vs (0.51±0.08)mm; both $P < 0.001$], and there were no significant differences between the brachial-radial PWV and femoral-ankle PWV between the two groups ($P>0.05$). Multivariate linear regression analysis showed that prediabetes was an independent influencing factor in carotid-femoral PWV after adjusting for confounding factors ($P<0.001$), in addition, age ($P<0.001$), diastolic blood pressure ($P<0.001$), staying up late ($P=0.011$) and low density lipoprotein cholesterol ($P=0.022$) were also the independent influencing factors of carotid-femoral PWV. **Conclusions** Compared with healthy people, the stiffness of aorta is significantly increased in prediabetic people, but there is no significant change in the stiffness of peripheral arteries. prediabetes, age, diastolic blood pressure, staying up late and low density lipoprotein cholesterol are independent influencing factors of carotid-femoral PWV.

【**Key words**】 Prediabetes; Arterial stiffness; Pulse wave velocity; Ultrasonic Doppler;

1-16 Study on the risk of coronary heart disease with type 2 diabetes in young and middle-aged people: Sex differences

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Abstract
Objective: The study aimed to evaluate the sex differences for the risk of coronary heart disease (CHD) with type 2 diabetes (T2D) in young and middle-aged people.
Methods: A total of 1071 CHD with T2D adults were selected from the National Population Health Data Center. Weighted univariate and multiple logistic regression analyses were used to estimate the odds ratios with 95% confidence intervals.
Results: The CHD prevalence among patients with T2D was 35.29% (36.47% and 32.49% for males and females, respectively), which increased with BMI (33.22%, 34.69% and 41.83% for BMI groups <25 kg/m^2, 25 to <30 kg/m^2 and ≥30 kg/m^2, respectively). Weighted logistic regression analyses showed that age, hypertension, TG, HDL and CRP was significantly associated with CHD among patients with T2D in males, while the significant association of age and hypertension were observed in females.
Conclusions: Sex, age, hypertension, TG, HDL and CRP were significantly associated with CHD among patients with T2D. However, such association differed by sex. Such sex disparities should be considered in the prevention and treatment of CHD among patients with T2D, particularly, in young and middle-aged people.

Keywords: Coronary heart disease, Type 2 diabetes, Young and middle-aged people, Sex differences

Conflicts of interest
The authors declare that there is no conflict of interest.
Acknowledgements
The authors thank the National Population Health Data Center for providing the data.

1-17 Exploration of Intervention Strategies for Abnormal Lipophagy in Non-alcoholic Fatty Liver Disease and Evaluation of Their Effects by Ultrasonic Imaging

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Objectives: Nonalcoholic fatty liver disease (NAFLD) is the most prevalent chronic liver disease worldwide. Conversely, advanced fibrosis has been identified as a significant determinant of long-term outcomes and mortality. The progression from simple steatosis or steatosis with mild inflammation to bridging fibrosis *occurs* concurrently with the transformation of steatohepatitis. One key factor driving this process is the impact of lipotoxicity on hepatocytes, inducing endoplasmic reticulum stress, oxidative stress, and mitochondrial dysfunction. This increases the risk of progressive liver disease and contributes to nonalcoholic steatohepatitis (NASH), characterized by inflammation, ballooning, and fibrosis. Under physiological conditions, a balance between triacylglycerol (TAG) and free fatty acid (FFA) levels in the liver is maintained through neutral lipolysis and/or lipophagy for TAG breakdown into FFA or esterification for FFA synthesis into TAG. However, impaired fat phagocytosis has been observed in the livers of NAFLD patients; thus reinstating impaired fat phagocytosis may serve as an effective therapeutic strategy.
Methods: Heat shock cognate protein 70 (HSC70) functions as a chaperone protein that initiates lipophagy, potentially promoting lipophilia. Transcription factor EB (TFEB) regulates lipophilia by controlling lysosomal activity and biogenesis. Overexpression of TFEB could serve as an alternative approach to enhance lipophilia. Rapamycin, an mTOR inhibitor, can activate ULK1 to initiate autophagy and regulate the nuclear translocation of TFEB for autophagy regulation. Exosomes, natural carriers of signaling molecules, possess desirable properties for therapeutic delivery including biocompatibility, circulatory stability, permeability across biological barriers, low immunogenicity and toxicity levels. Moreover, exosomes naturally target the liver making them highly effective in drug delivery strategies. Imaging examination provides intuitive and specific results; ultrasound elastography is particularly convenient and easy to use in clinical practice. Furthermore, it allows repeated examinations over time which makes it a convenient and rapid method for diagnosing and grading fatty liver and fibrosis in NAFLD.
Results: Treatment of the C57/6J fatty liver model with exosome-mediated delivery of small molecular proteins, mRNA, and compounds led to a reduction in hepatic steatosis and improvement in blood biochemical parameters.
Conclusion: Investigating hepatocyte lipophilia holds promise for the treatment of patients with moderate to severe nonalcoholic fatty liver disease.
Key words: Hepatocytes; Lipophilia; Exosomes; Nonalcoholic Fatty Liver Disease

Conflicts of Interest: There is no conflict of interest.

1-18 Analysis on the prevalence of HIV/AIDS combined with chronic diseases and related lifestyle characteristics in Xining, Qinghai Province

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Abstract: Objective To understand the prevalence of major chronic diseases and related lifestyle characteristics of people living with HIV/AIDS (Human Immune Deficiency Virus/Acquired Immune Deficiency Syndrome, HIV/AIDS) in Xining, Qinghai Province so as to provide a scientific basis for the prevention and regular treatment of chronic diseases in HIV/AIDS population. **Method** From February to July in 2023, a cross-sectional investigation including questionnaire survey, physical examination and laboratory data collection was conducted in HIV/AIDS population receiving antiviral treatment in Xining, Qinghai Province. **Results** A total of 468 subjects were included with an average age of 45.01±12.63 years, 57.0% of them were homosexually transmitted infection and 41.7% of them were heterosexual transmitted infection. The average year of diagnosis was 5.45±3.34 years; The average number of the latest CD4 $^{+}$T cell counts was 509.84±237.15. The smoking rate, drinking rate in the past 12 months and regular physical exercise rate among the respondents were 38.5%,38.9% and 39.0% respectively, the proportion of overweight and obesity were 29.9% and 9.1% respectively; There were 245 subjects who combined with chronic diseases with a proportion of 52.4% among which the top six chronic diseases were hypertension (29.5%), depression (26.3%), diabetes (6.4%), chronic bronchitis (3.2%), coronary heart disease (2.1%) and malignant tumor (1.1%) respectively. **Conclusio**n The prevalence of major chronic diseases such as hypertension, diabetes and depression as well as unhealthy lifestyle factors were relatively high in HIV/AIDS population in Xining, Qinghai Province. High importance should be placed on chronic disease prevention health education in this population, much effort need be made such as regular monitoring of the relevant biochemical indicators and paying attention to their mental health so as to improve the life quality of HIV/AIDS population in multiple dimensions.

Key words:HIV/AIDS; Chronic diseases; Lifestyle characteristics;

Declaration of competing interests:

The authors declare that they have no competing interests.

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1-19 Plasma metabolites of kynurenine pathway and risk of stroke in the general population: a nested case-control study

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Running title: Kynurenine pathway metabolites and stroke risk

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Abstract

Background: Kynurenine pathway have been linked to several cardiovascular diseases, but their specific associations with stroke risk remain elusive. This study aimed to explore the associations between kynurenine pathway metabolites and stroke risk.
Methods: A case-control study was performed nested in a community-based cohort from 2013 to 2018 (n=16,113). A total of 412 incident stroke cases and 412 controls matched by age and sex were included. Plasma levels of kynurenine pathway metabolites, including tryptophan, kynurenine, kynurenic acid (KYNA), 3-hydroxykynurenine (3-HK), 3-hydroxy anthranilic acid (3-HAA), anthranilic acid (AA), and xanthurenic acid (XA), were measured by ultrahigh performance liquid chromatography-tandem mass spectrometry. Conditional logistic regression analyses were used to calculate odds ratios (ORs) and their 95% confidence intervals (CIs) between these biomarkers and stroke risk.
Results: After adjustment for body mass index, current smoking, marital status, estimated glomerular filtration rate, and physical activity, the corresponding OR for the highest versus lowest quintile of total stroke was 0.56 (95% CI: 0.36-0.89, *P* trend = 0.018) and 0.48 (95% CI:0.55-0.81, *P* trend = 0.015) for ischemic stroke, respectively. No significant association was found among plasma tryptophan, kynurenine, KYNA, 3-HK, 3-HAA, and AA with stroke risk.
Conclusions: Our novel findings indicate an inverse association between plasma XA and the risk of total stroke and ischemic stroke in the general population.
Keywords: kynurenine pathway; stroke; risk; plasma xanthurenic acid

1-20 Susceptibility gene identification and risk evaluation model construction by transcriptome-wide association analysis for salt sensitivity of blood pressure

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Abstract

Background: Blood pressure salt sensitivity (SSBP) is an intermediate phenotype of hypertension and is difficult to diagnose accurately in the population. So, we aimed to identify genes related to susceptibility to the SSBP, construct a risk evaluation model, and explore the potential functions of these genes.

Methods and Results: A genome-wide association study of the systemic epidemiology of salt sensitivity (EpiSS) cohort was performed to obtain summary statistics for SSBP. Then, we conducted a transcriptome-wide association study (TWAS) of 12 tissues using FUSION software to predict the genes associated with SSBP and verified the genes with an mRNA microarray. The potential roles of the genes were explored. Risk evaluation models of SSBP were constructed based on polygenetic risk scores (PRSs), polygenic transcriptome risk scores (PTRSs) and combinations of the identified genes and covariates from the TWAS. The TWAS revealed that 2605 genes were significantly associated with SSBP. Among these genes, 69 were differentially expressed according to the microarray analysis. The functional analysis showed that the genes identified in the TWAS were enriched in metabolic process pathways. Multiple logistic regression models revealed that a PRS of $P<0.05$ had the best predictive ability compared with other PRSs and PTRSs. The combinations of PRSs and PTRSs did not significantly increase the prediction accuracy of SSBP in the training and validation datasets.

Conclusions: Several known and novel susceptibility genes for SSBP were identified via multitissue TWAS analysis. The risk evaluation model constructed with the PRS of susceptibility genes showed better diagnostic performance than the transcript levels, which could be applied to screen for SSBP high-risk individuals.

Keywords: Salt sensitivity of blood pressure, transcriptome-wide association study, polygenetic risk scores, polygenic transcriptome risk score, EpiSS study.

Funding

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Competing interests

The authors declare that they have no competing interests.

1-21 Plasma proteins for early prediction of type 2 diabetes and their associations with habitual diet

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Amis: Circulating proteins are involved in biological processes related to type 2 diabetes mellitus (T2DM), but have been largely unexplored for risk prediction and as targets for early prevention. The primary aim of this study was to identify plasma proteins robustly associated with incident T2DM and to identify dietary factors associated with such proteins, aiming to find potential protein targets for nutritional prevention. The aim was extended to investigate whether plasma proteins could improve early risk prediction beyond clinical risk factors.

Methods: We analyzed 276 proteins in plasma that have been related to cardiovascular diseases and metabolic conditions in two Swedish-population based prospective cohorts, using high-throughput proximity extension assays. Associations between proteins at baseline with incident T2DM were estimated using Cox proportional hazards models. We then examined the prospective associations of dietary factors with diabetes related proteins. A machine learning framework was applied to identify protein biomarker for early prediction and predictive performance was compared with clinical risk factors and the Framingham Offspring Risk Score.

Results: We identified 175 plasma proteins with novel and robust associations with T2DM risk in 4103 participants followed-up for 10 years. Among those, 112 associations were validated in an independent cohort comprising 5141 participants followed-up for 7 years, and related to pathways including cytokine-cytokine receptor interaction, Rap1-, MAPK-, PI3K-Akt-, TNF- signaling and apoptosis. We demonstrated causal mediation linkages in the comprehensive catalog of risk factors–proteins–diabetes associations, underscoring the potential importance of proteins early in the pathogenesis of diabetes. We also identified associations between habitual diet and T2DM related proteins, characterizing potential mediating role of certain proteins e.g. FGF-21, LEP, IL6, FABP4 and KYAT1 in beneficial effects of dietary pattern characterized by high intakes of vegetables, fruits, nuts, fat fish and whole grains on T2D prevention. Furthermore, plasma proteins improved the predictive potential of conventional risk factors only or the Framingham Offspring Risk Score, in particular for identifying individuals who developed T2DM at later time points from baseline.

Conclusions: Proteins associated with T2DM risk hold great potential to be used for early prediction and as potential targets for nutritional prevention of T2DM.

Keywords: Type 2 diabetes, proteomics, predictive biomarkers, habitual diet, risk prediction.

1 Conflict of interest

There are no conflicts of interest to declare.

1-22 Metabolic Syndrome, High-sensitivity C-reactive Protein and the Risk of Heart Failure：The Kailuan Cohort Study

Abstract

Background and aims

Metabolic syndrome (MetS) and elevated levels of high-sensitivity C-reactive protein (hs-CRP) have been identified as risk factors for heart failure (HF) in some studies. We aimed to investigate the combined effect of MetS and high hs-CRP levels on the 5risk of incident HF.

Methods

The study involved 92,021 participants with no history of HF from the Kailuan cohort.Participants were divided into four groups according to the presence of MetS and elevated hs-CRP levels (≥ 3 mg/L).Cox regression models were used to analyse the association between MetS, inflammation and risk of heart failure.

Results

During 13.1 years of follow-up, 2,890 participants were diagnosed with heart failure. After adjustment for multiple confounders, participants with both MetS and hs-CRP ≥3 mg/L had an increased risk of HF compared with those without MetS and hs-CRP <3 mg/L(HR: 1.84, 95% CI: 1.63-2.09).Stratification by age showed a higher risk of heart failure in the younger age group among participants with MetS and inflammation(HR: 3.93, 95% CI: 2.23-6.92).

Conclusions

The combination of metabolic syndrome and elevated hs-CRP levels is associated with an increased risk of heart failure in the Chinese population.

Keywords

Metabolic syndrome, high-sensitivity C-reactive , heart failure, risk factors, cohort study.

Conflict of interest

The authors have disclosed no conflicts of interest.

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1-23 Associations of metabolic changes and polygenic risk scores with cardiovascular outcomes and all-cause mortality across BMI categories: a prospective cohort study

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Abstract

Background

Associations between metabolic status and changes in metabolic status and the risk of adverse cardiovascular outcomes have been reported. However, the role of genetic susceptibility has not been considered. We aimed to examine the combined effects of metabolic status, metabolic transitions, and genetic susceptibility on cardiovascular outcomes and all-cause mortality across all BMI categories.

Method

In the dataset from the UK Biobank, we retrieved a total of 420 383 participants at baseline and 13 183 participants at the second resurvey. Metabolically healthy (MH) status was determined by < 3 abnormal components (waist circumstance, blood pressure, blood glucose, triglycerides, and high-density lipoprotein cholesterol). Genetic predisposition was estimated using the polygenic risk score (PRS). Cox regressions were performed to evaluate the associations of metabolic status, metabolic transitions, and PRS with cardiovascular outcomes and all-cause mortality across BMI categories.

Results

During a median follow-up of 14.38 years, all-cause mortality occurred in 28,347 of 384,860 participants, cardiovascular mortality in 7220 of 399,359 participants, and cardiovascular morbidity in 59,229 of 399,359 participants. Compared to individuals with metabolically unhealthy obesity and a high PRS, participants with a metabolically healthy normal weight and low PRS demonstrated the lowest risk of cardiovascular outcomes, including morbidity from CVD (hazard ratios [HR]: 0.31; 95% confidence interval [CI]: 0.30, 0.33), CAD, MI, stroke, and HF, along with mortality from MI and AF; participants with a metabolically healthy overweight and low PRS had the lowest risk of all-cause mortality (HR: 0.57; 95% CI: 0.52, 0.61) and specific mortality from CVD, CAD, and HF. These protective associations were more pronounced in females and younger individuals (< 65 years) ($P_{\text{additive interaction}} < 0.05$). Additionally, participants with stable MH status and a low PRS exhibited a reduced risk for adverse cardiovascular outcomes across all BMI categories.

Conclusion

Maintaining MH status and a low PRS were associated with a reduced risk of cardiovascular outcomes and all-cause mortality across BMI categories, particularly in females and individuals younger than 65 years. Improving the MH status across all BMI categories should be recommended, especially for individuals with a high CVD PRS, as well as for males and those older than 65 years.

Keywords: metabolic changes; polygenic risk scores; cardiovascular outcomes; all-cause mortality; BMI categories

1-24 Evaluate the Progress on Sustainable Development Goals for premature mortality from non-communicable diseases in the Western Pacific region

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Abstract

Objective: The Sustainable Development Goal (SDG) target 3.4 focuses on a one-third reduction of premature mortality from non-communicable diseases (NCDs) by 2030. This study assessed trends of premature mortality from four major NCDs (neoplasms, cardiovascular diseases, chronic respiratory diseases, and diabetes mellitus) in the Western Pacific region based on the Global Burden of Disease, Injuries, and Risk Factors Study (GBD).

Methods: Using joinpoint regression and the 1990-2019 data from GBD, we assessed changes in premature mortality from NCDs in achieving the SDG NCD target and explored contributions of NCD clusters to overall trends using years-of-life-lost (YLLs). We assessed changing rankings of NCD risks at the regional level and the status of NCD risks at the country level. The association between potential risk factors and premature mortality was also investigated.

Results: Of the 31 countries and areas studied, only 4 (Singapore, China, Mongolia, and the Republic of Korea) met the SDG target. Most countries had reduced premature mortality of four major NCDs, while almost all had increased mental disorders. Metabolic risks became more prominent, while environmental/occupational risks declined. Large variations existed in NCD premature mortality and related risks across countries.

Conclusion: Most countries in WPR made progress in NCD prevention and control, but the majority could not meet the SDG target. Tailored strategies are required to fight the growing and diverse NCD epidemic.

Keywords: non-communicable diseases; premature mortality; risk factors; trends; Sustainable Development Goal; the Western Pacific region

Fundings

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Conflict of interest

The authors declare that they have no conflict of interest related to this work.

1-25 Self-management ability and influencing factors of patients with chronic obstructive pulmonary disease

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Abstract Objective: To investigate the current situation of self-management of patients with chronic obstructive pulmonary disease (COPD) in Urumqi City, and to explore its influencing factors, so as to provide a scientific basis for the development of self-management intervention strategies for COPD in the future. **Methods:** A total of 302 patients with chronic obstructive pulmonary disease (COPD) admitted to the Department of Respiratory Medicine of a hospital from October 2023 to April 2024 were selected as the research subjects, and the COPD Patient Self-management Scale (CSMS) was used for questionnaire survey. **Results:** The average score of the total self-management scale was 112.52±14.71, with the highest scores of daily life management (47.34±12.03) and the lowest score of symptom management (14.02±8.11). Age, education level, smoking status, years of illness, course of disease and complications were the influencing factors of self-management (P<0.05). **Conclusion:** Health education on symptom management should be strengthened, and the influencing factors should be focused on when formulating intervention strategies, and disease prevention and control should be carried out in a targeted manner.

Keywords: COPD; self-management ability; influencing factors

声明：稿件无利益冲突

1-26 Global burden attributable to alcohol use, 1990-2019: findings from the Global Burden of Disease Study 2019

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Aims To analyze the attributed health loss of alcohol use globally from 1990 to 2019 to inform policies. **Methods** Results from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 were used. The contribution of alcohol use to deaths and disability-adjusted life years (DALYs) was estimated following the GBD comparative risk assessment framework in which observed health outcomes are compared to those that would have been observed if a counterfactual level exposure had occurred in the past. The average annual percent change (AAPC) was calculated using Joinpoint Regression Program to examine the time trend of the burden. **Results** Globally, alcohol use caused 2.44 million deaths and 93 million DALYs in 2019, of which around 85% were men, and was the first leading risk factor for DALYs in people aged 15-49 years and the seventh leading risk factor for DALYs in men. The age standardized attributable DALY rates varied by region, with the highest in Eastern Europe (3,494.53/100,000), and the lowest in North Africa and the Middle East (188.28/100,000). Globally, for both sexes, cirrhosis and other chronic liver diseases were the first leading cause of attributable deaths and DALYs; the second leading cause was intracerebral hemorrhage for deaths and alcohol use disorders for DALYs; the third for both deaths and DALYs was tuberculosis for men, and breast cancer for women. Globally, the age-standardized attributable DALY rate has declined over the recent 15 years from 2005 to 2019, with AAPC of -1.46% for men and -2.16% for women; the trend varied by region, with Central and Eastern Europe and Central Asia experiencing the fastest decline, while North America showing a slight increase. **Conclusions** Alcohol-use attributable burden varied across sexes, ages and regions. Countries should tailor their policies on reducing alcohol use to the pattern of the attributable burden.

Keywords: Alcohol use, burden of disease

Conflicts of interest: No conflicts of interest.

1-27 Serum Arsenic Augments Gallstone Risk in Henan Rural Cohort with multiple Metal(loid) Exposure

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ABSTRACT

Objectives: To investigates the relationship between serum concentrations of arsenic (As), zinc (Zn), copper (Cu), chromium (Cr), selenium (Se), cadmium (Cd), lead (Pb) and gallstones (GS) risk among rural residents in Xinxiang County, Henan Province.

Methods: Participants (n=4204) were from the Henan Rural Cohort (Grant no: 2016YFC0900803), a cohort study on chronic non-communicable diseases. GS diagnosis relied on abdominal ultrasound reports during follow-up. Baseline serum samples underwent inductively coupled plasma mass spectrometry (ICP-MS) analysis. Associations between serum metal(loid)s and GS were assessed using robust Poisson regression and Bayesian kernel machine regression (BKMR).

Results: 121 individuals were diagnosed with GS (incidence rate: 2.88%). Significant differences ($P < 0.05$) in serum As (median: 0.68 vs. 0.62 μg/L) and Zn (800.42 vs. 817.32 μg/L) were found between GS and non-GS groups. In the robust Poisson regression model, after adjusting for gender, age, BMI, fatty liver and etc., each natural logarithm increase in serum As concentration was associated with a 0.44-fold increase in the relative risk (RR) of GS [95% confidence interval (CI): 1.08, 1.93, P =0.008]. Moreover, individuals in the highest quartile (Q4) of As had a 2.08-fold higher RR compared to those in the lowest quartile (Q1) (95% CI: 1.15, 3.77, P = 0.016). Conversely, each natural logarithm increase in serum zinc concentration was linked to a 0.60-fold reduction in the RR of GS (95% CI: 0.20, 0.80, P = 0.012). Furthermore, the Q4 group of zinc exhibited a 0.47-fold lower RR compared to the Q1 group (95% CI: 0.26, 0.84, P = 0.011). BKMR showed no interaction between metal(loid)s and GS risk. Serum arsenic had a non-linear GS risk relationship, while serum zinc showed a linear inverse association.

Conclusions: Elevated serum arsenic levels increase GS risk, while higher serum zinc levels may reduce it.

Keywords: Gallstones; Serum metal(loid)s; Poisson regression; Bayesian Kernel machine regression (BKMR).

Competing interests: All authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this study.

1-28 Right ventricular myocardial work and right ventricle-pulmonary artery coupling in tricuspid regurgitation

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Objective: To investigate the relationship between functional tricuspid regurgitation with right ventricular (RV) myocardial work (MW) and the impact of tricuspid regurgitation on right ventricle-pulmonary artery (RV-PA) coupling.

METHODS: 137 consecutive patients with functional tricuspid regurgitation from a single center were included. The degree of regurgitation was categorized into the following four groups according to the newly suggested grading criteria: 53 cases was graded as mild group, 51 cases was graded as moderate group, 15 cases was graded as moderate-severe group, and 18 cases was graded as severe group. All patients underwent conventional echocardiography measurements, speckle-tracking echocardiography parameters, including RV strains and RVMW parameters. RV-PA coupling was estimated using the ratio between two standard echocardiographic measurements: tricuspid annular plane systolic excursion (TAPSE) /pulmonary artery systolic pressure (PASP), right ventricular area change fraction (FAC) /PASP, tricuspid annular plane tissue doppler imaging derived tricuspid lateral annular systolic velocity (TDIs') /PASP, RVGLS/PASP, RVFWS /PASP, right ventricular forward stroke volume (RVSV) /three-dimensional right ventricular systolic volume (RV3DESV).

RESULTS: The results of right heart function analysis showed that there were no significant differences between the TAPSE, RVGLS, RVFWS, RV global wasted work and global work efficiency in the moderate-severe and severe groups, but both were significantly different from those in the mild and moderate groups, respectively (all $P<0.05$). The results of RV-PA coupling analysis showed significant differences between all groups (all $P<0.001$). TAPSE/PASP, FAC/PASP, TV s'/PASP, RVGLS/PASP, RVFWS/PASP, and RVSV/RV3DESV in the moderate-severe and severe groups were significantly different from those in the mild and moderate groups, respectively (all $P<0.05$), and mild vs. moderate vs. moderate-severe vs. severe, TAPSE/PASP: 0.69±0.28 mm/mmHg vs. 0.61±0.24 mm/mmHg vs. 0.44±0.24 mm/mmHg vs. 0.38±0.16 mm/mmHg; FAC/PASP: 1.38±0.52 %/mmHg vs. 1.23±0.44 %/mmHg vs. 0.90±0.50 %/mmHg vs. 0.82±0.42 %/mmHg. 0.42 %/mmHg; TV s'/PASP: 0.43±0.16 cm/s*mmHg vs. 0.38±0.17 cm/s*mmHg vs. 0.31±0.16 cm/s*mmHg vs. 0.24±0.09 cm/s*mmHg; RVGLS/PASP: 0.60±0.25 %/mmHg vs. 0.55±0.26 %/mmHg vs. 0.34±0.19 %/mmHg vs. 0.32±0.18 %/mmHg; RVFWS/PASP: 0.72±0.30 %/mmHg vs. 0.65±0.29 %/mmHg vs. 0.41±0.26 %/mmHg vs. 0.40±0.22 % /mmHg; RVSV/RV3DESV: 0.84±0.40 vs. 0.55±0.31 vs. 0.31±0.24 vs. 0.13±0.28.

CONCLUSION: Increased tricuspid regurgitation was related with compromised RVMW. The mismatch of RV-PA coupling became more serious with the aggravation of regurgitation degree step by step.

1-29 Workload-capacity imbalances drive self-management complexity: a multicenter cross-sectional study

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Abstract

Background Multimorbidity is increasing globally, emphasizing the need for effective self-management strategies. The Cumulative Complexity Model (CuCoM) offers a unique perspective on understanding patients' self-management based on workload and capacity. This study aims to quantitatively validate the CuCoM in multimorbid patients and identify tailored predictors in different workload-capacity profiles.

Methods This multicenter cross-sectional survey recruited 1920 multimorbid patients in four primary health centers and four hospitals in China. The questionnaire measured variables related to patient workload (drug intake, doctor visits and follow-up, disruption in life, and health problems), patient capacity (social capacity, environment capacity, financial capacity, physical capacity, and psychological capacity), and self-management. Latent profile analysis, chi-square, multivariate linear regression, and network analysis were employed in the current study.

Results Among the patients, 10.2% were in a low workload and capacity profile, 7.5% were in a high workload and low capacity profile, 64.6% were in a low workload and high capacity profile, and 17.7% were in a high workload and capacity profile. Patients with low workload and high capacity exhibited better self-management (β=0.271, P<0.001); in contrast, those with high workload and low capacity exhibited poorer self-management (β=-0.187, P<0.001). Additionally, the tailored predictors vary across different "workload-capacity" profiles (P<0.05). In the network analysis, socioeconomic factors exhibited the central node (P<0.05).

Conclusions Personalized interventions are necessary to increase capacity and reduce workload, and that policy is urgent to achieve common prosperity and health equity.

Keywords workload; capacity; cumulative complexity model; multimorbidity; self-management

1-30 National, and regional prevalence of elevated blood pressure in Chinese children: A systematic review and meta-analysis

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COMPETING INTERSTS
The authors declare that the research was conducted in the absence of conflict of interest.

Abstract word count: 300 words

Abstract
Objectives
This study aimed to investigate the prevalence of elevated blood pressure (BP), explore its associated factors, and estimate the burden of elevated BP in Mainland China in 2020.
Methods
We conducted a systemic review and meta-analysis of epidemiolocal studies on the prevalence of elevated BP among Chinese children published since 1990. A multilevel mixed-effect meta-regression was performed to estimate the age- and sex-specific prevalence of elevated BP. The overall prevalence and total cases of elevated BP among Chinese children aged 6-18 years in 2020 were generated by applying the China census data. Odds ratios (ORs) of associated factors were pooled using random-effects meta-analysis.
Results
A total of 132 articles covering 22422416 Chinese children were included. The prevalence of elevated BP ranged from 9.76% (95% confidence interval [CI]=6.71–11.89) among children aged six years to 8.83% (95% CI=6.06–14.90) among those aged 18 years, peaking at 16.68% (95% CI=12.88–21.45) among those aged 14 years. In 2020, the overall prevalence of elevated BP among Chinese children aged 6–18 was 13.52% (95% CI=10.20–17.56). Elevated BP prevalence was higher in boys compared to girls (14.50%, 95% CI=11.00–18.90 vs. 12.39%, 95% CI=9.28–16.02). Among the three economic regions, the prevalence of elevated BP was the highest in East China (16.17%, 95% CI=12.27–19.73) and the lowest in West China (10.92%, 95% CI=8.78–15.56). Furthermore, this study displayed that higher BMI status was significantly associated with increased risk of elevated BP (thinness, OR=0.67, 95% CI=0.54-0.83; overweight, OR=2.08, 95% CI=1.80-2.40; obesity, OR=3.83, 95% CI=2.87-5.09).
Conclusions
We found substantial variation of elevated BP burden across age, sex, and economic regions of China, and identified several associated factors, which could help to guide the development of targeted public health strategies and optimise the allocation of regional health resources.
Keywords: Blood pressure; children; prevalence

1-31 Bidirectional association between cardiometabolic multimorbidity and depression and mediation of lifestyles: a multicohort study

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Objectives: Cardiometabolic multimorbidity (CMM) and depression are major health concerns, and the onset of either condition may heighten the risk of developing the other. This study aims to characterize the reciprocal associations between CMM and depression among middle-aged and older adults.

Methods: This multicohort study used harmonized data from five prospective cohorts from China, South Korea, US, UK and Europe. Cardiometabolic diseases (CMD, including diabetes, heart diseases and stroke) and depression were assessed at baseline and at 7-8 years' follow-up. Lifestyle factors, including physical activity, alcohol consumption and smoking status were regarded as potential mediators. Two sets of analyses, CMM-depression analysis (n=38,947) and depression-CMM analysis (n=36,905) were conducted to explore the bidirectional association between CMM and depression.

Results: In the CMM-depression analysis, 9,932 (25.5%) individuals developed depression. Having CMM at baseline was associated with a 1.43-fold increased risk of depression (vs. free of CMD: 95% CI=1.31-1.56), particularly for those developed an additional CMD during follow-up [vs. always no CMM: hazard ratio (HR)=2.20, 1.80-2.69]. Lifestyle factors mediated 10.86% of the association. In the depression-CMM analysis, 838 (2.3%) participants developed CMM. The HR for developing CMM was 1.32 (1.13-1.55) in patients with depression. Compared to consistently no depression, the emergence of depression was associated with 1.91 (1.62-2.26) -fold increased risk of CMM. Lifestyle factors mediated 4.02% of the association. The bidirectional relationships were more pronounced in Western countries than Asian countries.

Conclusion: CMM and depression was bidirectionally associated. The mediated effects of lifestyle factors were larger in the CMM-lifestyle-depression pathway than depression-lifestyle-CMM pathways.

Keywords: reciprocal relationship; cardiovascular diseases; diabetes; mental health; lifestyle modifications

Declaration of interests

Authors declare that they have no competing interests.

1-32 Gender differences in the associations of adverse childhood experiences with depression and anxiety: a systematic review and meta-analysis

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Abstract

Background: The presence of gender disparities in the connections between adverse childhood experiences (ACEs) and mental health outcomes, including depression and anxiety, has attracted considerable attention. We conducted a systematic review to examine the potential impact of gender on the associations between ACEs and mental health outcomes, including depression and anxiety.
Methods: We conducted a systematic review of observational studies retrieved from three electronic databases (PubMed, Medline, and Embase) from 1 January 2010 to 8 June 2022. The included studies should have reported the gender-specific risks of depression or anxiety associated with varying number or specific types of ACEs. Using a random-effects model, we calculated the gender-specific pooled odds ratios (ORs) and derived the pooled women-to-men ratio of ORs (RORs) for the associations of ACEs and depression or anxiety, with corresponding 95% confidence intervals (CIs).
Results: Regarding the number of ACEs, gender differences were observed in the association between experiencing 2 ACEs (compared to 0 ACE) and anxiety. Women with 2 ACEs were at a higher risk of developing anxiety than men (ROR=2.04, 95%CI=1.15-3.62). Moreover, men exposed to certain types of ACEs, including bullying (ROR=0.86, 95%CI=0.83-0.88), emotional abuse (ROR=0.66, 95%CI=0.52-0.83), sexual abuse (ROR=0.58, 95%CI=0.37-0.91), and incarceration (ROR=0.83, 95%CI=0.71-0.98), had a higher risk of developing depression compared to women.
Conclusions: Gender differences exist in the associations of ACEs with depression and anxiety, underscoring the imperative of incorporating gender as a critical factor in understanding the long-term effects of ACEs on mental health.

***Keywords*:** Adverse childhood experiences; depression; anxiety; gender differences

Declarations of interest: none.

1-33 Estrogen exposure across reproductive life course and the risk of diabetes, hypertension, and major adverse cardiovascular events among post-menopausal women in northwest China: Results from the Regional Ethnic Cohort Study

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Study aims: To examine the associations between cumulative estrogen exposure and the risk of diabetes, hypertension, and major adverse cardiovascular events (MACEs) among post-menopausal women in northwest China.
Methods: We used baseline data of post-menopausal women from the Regional Ethnic Cohort Study (RECS) in Northwest China conducted from June 2018 to May 2019. Women reproductive factors, diabetes, hypertension, and major adverse cardiovascular events (MACEs) were self-reported based on structured questionnaire. Surrogate measures of endogenous estrogen exposures across women lifetime were used to derive three indices including: reproductive lifespan (RLS), endogenous estrogen exposure (EEE), and lifetime gestation duration. We fitted multivariable-adjusted logistic regression model to examine the associations of estrogen exposure with the risk of diabetes, hypertension and MACEs.
Results: A total of 35,498 post-menopause women, with a median age of 59.0 years (interquartile range: 54.0-65.0) were included in this study. The prevalence of diabetes, hypertension, and MACEs were 5.41%, 19.72%, and 14.09%, respectively. Per year increase in RLS was associated with a 2.1% lower risk of diabetes, a 2.6% lower risk of hypertension and a 4.3 % lower risk of MACEs, while similar results were observed for EEE. Higher quartiles of RLS and EEE both exhibited a graded association with a decreased risk of diabetes, hypertension and MACE. Additionally, each additional year of lifetime gestation duration was associated with increased risk of hypertension (OR: 1.05, 95% confidence interval 1.02, 1.08) and MACEs (OR: 1.09; 95%CI 1.05, 1.12), although no association between lifetime gestation duration and the risk of diabetes.
Conclusions: Stable and periodic endogenous estrogen exposure during women life course due to monthly menstrual cycles may benefit on postmenopausal vascular health. Conversely, women experiencing excessive pregnancy events may establish a disadvantaged foundation for postmenopausal cerebrovascular health profile.
Keywords: estrogen exposure, reproductive lifespan, cardiovascular diseases, diabetes, hypertension
Declare conflicts of interest: The authors have no conflicts of interest to declare.

1-34 Association between age at menarche and the risk of type 2 diabetes among women in northwest China: Results from the Regional Ethnic Cohort Study

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Study aims: To examine the effect of age at menarche on type 2 diabetes (T2DM), and to evaluate whether this association differ among ethnic subgroups among women in northwest China.
Methods: Using baseline data of the Regional Ethnic Cohort Study in northwest China, a total of 30,972 female aged 34 to 75 were included in the study. Age at menarche, diabetes status and age at diagnosis were self-reported through standard questionnaires. Association between age at menarche and the risk of diabetes was examined using multivariable adjusted cox proportional hazards models, with age at diagnosis as the survival time. Besides, we conducted analysis in subgroups stratified by ethnicity, including Han, Hui and other minorities to assess whether the association differ among ethnic groups.
Results: Among 30,972 women included, the mean age at menarche was 15.1 (standard deviation 1.9), and the prevalence of T2DM was 6.9%. After adjusting for socioeconomic, lifestyle, and other reproductive factors, compared to women with menarche onset age at 14 years old, the adjusted hazard ration of T2DM was 1.32 (95% confidence interval [CI] 1.08, 1.62), 1.26 (95%CI 1.07, 1.47), 0.88 (95%CI 0.77, 1.02), 0.80 (95%CI 0.69, 0.93) and 0.87 (95%CI 0.75, 0.99) for those with age at menarche ≤12, 13, 15, 16, ≥17 respectively. The results remained consistent after further adjustments for body mass index and blood pressure. Subgroup analysis revealed that early menarche (≤12 y) was associated with the 43% increased risk of T2DM, which was only observed in women of Han ethnicity. The association between each additional year of age at menarche and a decreased risk of T2DM was barely significant among Hui women and not significant among other minorities.
Conclusions: Early menarche was associated with higher risk of diabetes, while later menarche women with lower risk of diabetes, particularly among Han women.
Keywords: age at menarche, type 2 diabetes
Declare conflicts of interest: The authors have no conflicts of interest to declare.

1-35 Dysregulation of Gut Microbiota-Derived Metabolism in Diabetic Cognitive Impairment: An Integrative Metagenomic and Metabolomic Analysis

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Objectives: Although accumulating evidence implicating altered gut microbiota in diabetes and related neurodegenerative disorder, diabetic cognitive impairment (DCI); however, the association between dysbiosis of the gut microbiota and metabolites in the pathogenesis of DCI remains unclear.

Methods: Fecal and plasma samples were obtained from Linyi cohorts (DCI, T2DM-non-DCI, and healthy controls), metagenomic analysis and metabolomic profiling were performed to investigate alterations in the gut microbial composition and circulating metabolites in DCI.

Results: The gut microbiota composition of individuals with diabetes exhibited a higher prevalence of *Prevotella* and a lower prevalence of *Bacteroides*. Conversely, individuals with DCI showed a decrease in *Prevotella* and *Megamonas*, and an increase in *Bacteroides* and *Phocaeicola*. Additionally, untargeted metabolomics analysis revealed the presence of various neurotransmitters and specific amino acids linked to neuromodulation, with a depletion of differential metabolic pathways of amino acids associated with neurocognition in DCI patients. It is worth noting that the altered abundance of certain gut bacteria is closely associated with the presence of most neuromodulatory metabolites.

Conclusions: Our research results offer fresh perspectives on the complex relationship between the gut and microbiome-brain axis in the development of DCI, emphasizing the possibility of creating innovative treatment approaches that focus on the gut microbiota.

Key words: Diabetic cognitive impairment; Metagenomic, Metabolomic

1-36 Analysis of depression status and influencing factors among high stress rescue personnel

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[Abstract] Objective To clarify the risk and protective factors of rescue personnel, and to provide reference for precise prevention and early intervention of possible depression among rescue personnel. **Methods** Adopting cross-sectional research design, a cluster sampling survey was conducted on 4460 rescue personnel using the self-rating depression scale (SRDS). Using machine learning algorithms such as logistic regression, Naive Bay, K-NN, SVM, and Random F, were analyzed the relevant influencing factors of depression and compared the predictive effects of different models. **Results** The incidence of depression among rescue personnel was 36.2%. The ROC areas under the curve (AUC) of the prediction model were 0.556, 0.519, 0.535, 0.510 respectively. Binary logistic regression analysis showed that age(OR=1.029,95%CI=1.007~1.053), educational level in high school (OR=1.217, 95% CI=1.047~1.414), polytechnic school (OR=1.509, 95% CI=1.279~1.780), marital status (OR=1.262, 95% CI=1.002~1.589), low body mass index (OR=2.122, 95% CI=1.227~3.669), obesity (OR=1.368, 95% CI=1.071~1.747) significantly (P<0.05). The area under the ROC curve (AUC) based on SDS was 0.574(95% CI: 0.556~0.592), specificity 0.612, sensitivity 0.508. **Conclusion** The use of logistic regression and Naive Bay were showed good predictive effects. Depression status was related to age, education level, marital status, and body mass index.

[Key words] high stress; depression; machine learning; predictive models; rescue personnel

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2-1 A recombinant Bacillus Calmette-Guérin with c-di-AMP as adjuvant promotes white adipogenesis through regulating adipokines

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Abstract: Objective Bacillus Calmette-Guérin(BCG) is the only approved vaccine against tuberculosis(TB), but its protection efficiency is not perfect. Recombinant BCG (rBCG) with higher protection will help to prevent and control of TB epidemic. The aim of the study is to investigate the regulation and mechanism of rBCG, which overexpressed c-di-AMP synthetase (DisA) with c-di-AMP as adjuvant and higher immunity protection, on white adipose in mice. **Methods** Mice were injected by tail veil with 10^6 CFU BCG and rBCG respectively. Mice weights were measured weekly. After 10 weeks of immunization, mice white adipose tissue (eWAT) of epididymis were isolated and weighed, stromal vascular fraction cells (SVFs) were isolated and counted. eWAT pathological sections were stained with HE staining. Total RNA of eWAT were extracted and genes transcription of adipose metabolism and adipokines were detected by qRT-PCR. **Results** All group of mice showed weight gains. Compared with control group, rBCG induced an increase on eWAT weight, but a decrease in the number of SVFs cells significantly. HE staining showed that BCG and rBCG both induced adipocyte hyperplasia. qRT-PCR results showed that BCG and rBCG immunization had little effects on the expression of adipose synthesis-related genes such as FABP4, PPAR-γ and LDHA in eWAT, but downregulated adipose metabolism transcription factors of PGC-1α significantly, and a decline trend on Crtc2. BCG and rBCG both inhibited the transcription of leptin, but had little effects on that of adiponectin, TNF-α and IL-10. rBCG immunization significantly upregulated the transcription of IFN-γ in eWAT. **Conclusion** This study reported rBCG with c-di-AMP as adjuvant could promote white adipogenesis in eWAT by regulating adipokines. This study was helpful to elucidate the metabolic mechanisms during BCG and rBCG immunization, and provided new insights for the development of more effective vaccines against TB.

Keywords: Tuberculosis, Bacillus Calmette-Guérin, recombinant BCG, c-di-AMP, white adipose, adipokines

Acknowledgement

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Statement: No potential conflict of interest was reported by the authors.

2-2 Analysis on repetitive reporting of hepatitis B Cases in Qinghai Province, 2018-2022

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Abstract: Objective To analyze the duplicated reporting of hepatitis B in Qinghai Province during 2018—2022, and to investigate the impact of duplicated reporting on the reported incidence of hepatitis B in Qinghai Province. **Methods** The National Notifiable Disease Report System (NNDRS) was used to collect the report cards of hepatitis B reported in Qinghai Province during 2018—2022, set up 5 types of checking rules, and the duplicate reporting was analyzed using R4.3.2 software. **Results** A total of 47 093 hepatitis B report cards were reported in Qinghai Province during 2018—2022, among which 46 951 (99.47%) were included in this study, and 6 107 (13.01%) were duplicated report in 5 years. The proportions of the repetitive reporting cards in 1—5 years were 3.76%, 6.90%, 9.31%, 11.39% and 13.01%, respectively. showing an increase trend with year (Z=55.08, *P*<0.01). When the time span of inclusion card is 5 years, the repeat reporting rate of 8 cities and states in Qinghai Province is between 9.45%—15.25%, and the duplicate reporting rates of acute, chronic, and unclassified hepatitis B cases were 11.79%, 13.06%, and 12.58%, respectively. **Conclusions** The analysis indicated that the duplicated repeating rate of hepatitis B was 13.01% in Qinghai during 2018—2022, and the duplicated reporting mainly occurred across years, which mainly caused the reported incidence of hepatitis B in Qinghai Province to be overestimated. **Conflict of interest** none.

Key words: Hepatitis B; Duplicate reports; Incidence rate; Infectious disease; Report system

2-3 The joint effect of meteorological factors on hand, foot, and mouth disease (HFMD) and construction of a warning index in China

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ABSTRACT

Objectives: To explore the joint effect of meteorological factors on HFMD, and subsequently constructs a meteorological warning index for HFMD.

Methods: Weekly HFMD incidence data of 333 cities during 2015-2019 in China was obtained from Chinese Center for Disease Control and Prevention. The corresponding meteorological data (weekly mean temperature, relative humidity (RH), wind speed, air pressure and weekly cumulative rainfall) were collected from the fifth generation of European ReAnalysis. Distributed lag non-linear models were first applied to assess the association of single meteorological factor with HFMD incidence. Quantile-Based g-computation model was subsequently used to estimate the joint effect of multiple meteorological factors on HFMD. Further, we constructed a meteorological warning index based on their effect weights calculated by random forest (RF) model. Decision tree regression model was used to detect risk threshold of meteorological warning index.

Results: We observed inverted U-shaped associations of weekly mean temperature and cumulative rainfall with HFMD incidence. Positive associations of weekly mean RH, wind speed, and air pressure with HFMD incidence were observed. Further, HFMD risk increased 3.11% (95%CI: 2.91%-3.31%) for each percentile rise in the joint exposure of five meteorological factors. RF model indicated that temperature, wind speed and air pressure were top three meteorological contributors of the HFMD incidence. The meteorological warning index of China based on their effect weights was highly correlated with HFMD incidence (R square: 84.4%) and performed well in risk warning.

Conclusions: Joint exposure to multiple meteorological factors could increase the incidence of HFMD. Meteorological warning index targeted at HFMD may provide a warning signal at early stage of epidemic, which could help initiate timely public health response.

Keywords: Hand, foot, and mouth disease; Meteorological factors; Joint effects; Meteorological warning index.

Competing interests

The authors declare no competing interests.

2-4 The joint effects of meteorological factors on influenza: a nationwide time series study in China

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Conflict of Interest
All authors disclosed no relevant relationships.

Abstract
Objective: Although many studies have reported the impact of temperature and humidity on influenza, few studies examined other meteorological factors, let alone their joint effects. This study aimed to investigate the joint effects of meteorological factors on influenza in China and identify the main factors contributing to the joint effect.
Methods: Influenza cases data during 2015-2019 in 324 prefectures of China were collected from the Chinese Center for Disease Control and Prevention. Meteorological data were obtained from the ERA5-Land dataset of the European Centre for Medium-Range Weather Forecasts. Firstly, a Distributed Lag Non-linear Model (DLNM) was applied to investigate the exposure-response relationship between temperature, relative humidity, wind speed, and atmospheric pressure and influenza. Then, a quantile g-computation (qgcomp) model was employed to evaluate the joint effects of mixture exposure the four meteorological factors on influenza.
Results: A total of 5,093,710 influenza cases were included in the study. The U-shaped relationships between temperature, relative humidity, atmospheric pressure and influenza, whereas wind speed showed a negative effect on influenza. There was also a U-shaped association of mixture exposure to all the four meteorological factors and influenza. Following linearization, the highest risk was observed at the fourth quantile of mixture exposure (RR=1.21, 95%CI: 1.11-1.32) in total population, with temperature contributing the most (54.15%) to the joint effect, followed by atmospheric pressure (24.46%), wind speed (16.52%) and relative humidity (4.87%).
Conclusion: The study discovered that mixture exposure to meteorological factors associated with influenza, and temperature contributed most to the combined effect. **Keywords:** Influenza; Joint Effects; Meteorological Factors.

2-5 Analysis on the improvement of tuberculosis prevention and control in medical institutions by the compact medical community in X County of southern Xinjiang

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Abstract: Objective: By studying the construction of the compact medical community in X county of southern Xinjiang, to understand the improvement of the compact medical community in the tuberculosis prevention and control of the former county-level medical institutions and township health centers, and to provide reference for the development of tuberculosis prevention and control capabilities of regional medical institutions. **Methods:** According to the grounded theory method and the method of purpose sampling, semi-structured interviews were conducted among the responsible persons in charge of medical community construction and tuberculosis prevention and control personnel in X County. The interview data were converted, coded, and the theoretical concepts were formed by constant comparison. **Results:** Through the research, related concepts were extracted from the interview text, and four themes were formed: tuberculosis prevention and control, tuberculosis management, patient referral and personnel training, and the active discovery and treatment process of local tuberculosis patients under the close-knit medical community was understood. The improvement of tuberculosis prevention and control in medical institutions under the compact medical community was qualitatively analyzed. **Conclusion:** The improvement of the compact medical community in the prevention and control of tuberculosis in medical institutions mainly lies in the establishment of a county-level integrated prevention and control mechanism, the improvement of patient management of tuberculosis prevention and control, the simplification of patient referral, and the enhancement of regional training on tuberculosis prevention and control. However, X County still has a long way to go to achieve the target of tuberculosis prevention and control. It is suggested that from the perspective of prevention and control of tuberculosis in medical institutions, Improve the performance assessment mechanism of tuberculosis, and expand the active detection of grass-roots medical institutions.

Key words: County-level medical communities、Tuberculosis prevention and control、Medical institutions、Medical personnel、Grounded Theory

2-6 Global burden of pertussis in 204 countries and territories, from 1990 to 2019: results from the Global Burden of Disease Study 2019

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Objectives: This study aimed to examine the impact of pertussis on the global, regional, and national levels between 1990 and 2019.
Methods: Data on pertussis on a global scale from 1990 to 2019 were collected from the 2019 Global Burden of Disease Study. We performed a secondary analysis to report the global epidemiology and disease burden of pertussis.
Results: During the period spanning from 1990 to 2019, pertussis exhibited a steady global decline in the age-standardized incidence rate (ASIR), age-standardized disability-adjusted life years rate (ASYR), and age-standardized death rate (ASDR). Nevertheless, upon delving into an in-depth analysis of various regions, it was apparent that ASIR in southern sub-Saharan Africa, ASYR and ASDR in high-income North America, and ASDR in Western Europe and Australasia, were witnessing an upward trajectory. Moreover, a negative correlation was observed between the Socio-demographic Index (SDI) and burden inflicted by pertussis. Notably, the incidence of pertussis was comparatively lower in men than in women, with 0–4-year-olds emerging as the most profoundly affected demographic.
Conclusion: The global pertussis burden decreased from 1990 to 2019. However, certain regions and countries faced an increasing disease burden. Therefore, urgent measures are required to alleviate the pertussis burden in these areas.
Keywords: GBD 2019; burden; pertussis; global trend; Epidemiology

The authors have no competing interests to declare.

2-7 Low awareness of Undetectable Equals Untransmitable (U=U) among men who have sex with men (MSM) in Chengdu, Southwestern China

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【**Abstract**】 **Objective** AIDS is a major public health issue around the world, and men who have sex with men (MSM) is a high-risk group for HIV infection. HIV stigma is one of the biggest obstacles to achieving the global goal of "ending the AIDS epidemic by 2030". The introduction of the undetectable equals untransmittable (U=U) statement significantly reduces HIV stigma and provides an empirical basis for achieving "zero transmission". At present, U=U has been supported and developed in several countries. However, the current status of U=U awareness among the MSM population in China, as well as the factors that are associated with it, are unknown. **Methods** We conducted a cross-sectional survey was among MSM recruited in collaboration with a local homosexual-friendly community-based organization (CBO) in Chengdu China from March to May 2022, to assess the association between risk sexual behaviors, HIV testing, psychosocial vulnerability, HIV-related literacy, perceived risk of HIV infection and U=U awareness. **Results** Of the 497 MSM included in the study, 116 (23.4%) were aware of U=U. More than half (63.2%) of the participants reported multiple sexual partnerships and 15.7% used substances during sex. Factors associated with U=U awareness included substances use during sex (multivariate odds ratios *ORm*=1.96; 95%*CI*: 1.13-3.41), HIV status tested in the last six months (*ORm*= 2.07; 95%*CI*: 1.14-3.77), HIV-related literacy (*ORm*=1.41; 95%*CI*: 1.14-1.74) and perceived risk of HIV infection (*ORm*=1.11; 95%*CI*: 1.02-1.21). **Conclusion** Although U=U is supported by evidence, its awareness and advocacy progress among MSM is still slow in China. Intervention programs should be focused on assisting in risk perception, increasing HIV-related literacy and promoting regular HIV testing among MSM.

【**Keywords**】 HIV/AIDS, Men who have sex with men (MSM), Undetectable equals Untransmittable (U=U), Risk behaviors, China

Competing interests
The authors have no competing interests to declare that are relevant to the content of this article.

2-8 Implications of Lifestyle Management Strategies for Rescue Workers During the COVID-19 Pandemic for Future Biosecurity Prevention and Control

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[Abstract] Objective: This study aims to explore how the lifestyles of rescuers have changed before and after the COVID-19 outbreak to inform disease prevention and control strategies during the pandemic and future countermeasures. **Methods:** An online survey was conducted to collect and analyze data on the lifestyle and general health of 1054 rescuers from a specific unit during the pandemic. A chi-squared test or a non-parametric test was used to identify lifestyle changes and mental health variations, analyzed using SPSS version 23.0. **Results:** Post-outbreak, rescuers reported a significant increase in smoking, alcohol consumption, mobile phone usage, and nighttime awakenings, while work hours and physical activity notably decreased ($P < 0.01$). Difficulty in falling asleep showed an upward trend, although this change was not statistically significant. **Conclusion:** The lifestyle and work habits of rescuers shifted markedly due to the COVID-19 outbreak. Currently, it is crucial to implement health education and management strategies focusing on smoking, alcohol use, and mobile phone habits as well as biosecurity capacity building.

Keywords: COVID - 19; State of life; Lifestyle; Rescuers; Biosafety prevention and control

3-1 Research and Analysis on Cardiovascular Health of Chinese Children and Adolescents

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Objectives: To investigate and study the status of cardiovascular health among children and adolescents in China, and to provide guidance on interventions for cardiovascular health among children and adolescents.

Methods: From September to December 2023, a nationwide sample survey was conducted, including a total of 6091 primary and secondary school students aged 7-17. Healthy diet, participation in physical activity, avoidance of nicotine, healthy sleep, healthy weight, and healthy levels of blood lipids, blood glucose, and blood pressure were evaluated and statistically analyzed according to the cardiovascular health assessment standard (Life's Simple 7 and Life's Essential 8) developed by the American Heart Association.

Results: After data cleaning, a total of 4614 children and adolescents were included in Life's Simple 7, of which only 25 were at the ideal level of 7 indicators, accounting for 0.5%; The number of people with the ideal level of 6 to 7 indicators accounted for 10.8% of the total number of people. Most children and adolescents have 4 to 5 ideal indicators, accounting for 69.8%. Furthermore, a total of 3932 subjects with no missing values in life essentials 8 were included. The results showed that the overall cardiovascular health score of the total population was 74.8, 43.5% of children and adolescents had an overall cardiovascular health score between 70 and <80, and 28.9% of children and adolescents had an overall cardiovascular health score between 80 and <90.

Conclusion: Chinese children and adolescents have low levels of cardiovascular health, and interventions should be strengthened to achieve prevention and reduce the incidence of cardiovascular disease in adulthood.

Keywords: Cardiovasular Health; Children; Adolescents.

3-2 Relationship between Adverse Childhood Experiences and Obesity in Adolescents: A Cross-Sectional Study

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Abstract
Purpose:
This study aims to investigate the association between adverse childhood experiences (ACE) and obesity in adolescents through statistical analysis.
Methods:
A cross-sectional survey was conducted among first and second year undergraduate students at China Medical University in 2021, with a total of 3775 students participating. The study team utilized a questionnaire method to collect general demographic information, parental occupation, and annual family income of college students. The study team also used the Three Factor Dietary Behavior Scale to investigate restricted eating, uncontrolled eating, and emotional eating among college students. Recorded anthropometric data such as height, weight, body mass index (BMI), waist circumference, and hip circumference.
Results:
The survey revealed associations between ACE occurrence and individual factors like age, gender, household registration type, and family economic status. Higher cumulative ACE intensity correlated with increased likelihood of restrictive eating, uncontrolled eating, and emotional eating. Specifically, physical neglect was linked to elevated risk of emotional eating. Specifically, the cross-sectional survey results indicate that experiencing physical neglect is associated with an increased probability of engaging in emotional eating behaviors
Conclusion:
ACE intensity were found to be risk factors for central obesity.,and physical abuse was associated with more severe disordered eating behaviors. Higher cumulative ACE intensity correlated with increased risk of uncontrolled eating and emotional eating.Meanwhile, the higher the cumulative intensity of ACE, the more severe the uncontrollable eating and emotional eating behaviors become.
Keywords: Adverse childhood experiences,Obesity,Adolescence,Eating behaviors, Physical Abuse

3-3 Trends in body composition indicators and its association with overall and cause-specific mortality in US adults: An NHANES Analysis 1999-2018

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Objectives The aim of this study was to estimate 20-year trends in multiple body composition indicators and prevalence of sarcopenic obesity in the US population and to compare these trends according to ethnicity and to examined the association of estimated body composition indicators with all-cause and cause-specific mortality.

Methods Data were extracted from the National Health and Nutrition Examination Survey (NHANES; 1999-2000 to 2017-2018) (n=26829). Body composition indices among adults aged 20 years or older were measured by trained technicians using standardized protocols. Data on the leading cause of death were used for case definition according to the codes of the International Classification of Diseases 10th Revision (ICD-10). . The age- and sex-adjusted means or proportions of SO were calculated and multivariable Cox regression was used to investigate the associations of sarcopenic obesity with mortality.

Results Age- and sex-adjusted mean fat mass decreased from 28.1 kg (95% CI, 27.3-28.9 kg) in 1999-2000 to 26.5 kg (95% CI, 25.5-27.5 kg) in 2017-2018. Mean muscle mass increased from 52.7 kg (95% CI, 52.10-53.2 kg) in 1999-2000 to 54.2 kg (95% CI, 53.5-54.9kg) in 2017-2018. Mean skeletal muscle mass increased from 22.1 kg (95% CI, 21.9-22.4 kg) in 1999-2000 to 22.8 kg (95% CI, 22.5-23.2 kg) in 2017-2018. Mean trunk fat mass decreased from 14.2 kg (95% CI, 13.7-14.6 kg) in 1999-2000 to 12.3 kg (95% CI, 12.2-13.3 kg) in 2017-2018. The association of fat mass with overall mortality followed a J-shaped pattern. A notable increase in risk is observed at lower fat mass levels, while the risk increment is comparatively modest at higher fat mass levels. For muscle mass, we estimated the mortality risk to reach a nadir at free fat mass in the range of 55-80 kg/m², with inverse associations below, and positive associations above, although the magnitude of associations varied.

Conclusions The muscle mass in the United States has increased, while the fat mass index is decreasing. And There was a statistically significant association between sarcopenic obesity and causes of death evaluated by the fat to muscle ratio, emphasizing the importance of maintaining a lower trunk fat to skeletal muscle ratio to reduce mortality.

3-4 Moderate-Intensity Interval Exercise Induces Circulating Lipid Redistribution and Exacerbates Cardiac Functional Impairment in High-Fat, High-Calories Diet-Fed Mice

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Abstract：Background High-fat, high-calories diet (HFCD) is a major cause of obesity and cardiometabolic disorder, with physical exercise being a cornerstone for preventing diet-induced weight gain. However, it is currently unclear whether physical exercise could protect against HFCD-induced cardiac dysfunction and cardiometabolic disorder. **Methods** Mice were fed with HFCD and simultaneously subjected to different intensities of physical exercise for 8 weeks. Changes in glucose tolerance, whole-body metabolism, cardiac function and cardiac metabolism were closely followed. **Results** HFCD-feeding led to significant cardiac function impairment, as well as elevation of body weight, blood glucose and serum lipid level. Three different intensities of physical exercise prevented HFCD-induced metabolic syndromes and fat deposition in the white adipose tissue (WAT) and the liver of the mice. However, a striking further reduction of cardiac function and abnormal cardiac lipid accumulation were observed in HFCD-fed mice subjected to moderate or higher intensity exercise. Further in-vivo evidences revealed that exercise induced circulating lipid redistribution from WAT and liver to the myocardium, leading to excessive cardiac lipid uptake. Furthermore, excessive cardiac lipid uptake resulted in damaged mitochondrial respiration complex activity, decreased mitochondrial fatty acid oxidation capacity, forming a vicious cycle of lipotoxicity. **Conclusion** Our study provided valuable insights into the cardiac effects of exercise on a HFCD population, indicating that counteracting the negative effect of HFCD by simultaneous physical exercise is unfeasible and detrimental. Moreover, inappropriate physical exercise may damage certain organs even though it may lead to weight loss and overall metabolic benefits.

Key words: Exercise; High-fat, high-calories diet; Cardiac function; Mitochondria, Fatty acid oxidation, Lipotoxicity

Declaration of interests

The authors declare no competing interests.

3-5 Lipid overload-induced RTN3 activation leads to cardiac dysfunction by promoting lipid droplet biogenesis

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Abstract: **Objective** Lipid droplet (LD) accumulation is a notable feature of obesity-induced cardiomyopathy and the extent of LD accumulation is directly related to the impairment of cardiac function. However, detailed pathological processes governing cardiac LD content remains poorly understood. Reticulon 3 (RTN3) was recently identified as a key modulator of lipid metabolism in adipocytes. However, the role of RTN3 in cardiac LD accumulation and obesity-induced cardiomyopathy remains unclear. **Methods** Mice were fed high-fat diet (HFD; 60 kcal% fat) to induce obesity, and cardiomyocytes were treated with 500 μM palmitate. Cardiac-specific RTN3 knockout/overexpression mice were developed using Cre/loxp system or adeno-associated virus 9 intramyocardial injection. Multiple analyses, including echocardiography, lipidomics, long-term live-cell monitoring, and fluorescent imaging, were performed. **Results** HFD-fed mice exhibited impaired cardiac function, elevated cardiac LD and increased RTN3 expression. Cardiac-specific RTN3 overexpression induced obvious cardiac LD accumulation and functional impairment in normal diet (ND)-fed mice, phenotyping the detrimental effects of HFD. In contrast, RTN3 ablation ameliorated HFD-induced cardiac dysfunction. Live cell imaging revealed that RTN3 overexpression significantly accelerated LD biogenesis in cardiomyocytes. Mechanistically, RTN3 directly bound with fatty acid binding protein 5 (FABP5) to facilitate the directed transport of fatty acids to endoplasmic reticulum, thereby promoting LD biogenesis. Further investigations discovered that the 1^{st}–65^{th} amino acids of RTN3 were indispensable for interacting with FABP5 and regulating LD biogenesis. Moreover, lipid overload-induced RTN3 upregulation was due to the increased expression of CCAAT/enhancer binding protein α (C/EBPα), which positively regulated RTN3 transcription by binding to its promoter region. The above findings were further verified in the myocardium of obese patients. **Conclusion** Our study reveals a novel mechanism contributing to cardiac LD biogenesis. Manipulating LD biogenesis by modulating RTN3 may be a potential strategy for treating cardiac dysfunction in obese patients.

Keywords：obesity; cardiac lipid accumulation; lipid droplet biogenesis; RTN3; FABP5.

Conflict of Interest

The authors declare no competing interests.

3-6 Lower intake of dietary linoleic acid is associated with children's lower basal metabolic rate with the mediation of gut microbiota

Authors

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Abstract

Objective: Dietary linoleic acid (LA) consumption has increased for many years, but its association with basal metabolic rate (BMR) in children has not been confirmed. Since the gut microbiota plays an essential role in host metabolism, it is necessary to explore the association between LA and BMR in children mediated by gut microbiota.

Methods： A face-to-face epidemiological survey was conducted to collect the fecal samples, physical examination information, and questionnaire data in 75 children. All fecal samples were analyzed for 16S fecal microbiome data and fecal metabolome data. Food Frequency Questionnaire (FFQ) was used to get dietary information, and LA intake was calculated by the Food and Nutrient Database for Dietary Studies. BMR was measured by a body composition analyzer (TANITA, Japan, MC-980).

Results: All participants were divided into two groups according to different LA intake, varied composition and level of fecal metabolites and gut microbiota were shown in different groups. A strong association could be observed between some of the varied gut genera and metabolites, as well as the varied gut genera and BMR. The Slackia spp., which has a negative association with BMR (β= -0.094, 95% confidence interval: -0.182~-0.006, P = 0.037), was also negatively associated with Cholesterol and LysoPG 18:1. Both of the two metabolites were significantly up-regulated in the group with lower levels of LA intake.

Conclusion: The positive association between LA intake and children's BMR may be caused by changes in gut flora. The Slackia spp., Cholesterol, and LysoPG 18:1 may modulate the association in the micro-level.

Keywords: Linoleic acid; Basal metabolic rate; Gut microbiota; Metabolite

3-7 A longitudinal study on the nutritional status and its influencing factors of children in poverty alleviation areas of two provinces in western China

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Abstract

Objectives: To describe the nutritional status of children in poverty alleviation areas of two provinces in Western China and its trends over time, as well as to explore the influencing factors of their nutritional status. **Methods:** A longitudinal observational study was conducted from July 2020 to June 2022, involving 480 children in grades 2 to 5 from three primary schools in three poverty-alleviated counties in Shaanxi and Sichuan provinces. Anthropometric data of the children and questionnaire data from the children and their parents were collected at baseline and during three follow-up rounds at 6-month intervals. Family economic status, patterns of parental feeding practice, and children's dietary patterns were formulated using factor analysis. A mixed-effects model was used to analyze the trend of children's nutritional status over time and to identify factors influencing children's nutritional status. **Results:** At baseline, the prevalence of overweight/obesity, central obesity, and thinness among children was 30.4%, 31.5%, and 7.3%, respectively. Between October 2020 and June 2022, a downward trend was observed in the prevalence of central obesity (from 31.5% to 28.3%), while the prevalence of overweight/obesity and thinness remained relatively stable. This study identified three dietary patterns among children (snack and beverage dietary, plant-based dietary, and animal-based dietary), as well as three parental feeding practice patterns (restriction feeding, pressure to eat, concern about feeding). A high socioeconomic status (OR=3.77), a plant-based dietary pattern (OR=2.44), and maternal overweight/obesity (OR=2.40) were significantly associated with an increased risk of central obesity in children ($P<0.05$). Additionally, a moderate level of feeding concern pattern (OR=3.40) and paternal overweight/obesity (OR=2.76) were associated with an increased risk of children's overweight/obesity ($P<0.05$). Additionally, a moderate level of feeding concern pattern (OR=0.35) was associated with a decreased risk of thinness among children ($P<0.05$). **Conclusions:**There is a coexistence of overweight/obesity and thinness in poverty-alleviated areas, with a decline in central obesity, while the prevalence of thinness and overweight/obesity remains stable. Family economic conditions, parents' body weight status, parental feeding practice patterns, and children's dietary patterns significantly influence the nutritional status of children. The findings provide a foundation for the formulation of targeted nutritional intervention strategies.

Key words: Children; Poverty alleviation areas; Nutritional status; Influencing factors; Western China

3-8 Study on the Relationship between Family Functioning and Overweight/ obesity-related Behaviors among School-aged Children in Liangshan Area

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Abstract

Objective To explore the relationship between family functioning and overweight/obesity-related behaviors among school-aged children in Liangshan area, and provide scientific basis for intervention of overweight and obesity in school-aged children.

Methods 1890 school children were recruited in Liangshan area in March 2021. Information on overweight/obesity-related behaviors and General demographic information were collected through questionnaires, and family functioning was measured using the Chinese Family Assessment Instrument (C-FAI). The multivariate logistic regression analysis was used to analyze the relationship between family functioning and overweight/obesity-related behaviors.

Results After adjusting for gender, age, and ethnicity, school-aged children with good family functioning were less likely to have low frequency of breakfast (OR=0.327, 95%CI=0.220-0.486) and exercise (OR=0.303, 95%CI=0.215-0.427), but more likely to have low frequency of late night snacks (OR=1.469, 95%CI=1.023-2.112), low intake of Sugar-sweetened beverages (OR=2.551, 95%CI=1.567-4.152) and fried foods (OR=2.533, 95%CI=1.614-3.975), and less time using electronic devices (OR=6.273, 95%CI=2.405-16.360), and were less likely to mock their obese classmates (OR=9.228, 95%CI=3.903-21.819).

Conclusion There is a certain correlation between family functioning and overweight/obesity-related behaviors in school-aged children. Good family functioning is of great significance for forming good dietary and lifestyle habits and controlling weight. Therefore, a family-functioning-centered intervention strategy for overweight and obesity in school-aged children can be explored.

Keywords: School-aged children; Overweight/obesity; Family functioning; Related behaviors; Intervention

Declaration of competing interest

None.

3-9 Research and Analysis on Physical Activity and Body Mass Index of Chinese Children and Youth, 2023

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Objective: The aim was to understand the current situation of physical activity (PA) and body mass index (BMI) in Chinese children and adolescents aged 7-17 years, and to investigate the effect of PA on BMI.

METHODS: PA and BMI were administered to 7000 children and adolescents aged 7 to 17 years from different regions of China from September to December 2023.PA was collected using Firstbeat to continuously capture a week's worth of information for each student, including 5 school days and 2 rest days, with up to 10 hours of wear time per day, and to compute heart rate, oxygen uptake, cardiorespiratory load, activity load, activity intensity, and BMI was measured by a professional and calculated using a weight/height2 formula.

RESULTS: According to the 2010 AHA "Life's Simple 7" ideal level criteria, the number of PA achievers was 439 (8.9%) and the number of BMI achievers was 3692 (68.3%). Children and adolescents who exercised 2 days per week had a significantly lower risk of obesity compared with those who did not participate in weekly exercise (OR=0.651,95% CI:0.464,0.915).

Conclusion: Although more than half of Chinese children and adolescents with BMI meet the standard, they all lack sufficient exercise, which may lead to a decline in muscle and cardiorespiratory health. Parents and schools are advised to encourage their children to participate in more physical activities to increase their physical activity and maintain a healthy weight and fitness level.

Keywords: China, children and adolescents, body mass index, physical activity, exercise

3-10 Environmental exposure markers of childhood obesity metabolic disease based on exposome-metabolome wide association study

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Abstract

Objective

The massive epidemic of childhood obesity has become a global public health crisis. The aim of this study is to elucidate the association between environmentally-derived chemicals and childhood obesity metabolic disease from a metabolic perspective by using the joint application of exposomics-metabolomics technology, to screen environmental exposure markers of childhood obesity metabolic disease, and to provide a scientific basis for the association between chemical pollutant exposure and childhood obesity metabolic disease.

Methods

A total of 192 cases of children with simple obesity, obesity combined with high blood pressure, obesity combined with dyslipidemia, obesity combined with both high blood pressure and dyslipidemia, and control children (with normal BMI, blood pressure, and lipids) were recruited in Fuxin City, Liaoning Province, China, using a case-control study design. Metabolic profiles and exogenous chemical residues were obtained from serum samples using ultra high performance liquid chromatography- mass spectrometry, and markers of environmental exposures to metabolic disorders in childhood obesity were screened by the meeting-in-the-middle strategy.

Results

A total of 315 metabolites and 14 exogenous chemical residues were identified by untargeted metabolomics analysis for subsequent statistical analysis. 13 markers of environmental exposure to childhood obesity metabolic disease screened by

meeting-in-the-middle strategy: LysoPC (18:0), Carnitine C14:0, Carnitine C14:0-OH, PE (36:4), SM (32:2), Hippuric acid, FA 24:6, Vitamin D3, DG (18:1/20:4), Valine, ST 28:1; O;S , Hypoxanthine, DG(16:0/18:2).

Conclusion

In this study, we used the exposome-metabolome wide association study to reveal the relationship between 14 environmental chemicals in children's blood and the development of childhood obesity metabolic disease, traced back the key exogenous chemicals affecting childhood obesity metabolic disease, screened out 13 endogenous exposure markers related to the exposure of specific chemicals, which can help in the early detection of the disease and the identification of early warning markers.

Keywords: Childhood obesity, Dyslipidemia, High blood pressure, Metabolomics, Exposome

Competing interests

The authors declare that they have no competing interests.

3-11 Title: Association between protein-to-energy ratio and overweight/obesity in children and adolescents in the United States-A cross-sectional study based on NHANES

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Abstract:

Background: The proportion of dietary protein may play a pivotal role in the onset of overweight and obesity among children and adolescents.

Methods: We analyzed cross-sectional data from 4,336 children and adolescents participating in the National Health and Nutrition Survey (NHANES) from 2011 to March 2020. Multivariate logistic regression analysis was utilized to estimate odds ratios (ORs) and 95% confidence intervals (CIs), while restricted cubic spline were employed to investigate the nonlinear associations between dietary protein intake and the prevalence of overweight and obesity in this population.

Results: The logistic regression model, adjusted for confounders, revealed that a 1% increase in the proportion of dietary protein intake corresponded to a 4% increase in the risk of overweight and obesity (OR=1.04,95%CI:1.01-1.07). A nonlinear relationship between dietary protein energy ratio and overweight/obesity was observed in children aged 6-11 years ($P < 0.05$) through restricted cubic spline analysis. After categorizing dietary protein intake into quartiles, the adjusted OR for the highest quartile, compared with the lowest, was 2.07 (95%CI:1.35, 3.16, $P = 0.001$) among children aged 6-11 years.

Conclusion: Dietary protein intake is positively associated with overweight and obesity in American children, independent of individual characteristics and total energy intake.

Keywords: Dietary protein, Overweight/obesity, Children, Adolescents, NHANES

3-12 Analysis of the association between parental feeding practices and body composition among children in Shenzhen

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Abstract:

Objective: To investigate the longitudinal association between feeding practices and children's weight status and body composition, and to explore the potential impact of child gender, age, and parental education level on this association.

Methods: A survey was conducted from September to November 2021 to 2023 among 1262 third-grade children and their parents in Luohu district, Shenzhen, China. Gender differences in the prevalence of overweight, obesity, and temporal trends in body composition were compared. Mixed-effects models were employed to analyze the relationship between parental feeding practices and weight status and body composition indices.

Results: At baseline, the rates of overweight, central obesity, and underweight among children were 26.45%, 22.90%, and 14.84%, respectively. From 2021 to 2023, the prevalence of central obesity among children exhibited a significant upward trend. Significant upward trends were also observed in fat-free mass (FFM), fat-free mass index (FFMI), total body water (TBW), and skeletal muscle mass (SMM) over time. Monitoring nutrition (MN), perception of Child's weight (PCW), concern about child's weight (CN), and perception of parental weight (PPW) were significantly associated with increases in children's waist-to-height ratio (WHtR) and central obesity, respectively ($P<0.05$). Dietary pressure had a more pronounced impact on FFM, TBW, and SMM compared to other dimensions ($P<0.05$). Children of mothers with a college education or above exhibited significant MN, leading to increased BMI, body fat mass (BFM), fat-free mass Percentage (FMP), fat mass index (FMI), and SMM (all $P<0.05$).

Conclusion: Higher levels of attention, combined with lower dietary pressure, perception of children's weight, and perception of parental weight, are associated with increased risk of obesity in children. Preventing childhood obesity and improving body composition indicators may require optimizing parental feeding practices to promote children's health.

Key words: Children; Parental feeding; Nutritional status; Body composition

3-13 Association between large for gestational age and childhood cardiometabolic risk: the Born in Guangzhou Cohort Study

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Abstract
Objective: This study aimed to explore the association between large-for-gestational age (LGA) and cardiometabolic risk in children within a prospective birth cohort study in China.
Methods: A total of 737 children aged 8-10 years were included from the Born in Guangzhou Cohort Study, who were followed up prospectively from birth. LGA was defined as birth weight above 90th percentile of the gestational age- and sex-specific INTERGROWTH-21st standards. Child's waist circumference, blood pressure, fasting glucose, insulin, total cholesterol, triglyceride, high-density lipoprotein (HDL) and low-density lipoprotein were measured at 9-year follow up. Three definitions of clustering of cardiometabolic risk factors (CCMRF; yes/no) and two definitions of metabolic syndrome (MetS; yes/no) were made according to clinical recommendations or previous studies. A continuous cardiometabolic risk score was also calculated by summing up the internal Z scores of five risk factors (i.e., waist circumference, systolic blood pressure, fasting triglyceride, HDL and glucose) and then divided by the square root of five (the number of components). The association between LGA and cardiometabolic outcomes was assessed using log-binomial regression for dichotomous outcomes and multiple linear regression for continuous risk scores, adjusting for confounding variables.
Results: Compared with non-LGA children, those born LGA had a higher cardiometabolic risk score (difference between the two groups, 0.52; 95% CI, 0.16-0.89) after adjustment for maternal age, education level, pre-pregnancy BMI, parity, and child sex. Children born LGA also had substantially increased risk of dichotomous CCMRFs (risk ratios, ranging from 1.8 to 2.1; P values <0.05) and MetS (risk ratios, 3.1 and 3.5; P values <0.05) (Figure 1).
Conclusion: Our findings have two implications: (1) It is important to monitor cardiometabolic health among LGA infants; (2) Avoiding fetal over growth might promote cardiometabolic health in childhood and even adulthood.
Key words: large-for-gestational age; cardiometabolic risk; cohort study

3-14 Construct the childhood obesity intervention program based on the Trans-Theoretical Model and its application

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Objective: This research focuses on how to solve the child obesity epidemic in Shenyang, and explored how to apply the Transtheoretical Model into children's health education, and how to combine health education technology with theoretical models in order to guide the improvement of children's health behaviors.

Methods： This is a cluster randomized controlled trial program. The intervention group consisted of 4 classes and 157 children, while the control group consisted of 4 classes and 160 children from the same school. The children in the intervention group were intervened according to the "multi-level multi-component comprehensive prevention and control plan for childhood obesity". Children, parents and school were taken as the three-level intervention objects. Five behaviors related to childhood obesity including children's vegetables and fruits, sedentary behavior, physical activity, meat intake and sugar-sweetened beverages intake were chose as multiple intervention components to conduct research.

Results: Intervention improved the score of five behavior-related self-efficacy and perceived benefits for children in the intervention group. The intervention increased intake of vegetables, fruits and meat, increased physical activity, and reduced sedentary time and sugar-sweetened beverage consumption. Compared with before the intervention, the obesity rate of children in the intervention group decreased by 10.3% after the intervention. Compared with the control group, the BMI z-score of the intervention group decreased by 0.275 after the intervention. After intervention, the scores of parents' parenting behavior, parents' parenting self-efficacy, parents' health behavior and parents' health attitude were improved in the intervention group. After the intervention, the teachers' health knowledge, awareness, belief and self-efficacy of prevention and control of childhood obesity were improved.

Conclusions: The comprehensive intervention program developed in this research can effectively facilitated the changes of five types of behavior, as well as reduced the detection rate of obesity and the Z score of BMI in the intervention group. The results show that bringing into a variety of objects including children, parents, schools, designed intervention programs based on the normal behavior model, and making use of parents' online communities are the keys to the successful implementation of the intervention.

Key Words: childhood obesity; the transtheoretical model; intervention; primary school; evaluation

可能存在的利益冲突：无

3-15 Study on the disease burden and trend of chronic diseases related to overweight and obesity in the adult population of a divisional city in Xinjiang Production and Construction Corps

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Abstract

Objective To analyze the trend of chronic disease prevalence among the adult population in a division city of Xinjiang Production and Construction Corps (Xinjiang Corps) and to explore the effects of overweight and obesity on the risk of hypertension and diabetes.

Methods A total of 468404 adult participants underwent physical examinations in a hospital in a division city of Xinjiang Corps from 2018 to 2023, with sample sizes of 80972, 79404, 61316, 73493, 86494, and 86725 for each year. Participants who underwent continuous medical checkups for six years were selected, and 10727 individuals were included after excluding those with baseline hypertension and diabetes in 2018 for a retrospective cohort study.

Results The prevalence of obesity, central obesity, hypertension, and diabetes among the adult population in the divisional city of Xinjiang Corps showed an overall increasing trend from 2018-2023($P<0.01$). The cumulative new incidence of hypertension was 44.52% (4776/10727), and that of diabetes was 8.60% (923/10727). Compared to the population with normal or underweight BMI, the overweight population had a 1.20 times higher risk of developing hypertension (HR=1.20, 95%CI:1.13~1.28) and a 1. 65 times higher risk of developing diabetes (HR=1.65, 95%CI:1.42~1.91). The obese population had a 1.35 times higher risk of developing hypertension (HR=1.35, 95%CI:1.24~1.48) and a 2.57 times higher risk of developing diabetes (HR=2.57, 95%CI: 2.13~3.10) compared to the underweight population. The pre-diabetic population with central obesity had a 1. 22 times higher risk of developing diabetes mellitus (HR=1.22, 95%CI:1.14~1.29), and the population with central obesity had a 1.08 times higher risk of developing hypertension (HR=1.08, 95%CI:1.01~1.15) and a 1.89 times higher risk of developing diabetes (HR=1.89, 95%CI:1.61~ 2.21).

Conclusion The burden of four chronic diseases in the adult population of a division of Xinjiang Corps is serious, especially in the overweight and obese and centrally obese populations, highlighting the urgent need to carry out effective interventions.

Key words: obesity, hypertension, diabetes, prevalence, risk factors, trends

Conflict of interest: None declared.

3-16 Improving Child Obesity Outcomes in China: Non-Digital Training Games for Executive Function

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Background: Globally, China has the greatest number of children with obesity. Child obesity is associated with impaired executive function (EF), including deficiencies in inhibitory control and working memory, but interventions to enhance EF among children with obesity are scarce. This study investigated the effects of scalable food Go/No-Go (FG) and healthy food working memory (FM) training games on EF, BMI-for-age, and food intake in children with obesity.

Methods: A randomized controlled trial using paper-based materials was conducted from May to July of 2023 in Shenyang, China. Thirty children aged 10-12 years with obesity were randomly assigned to intervention or control. The intervention group received FG and FM training 3 times/week for 4 weeks, while the control group received no training. The primary outcomes were BMI-for-age and food-related behavior, and secondary outcomes were EF indices, which were measured pre- and post- intervention period and analyzed.

Results: In the intervention group, frequency of energy-dense food choices decreased from 5 to 1.8 times post-intervention ($p<0.001$), and intake of these foods (e.g., potato chips, burgers, candy, beverages) decreased by 0.5, 0.5, 5.0, and 2.0 times per month, respectively, ($p<0.05$). In the control group, there were no significant changes in frequency, but increased intake of energy-dense foods. Importantly, EF indices improved among the intervention group, including reduced response time ($p<0.001$) and false counts ($p<0.001$) in FG and FM ($p<0.001$) in FM. The digit span test, trail making task and Stroop color-word interference task also improved post-intervention ($p<0.05$). No significant changes in BMI-for-age were observed for either group.

Conclusion: Food Go/No-Go and food working memory training games improved dietary quality in a sample of Chinese children with obesity. This intervention approach offers a scalable method for dissemination in multiple settings, such as under-resourced rural areas.

Keywords: Childhood obesity; Executive function; Inhibitory control; Working memory; Interventions.

3-17 A comparative study on the association between parental feeding practices and child body composition in Shaanxi province and Shenzhen city

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Abstract:

Objectives: To explore the association between parental feeding practices, children's weight status, and body composition in different regions of Shaanxi province and Shenzhen City.

Methods: A cross-sectional study was conducted from September to November 2023 to investigate 965 children and their parents in Zizhou County and Qingjian County of Yulin City, as well as 1262 children and their parents in the Luohu district of Shenzhen City. The child feeding questionnaire (CFQ) was used to identify seven dimensions of parental feeding patterns. Chi-square tests (for categorical variables) and one-way ANOVA (for continuous variables) were used to compare the prevalence of overweight and obesity, gender differences in body composition, and regional differences. Pearson correlation analysis and multiple linear regression models were employed to analyze the relationships between variables, and stratified analysis was conducted.

Results: A total of 1298 children (mean age 10.64 ± 8.06 years, 52.33% male) were included in this study. Significant gender differences were observed in high-intensity physical activity, as well as the intake of sweets and sugared beverages ($P<0.05$). The prevalence of childhood overweight and obesity increased with higher scores on concern about nutrition (CN), perception of child weight (PCW), and perception of parental weight (PPW), while it decreased with higher scores on pressure to eat (PE) and food as a reward (FR). Notably, a higher PE score was significantly associated with an increase in central obesity among children ($P<0.001$). Significant positive correlations were found between PCW, CN, PPW, and body composition indices in both regions.

Conclusion: Parental feeding practices are significantly associated with children's weight status and body composition indices. Optimizing parental feeding practices is crucial for preventing obesity and improving body composition. More personalized approaches to parental feeding practices are needed in different regions.

Key words: Children; Different regions; Parental feeding; Body weight status; Body composition

3-18 Association between dietary preferences and obesity in Chinese children and adolescents

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Abstract:

Background: Limited research has been carried out to investigate the links between dietary preferences and obesity in Chinese children and adolescents. This study aimed to assess the connections between dietary preferences and the likelihood of obesity among Chinese adolescents and children.

Methods: Our analysis utilized data from the China Health and Nutrition Survey (CHNS), a nationally representative survey, to conduct our research. 14452 participants 7-18 years of age were followed from 1991 to 2015. Body mass index (BMI) and BMI z-socre were used to evaluate the prevalence of overweight and obesity in Chinese children and adolescents. Further cluster analysis based on dietary preferences to establish different groups. Multivariate logistic regression was used to examine the association between dietary preferences and later obesity.

Results: The prevalence of overweight and obesity among children and adolescents in China was 7.80% (95% CI, 7.37~8.25) and 4.05% (95% CI, 3.73~4.38). The prevalence of overweight and obesity in children and adolescents in northern China was higher than in southern China (all P< 0.001).The prevalence of overweight and obesity was much higher among children and adolescents who preferred fast food (P=0.011, P<0.001)c. At the same time, the prevalence of obesity was higher in those who preferred to eat salty snacks (P=0.009). In addition, the prevalence of overweight and obesity among those who did not like soft drinks/sugar-sweetened drinks was lower (P=0.047, P=0.012).The results of multifactorial logistic regression analysis showed that Children and adolescents who preferred fast food were more likely to be overweight and obese (OR=1.41, 95% CI:1.11-1.79, P=0.004; OR=1.96, 95% CI:1.45-2.62, P<0.001).

Conclusions: The study found that the prevalence of overweight and obesity among Chinese children and adolescents not only differed significantly by age, gender, urban-rural and region, and increased over time, but also that there was an association between dietary preferences and their increased risk of developing overweight and obesity later in life.

3-19 Association between Somatotype, Weight Status and Executive Function in Preschool Children: A Prospective Study

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Objective: This study aims to clarify the association between weight status, somatotype, and executive function (EF), particularly working memory and inhibitory control, among preschool children while exploring their potential temporal association.

Methods: This study initially surveyed 528 children across four kindergartens (T1) and followed up 7 months later with 545 children (T2) with questionnaires, anthropometric measurements, and EF tasks. The longitudinal analysis included 406 children who completed both assessments. Obesity was classified using a BMI ⩾P95 percentiles and BMIz was calculated per WHO Growth Standards. EF was assessed using Day/Night Stroop tasks (DN1), simple version of Day/Night Stroop tasks (DN2), digit span forward (DSF), and digit span backward (DSB). The somatotype profiles were determined by latent profile analysis (LPA) based on BMIz and body fat distribution. The associations between weight status, somatotype, and EF were explored by ordered logistic regression and cross-lagged panel model (CLPM). EF differences between obesity and non-obesity groups were investigated by generalized linear mixed models (GLMs).

Results: LPA identified five somatotypes at T1 and T2, respectively. Compared with Normal-Symmetrical, Obesity-Apple children were more likely to perform poorly on the DSF at T2 (OR=2.25, 95%CI=1.22-4.16). The CLPM revealed a negative trajectory from BMIzT1 to DSFT2 (β=-0.11, P=0.021) and DN2T2 (β=-0.13, P=0.011). GLMs indicated that children with persistent apple-shaped were more likely to exhibit poorer EF, particularly in DSF (OR=1.91, 95%CI=1.16-3.17) and DN2 (OR=1.58, 95%CI=1.03-2.44).

Conclusion: This study establishes a longitudinal association between physical indicators and working memory in preschoolers. Children with persistent apple-shaped somatotype and high BMIz are at a greater risk for reduced working memory. These findings emphasize the importance of early weight and fat distribution management to support neurocognitive development and recommend targeted interventions to improve cognitive outcomes during critical years.

Keywords： Inhibitory control; Working memory; somatotype; obesity; children

Conflict of interest: No financial or non-financial benefits have been received or will be received from any party related directly or indirectly to the subject of this article.

3-20 Title:100-year secular trends of overweight and obesity in China: effects of age, period and cohort based on large national surveys

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Abstract

Background: Obesity has become a major public health problem worldwide and in China. This study examined the secular trend of overweight/obesity in China over the last 100 years.

Methods: Nationwide data from the China Health and Nutrition Survey and Chinese General Social Survey were used. A generalized binary mixed-effects model and a weighted quantile sum model were applied.

Findings: During 1909-2021, the prevalence of overweight/obesity was stable in 1909-1944, and a smooth increase from 1945 to 1959, followed by a decline between 1960 and 1974, but it resumed its rise after 1975 and peaked in 2003. The prevalence of overweight(obesity) among Chinese adults increased by 1.38(1.79) times, from 40.17%(10.76%) in 1993 to 55.33%(19.26%) in 2021 Cohorts born during the Chinese Culture Revolution (1960-1974) exhibited the lowest risk of overweight/obesity associated with low protein intake and high physical activity. Cohorts from the Reform and Opening-Up (1975-2003) showed a high risk of overweight/obesity related to favorable socioeconomic status and rapid urbanization. Persistent difference by sex and emerging difference by socioeconomic status in overweight/obesity prevalence were captured.

Conclusion: Overweight/obesity trends in China have shown a distinctive increasing-decreasing-increasing pattern over the past 100 years. These patterns exhibit unique characteristics and are influenced by discernible social forces.

Key words: Overweight, obesity, body mass index, age-period-cohort analysis, China

3-21 Altitude Exposure Modifies the Effects of Lean Mass on Bone Mineral Density: Evidence from Qinghai of Tibetan Adults

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Abstract

Objectives: There is limited research on relationship between body composition and bone mineral density (BMD) in high-altitude Tibetan population. We examined associations between body composition and BMD and the potential modifying role of altitudes in this relationship.

Methods: We analyzed 724 participants aged 19-85 years from the Tibetan community-based open cohort in the Golmud City suburb (2800 m above sea level). BMD and body composition were measured by dual-energy-X-ray absorptiometry (DXA). Multivariable regression models were created with BMD as the outcome, and moderation analysis was conducted by incorporating multiplicative interaction terms. Explored the linear or non-linear associations of lean mass index (LMI) that dominated the effects using restricted cubic splines (RCS). Additionally, further subgroup analysis was conducted based on LMI and BMI.

Results: The average lumbar and hip BMD of the Tibetan population was 1.00 g/cm2 and 0.94 g/cm2 respectively. The overall incidence of lumbar osteoporosis is higher in women than in men. In multivariate regression model, we found that a one-fold increase in LMI was associated with 0.003 g/cm2 increase of hip BMD [LMI hip: β (95% CI) = 0.003 (0.001, 0.005), P=0.010] in high altitude and this correlation significantly modifications with the increasing altitude (P interaction < 0.05). According to RCS results, individuals who are overweight and obese exhibit a substantial increase in BMD of the lumbar spine and hip when the LMI is above 16.67 kg/m2, with a decreasing slope or plateau when the LMI is higher than 20.11 kg/m2.

Conclusions: In Tibetan adults, lean mass had a strong positive association with BMD, and obese subjects are particularly susceptible to the impact of LMI on BMD. Our findings emphasize the importance of lean mass in bone health of Tibetan adults.

Keywords: Bone mineral density, Lean mass index, High-altitude, Tibetan

Conflict of interest: None declared.

3-22 Individual unhealth awareness modifies the association between neighborhood environment and child obesity and obesity-related behaviors

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Abstract

Objective: Obesogenic environment plays an important role in childhood obesity. Previous studies have demonstrated a relationship between school neighborhood environment exposure and obesity. Individual unhealth awareness, as well as parental unhealth awareness, could make some children more susceptible to the school neighborhood environment. Yet few studies have investigated this topic.

This study explores the impact of individual children's or parents' unhealthy awareness on the relationship between the school neighborhood environment and childhood obesity and obesity-related behaviors.

Method: Anthropometry, children and parents' questionnaire were conducted in 3670 children in Shenyang, China. School neighborhood environment data from school geospatial analysis. Questionnaire was used to measure individual and parental unhealth awareness. Primary outcomes were frequency of fruit and vegetable (FV) intake, perirenal fat thickness (PrFT) and body mass index (BMI).

Result: The association between school neighborhood environment (land-use, supercenters and greengroceries) and frequency of FV intake was weaker in those with higher individual unhealth awareness, and the association between school neighborhood environment (land-use and supercenters) and PrFT was stronger in those with higher individual unhealth awareness. We found no evidence of a moderating effect of parents' unhealth awareness.

Conclusion: The findings indicate that comprehensive strategies need to be implemented to prevent the obesity epidemic by addressing individual and environmental influences on diet.

Keywords: childhood obesity, neighborhood environment, Fruit and vegetable intake, Perirenal fat, Body mass index

Author Declarations

The authors declare that they have no competing interests.

3-23 Association between Abdominal Obesity-related Dietary Patterns and Prediabetes and Type 2 Diabetes (T2D) among Tibetan Adults

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Abstract

Aims: To identify abdominal obesity-related dietary patterns (DPs) and explore its relationship to prediabetes and diabetes (T2D) among Tibetan adults.

Methods: We conducted an open cohort with 1832 Tibetan adults and collected data in 2018 and 2022, which included food frequency questionnaires, blood samples and body composition measurements. By employing reduced rank regression (RRR) with visceral /abdominal fat ratio, waist-to-hip ratio (WHR), and Android /Gynoid fat ratio (A/G ratio) as intermediate response variables, we derived two obesity-related dietary patterns from 26 food groups. The association between DPs and prediabetes and T2D was analyzed by mixed-effects model and mediation analysis was further conducted.

Results: Two DPs were identified. DP1 was characterized as high consumption of beef and mutton, non-caloric drink, offal, and low intake in tubes and roots, salty snacks, onion and spring onion, fresh fruits, desserts and nuts and seeds; DP2 had high intake of whole grains, Tibetan cheese, light vegetables and pork and low of sugar-sweetened beverages, whole-fat dairy and poultry. Individuals in the highest tertile of DP1 showed a higher risk of developing prediabetes (OR 1.35, OR 95% CI (1.05, 1.73)) and T2D (OR 1.36, OR 95% CI (1.05, 1.76)). Similarly, those in the highest tertile of DP2 exhibited an elevated risk of developing T2D (OR 1.63, OR 95% CI (1.11, 2.40)) in fully adjustment model. Mediation analysis showed visceral /abdominal fat ratio, WHR, and A/G ratio mediate the association between DPs and prediabetes and T2D.

Conclusion: Abdominal adiposity related dietary patterns are positively associated with prediabetes and T2D among Tibetan adults. Our findings reveal the linkage between eating habit and prediabetes and T2D and shine light upon promoting healthier diet in Tibetan adults to lower the prevalence of prediabetes and T2D.

Keywords: Tibetan, Dietary Patterns, Prediabetes, Type 2 Diabetes (T2D), reduced rank regression (RRR)

Declaration of interest: All authors disclosed no relevant relationships.

3-24 The impact of high-altitude exposure on obesity risk among Tibetan adults in China using machine learning approach

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Abstract

Background: Epidemiological evidence suggests lower prevalence of obesity at a higher altitude. However, such inverse association was questioned due to heterogeneity in comparison populations. Further, proportional contribution of altitude on obesity was never investigated.

Objectives: We aimed to quantitatively evaluate the impact of high-altitude exposure on obesity risk by using machine learning (ML) approaches.

Methods: We enrolled 1503 Tibetan adults from two waves in an open cohort study in Tibetan communities whose members have been migrating from ultrahigh-altitude areas (> 4500m) to high-altitude areas (2800 m). We compared five optimized ML models and used SHapley Additive exPlanations (SHAP) to quantify the high impact on obesity in the optimal model.

Results: Random Forest (RF) was chosen to identify obesity, overweight/obesity, and central obesity (AUC: 0.738-0.917) with the highest prediction performances. SHAP indicated that high altitude was significantly negatively associated with obesity, overweight/obesity, and central obesity. The contribution of altitude to obesity (9.6% vs. 2.4%) and central obesity (6.9% vs. 4.4%) in women is higher compared with men. Altitude had a higher contribution to central obesity among women aged 60 years compared with other age groups.

Discussion: RF model was robust and accurate in predicting obesity and its related outcomes risk among Tibetan adults. High altitude was inversely associated with obesity, overweight/obesity and central obesity. The contribution of altitude to obesity was higher than other lifestyle factors, especially in women. Further mechanism studies could be explored.

Keywords: altitude, obesity, Tibetans, random forest, SHAP

3-25 Investigation and analysis of physical activity, blood pressure and total cholesterol in Chinese children and adolescents

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Objective: The aim of this study was to investigate the relationship between physical activity and blood glucose and lipids in Chinese children and adolescents, and to analyze the current situation. By studying the relationship between physical activity (PA) and blood pressure, total cholesterol (TC), it can help to understand the cardiovascular health status of children and adolescents, and provide a scientific basis for the prevention of cardiovascular diseases in adulthood.

Methods: A total of 7,000 children and adolescents aged 7 to 17 years from different regions were included in the study, based on the 2010 AHA cardiovascular health assessment standard "Life's Simple 7". According to the guidelines, the average daily PA duration of 60 minutes or more is considered to be up to the standard, otherwise it is not up to the standard.

Results: The average systolic blood pressure was 110±15 (mmHg), the average diastolic blood pressure was 68±10 (mmHg), and the blood pressure reached the standard rate was 69%. The average total cholesterol level of the total population was 4.1±6.2 (mmol/L), and the compliance rate was 70.1%. A total of 439 (8.9%) qualified for PA. Compared with children who did not exercise, children who exercised 1 day per week had a reduced risk of high blood pressure (OR=0.719,95%CI:0.521,0.993).

Conclusions: This study found that more than one-third of children and adolescents still have substandard blood pressure and total cholesterol, indicating that children and adolescents are still at high risk for cardiovascular health. This condition can be closely related to lifestyle factors such as poor diet and lack of exercise.

Keywords: China; physical activity; blood pressure; total cholesterol

3-26 Children with high genetic susceptibility benefit more from short-term physical activity interventions

Running Title: Gene and physical activity interaction on obesity

Authors

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Abstract

Objective: Whether change in short-term physical activity modifies the genetic susceptibility to weight loss is unknown. This study aimed to explore the short-term effect of gene-physical activity interaction on obesity for children.

Methods: This was a randomized control trail of 10-12 years old children with obesity allocated to a four week moderate-to-vigorous physical activity (MVPA) intervention combined with genetic susceptibility detection (n=93 for intervention and n=46 for control). The outcomes included body mass index (BMI), weight, waist circumference, hip circumference, body fat percentage, preperitoneal fat thickness and abdominal subcutaneous fat thickness. A weighted genetic risk score was generated based on 13 single nucleotide polymorphisms.

Results: Intervention strategies developed in study showed to be effective in strengthening children's MVPA level and improving body composition measures. A 10-minute increase in MVPA time per day was associated with a greater reduction in preperitoneal fat thickness in individuals at high genetic risk compared to those at low risk (-1.37±1.67 vs. -0.55±1.22 mm, P for interaction =0.01). For each 1-point increase in obesity genetic risk score, the amount of change in preperitoneal fat thickness expected from the physical activity intervention was -0.21 mm (95%CI: -0.34 - -0.09cm, P=0.001).

Conclusion: Children with a high genetic susceptibility to obesity may benefit more from a short-term increase in MVPA in terms of visceral fat improvement.

Key words: Obesity, Physical activity, Genetic susceptibility, Interaction

3-27 Maternal body mass index, gestational weight gain and offspring physical growth status at birth, mid-childhood and early adolescence: a birth cohort study

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Study aims: Whether the association strength between maternal adiposity and child growth changes as offspring grow older remains unclear. We aimed to examine the associations of maternal body mass index (BMI) and gestational weight gain (GWG) with offspring physical status from birth to early adolescence.

Methods: We used a birth cohort data from an antenatal micronutrient supplementation trial in rural western China. Maternal weights were collected during the first, second, and third trimester, then GWG during the second and third trimesters was calculated and classified following the Institute of Medicine recommendation. Offspring length/height and weight were measured at birth, mid-childhood (aged 7-10 years), and early adolescence (aged 10-14 years), which were then converted into z-scores using the INTERGROWTH-21st and WHO growth standards, respectively. We applied generalized linear models to examine the associations of maternal BMI and GWG with offspring's BMI and length/height at birth, mid-childhood, and early adolescence, respectively, with adjustments for common covariables.

Results: Overall, 411 mother-offspring pairs were analyzed (62% boys). Per/kg/m2 increase of maternal BMI in early pregnancy was associated with higher offspring BAZ, with the strongest effects in early adolescence. The adjusted mean differences (aMD) were 0.07 (95% confidence interval (CI) 0.001, 0.14) at birth, 0.09 (95% CI 0.05, 0.14) in mid-childhood, and 0.11 (95% CI 0.05, 0.17) standard deviation (SD) in early adolescence. Maternal excessive GWG was associated with higher HAZ in early adolescence (aMD, 0.44; 95% CI 0.17, 0.69).

Conclusions: Maternal adiposity during pregnancy has long-lasting impacts on offspring physical growth until early adolescence, and the association strength tends to become stronger as offspring grows order.

Keywords: body mass index, gestational weight gain, physical growth, early adolescence, birth cohort

Declare conflicts of interest: The authors have no conflicts of interest to declare.

3-28 The effects of brain reward system gene polymorphisms for clustering of obesity-related health risk behaviors in children and adolescents

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Purpose: Obesity-related health risk behaviors often do not occur in isolation but manifest as a cluster of multiple behaviors, especially in children and adolescents. This co-occurring set of health risk behaviors can be considered to constitute or represent a "behavioral pattern." An increasing body of research has found a close association between reward system-related genes and obesity-related health risk behaviors in children and adolescents. This study aims to explore patterns of behavioral clustering and investigate the role of genetic polymorphisms in the brain's reward system in the clustering of obesity-related health risk behaviors.

Method: From May to June 2023, children and adolescents in Liaoning Province were recruited for a questionnaire survey, blood biochemical index examination, and physical examination. EDTA anticoagulant blood was collected from children for detection of 89 gene loci of 18 genes.

Results: The study included a total of 636 participants with an average age of 13.44±1.17 years. 60.68% of children and adolescents exhibited the co-occurrence of three or more behaviors. Three behavioral cluster patterns were identified in the study: "low-risk behavior group," "sedentary-low physical activity group," and "diet-sleep problem group."

Five gene loci within the reward system were significantly associated with the co-occurrence index of behaviors. The TC genotype of the rs1745837 locus in the HTR1B gene was identified as a protective factor for children and adolescents exhibiting 3-5 co-occurring behaviors and 6 or more co-occurring behaviors. The AG genotype of the HTR1B gene rs1213366 locus was significantly associated with 3-5 co-occurring behaviors. The AA genotype of the rs2296972 locus in the HTR2A gene was identified as a risk factor for children and adolescents exhibiting three or more co-occurring behaviors.

The association of 5 genetic loci in the reward system with clustering patterns of behavior in children is significant. The study results indicate that the DRD2 gene rs4245149 is significantly associated with the clustering patterns of behavior in the "sedentary-low physical activity group" and the "diet-sleep problem group". The HTR1A gene variants rs6295 and rs10042486 are significantly associated with the clustering patterns of behavior in the "diet-sleep problem group" among children and adolescents. The CA genotype of the TPH2 gene rs1487275 is significantly associated with the "sedentary-low physical activity group".

Conclusion: Obesity-related health risk behaviors demonstrate a diverse and distinct clustering pattern. The polymorphism of reward system genes is significantly associated with the clustering pattern of obesity-related health risk behaviors. Future research should differentiate between male and female students based on the characteristics of behavior clustering patterns and conduct multi-dimensional, multi-level precision, and strategic behavioral intervention activities.

Keywords: Obesity-related health risk behaviors; Co-occurring behaviors; Behavior clustering; Reward system; Genetic polymorphism

Conflicts of Interest: The authors declare no conflict of interest.

3-29 Fermented Shen He Ling Exerts Weight Loss Effects by Regulating the Intestinal Microbiota and Its Metabolites

Objective: Research has shown that fermented Shen He Ling (SHLF08) exhibits safe and effective weight loss effects in both obese model rats and obese/overweight populations. This study further explored the possible weight loss mechanism of SHLF08 from the perspective of the gut microbiota.
Methods: （1）**Animal experiment:** After adaptive feeding for 1 week, 4-week-old Wistar rats were randomly divided into three groups. Except for the normal diet group (ND), the other groups were fed a high-fat diet (HFD). After the establishment of the obesity model, starting from the 5th week, physiological saline (blank group, model group) and Shenheling fermentation broth (SHLF08 group) were administered by gavage for 4 weeks. （2）**Population trial:** To explore the weight loss effect of SHLF08 in obese/overweight individuals through an 8-week randomized, placebo-controlled trial. After the intervention, differences in physiological parameters, biochemical parameters, gut microbiota, and metabolites between the model group/placebo group and the intervention group were compared to explore the possible anti-obesity effect of SHLF08.
Results: (1) Regarding the efficacy indicators, SHLF08 intervention had significant effects on weight loss in both the animal and population trials (P<0.05). SHLF08 intervention resulted in weight reductions of 2.59 kg and 3.29 kg (P<0.05) in the male and female groups, respectively, as well as reductions of 2.14 kg and 1.85 kg (P<0.05) in body fat, respectively. **(2) Gut microbiota-related indicators:** At the genus level, SHLF08 intervention significantly increased the abundance of *Lactobacillus*, *Bifidobacterium*, and *Dubosella* in the gut microbiota in both the animal and population experiments (P<0.05) and significantly increased the content of butyric acid in feces (P<0.05) while significantly reducing the abundance of Helicobacter and the ratio of Firmicutes to Bacteroidetes (P<0.05). In addition, in animal experiments, SHLF08 intervention also significantly increased the abundance of *Akkermansia*.
Conclusion: SHLF08 intervention reduced the weight of obese rats and obese/overweight subjects, possibly exerting an anti-obesity effect by regulating the imbalance of the gut microbiota and short-chain fatty acids.
Keywords: Fermentation; Homologous medicine and food; Weight loss; Intestinal microbiota; Short-chain fatty acids

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3-30 Regional adipose compartments conferred different cardiometabolic risk

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Obesity is a well-established risk factor for cardiometabolic diseases. In this study, we aimed to investigate the associations of fat mass in specific regions with cardiometabolic risk. This cross-sectional study consisted of 1256 children and adolescents aged 27-42 years from Beijing, who underwent dual-energy x-ray absorptiometry scan for regional fat masses and had multiple cardiometabolic phenotypes measured. In the multivariate model containing arm fat mass, leg fat mass, and trunk fat mass, after adjustment for region, family income, age, puberty development, physical activity, and smoking, higher trunk fat mass was independently associated with greater odds of most of cardiometabolic phenotypes, higher leg fat mass was associated with lower odds of most of cardiometabolic phenotypes, and arm fat mass was not significantly associated with most of cardiometabolic phenotypes. Analyses for individual risk factors demonstrated similar results. The results suggest that fat stored in different regions has differential influences on cardiometabolic risk.

3-31 Moderate-Intensity Interval Exercise Induces Circulating Lipid Redistribution and Exacerbates Cardiac Lipotoxicity in High-Fat, High-Calories Diet-Fed Mice

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Abstract

Background

High-fat, high-calories diet (HFCD) is a major cause of obesity and cardiometabolic disorder, with physical exercise being a cornerstone for preventing diet-induced weight gain. However, it is currently unclear whether physical exercise could protect against HFCD-induced cardiac dysfunction and cardiometabolic disorder.

Methods

Mice were fed with HFCD and simultaneously subjected to different intensities of physical exercise for 8 weeks. Changes in glucose tolerance, whole-body metabolism, cardiac function and cardiac metabolism were closely followed.

Results

HFCD-feeding led to significant cardiac function impairment, as well as elevation of body weight, blood glucose and serum lipid level. Three different intensities of physical exercise prevented HFCD-induced metabolic syndromes and fat deposition in the white adipose tissue (WAT) and the liver of the mice. However, a striking further reduction of cardiac function and abnormal cardiac lipid accumulation were observed in HFCD-fed mice subjected to moderate or higher intensity exercise. Further in-vivo evidences revealed that exercise induced circulating lipid redistribution from WAT and liver to the myocardium, leading to excessive cardiac lipid uptake. Furthermore, excessive cardiac lipid uptake resulted in damaged mitochondrial respiration complex activity, decreased mitochondrial fatty acid oxidation capacity, forming a vicious cycle of lipotoxicity.

Conclusion

Our study provided valuable insights into the cardiac effects of exercise on a HFCD population, indicating that counteracting the negative effect of HFCD by simultaneous physical exercise is unfeasible and detrimental. Moreover, inappropriate physical exercise may damage certain organs even though it may lead to weight loss and overall metabolic benefits.

Key words: Exercise; High-fat, high-calories diet; Cardiac function; Mitochondria, Fatty acid oxidation, Lipotoxicity

3-32 Inverted U-shaped association of between psychological stress and body composition of adolescents in Xi'an, China

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Abstract

Background: Obesity is a major public health concern worldwide that seriously threatens the physical and mental health of adolescents. Therefore, exploring the determinants and related mechanisms of obesity in adolescence is urgent.

Purpose: This study aimed to examine the associations between psychological stress and body composition. Such findings could provide scientific basis for preventing and treating obesity in adolescents.

Methods: A total of 662 adolescents aged 12.8 years completed the Adolescent Self-Rating Life Events Check List, measured body composition by Inbody 270.

Results: Mixed-effects models revealed an inverted U-shaped association of psychological stress with body composition. Compared with the lowest quartile of stress, the regression coefficients (95% CIs) for body mass index were 0.08 (0.02, 0.15) and -0.09 (-0.17, -0.01) of medium and high stress groups, respectively. Similar regression coefficients were found for stress and body fat mass. The regression coefficients (95% CIs) for body fat mass were 0.15 (0.02, 0.27) and -0.16 (-0.31, -0.02), respectively. Inverted U-shaped associations were observed for psychological stress with overweight and obesity and high fat mass percentage. The ORs (95% CIs) for overweight and obesity were 1.06 (1.02, 1.11) and 0.93 (0.89, 0.97), respectively and the ORs (95% CIs) for high fat mass percentage were 1.06 (1.02, 1.10) and 0.93 (0.90, 0.98), respectively. Further analyses showed that the associations of academic stress and punishment with high fat mass percentage were also inverted U-shaped. Results from restricted cubic splines also supported such inverted U-shaped associations (Figure 1).

Conclusions: An inverted U-shaped association existed between psychological stress and body composition in adolescents.

Keywords: Psychological stress, body composition, adolescents, China

No conflicts of interest

4-1 The association of a low-inflammatory diet with the trajectory of multimorbidity: a large community-based longitudinal study

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Abstract

Objective Evidence on the association between inflammatory dietary patterns and the trajectory of multimorbidity is sparse. We aimed to investigate the associations of a low-inflammatory diet with the multimorbidity trajectory.

Methods: Within the UK Biobank, 102,424 chronic disease-free participants (mean age 54.7±7.9 years, 54.8% female) were followed up to detect multimorbidity trajectory (annual change in the number of 59 chronic diseases). Baseline inflammatory diet index (IDI) and empirical dietary inflammatory pattern (EDIP) were separately calculated from the weighted sum of 32 posteriori-derived (15 low-inflammatory) and 18 prior-defined (9 low-inflammatory) food groups, and tertiled as low (low-inflammatory), moderate, and high.

Results: During the follow-up (median 10.23 years), 15,672 and 35,801 participants developed 1 and 2+ chronic conditions, respectively. Adherence to a low-inflammatory diet was associated with decreased multimorbidity risk (hazard ratio [HR_{IDI}]=0.84, 95% confidence interval [CI]: 0.81, 0.86; HR_{EDIP}=0.91, 95% CI: 0.89, 0.94) and a slower multimorbidity accumulation (β_{IDI}=-0.033, 95% CI: -0.036, -0.029; β_{EDIP}=-0.006, 95% CI: -0.010, -0.003) compared to a high-inflammatory diet, especially in participants aged >60 years (β_{IDI}=-0.051, 95% CI:-0.059, -0.042; β_{EDIP}=-0.020, 95% CI: -0.029, -0.012; both *P*-interactions<0.001). The 50th percentile difference (95% CI) of chronic disease-free survival time was prolonged by 0.81 (0.64, 0.97) and 0.49 (0.34, 0.64) years for participants with a low IDI and EDIP, respectively.

Conclusions: A low-inflammatory diet is associated with a lower risk and slower accumulation of multimorbidity (especially in participants aged >60 years) and prolonged chronic disease-free survival time.

Keywords: Low-inflammatory diet; multimorbidity trajectory; chronic disease; survival time; multimorbidity cluster

4-2 The associations among non-free sugar consumption, genetic predisposition, and the risk of dementia: Findings from UK Biobank cohort study

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Objectives: The relationship between free sugar consumption and the heightened risk of dementia has been established, yet the association between incident dementia and non-free sugar intake remains ambiguous. Furthermore, the influence of genetic predisposition on the association between sugar consumption and dementia risk remains inconclusive. This study aims to investigate the association among non-free sugar consumption, genetic predisposition, and the risk of dementia.

Methods: This cohort study included 159,408 UK Biobank participants. Data regarding free and non-free sugar consumption were assessed using web-based repeated 24-hour dietary recalls. The genetic risk for dementia was determined by calculating the polygenic risk score (PRS) for Alzheimer's disease, while gut microbial abundance assessments were utilized to evaluate the gut microbiome status. A cause-specific competing risk model was used to estimate the hazard ratios (HRs) and confidence intervals (CIs) for the association among sugar intake, PRS, gut microbial abundance, and the incidence of dementia.

Results: During a median follow-up period of 9.94 years, 1,219 participants (0.7%) were diagnosed with dementia. Intake of non-free sugars was linearly associated with an increased risk of dementia (HR for Quartile 4 vs. Quartile 1 = 1.26, 95% CI = 1.04, 1.52), whereas free sugar intake exhibited a nonlinear association (HR for Quartile 4 vs. Quartile 1 = 1.43, 95% CI = 1.20, 1.70). Furthermore, a significant interaction was observed between non-free sugar consumption and polygenic risk score (PRS), particularly in the high PRS subgroup where the association between non-free sugar consumption and increased dementia risk was pronounced (P for trend < 0.01).

Conclusions: Our findings highlight the critical need to explore the impact of non-free sugar consumption on dementia risk, especially in individuals with greater genetic vulnerability.

Key words: Dementia; Genetic susceptibility; Non-free sugar intake; UK Biobank

4-3 Association between DII and disease severity in patients with acute exacerbation of chronic obstructive pulmonary disease

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Object: This study aimed to explore the dietary inflammation index (DII) of patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) and analyse the association between the DII and the clinical symptoms and disease severity.

Methods: 525 patients diagnosed with AECOPD from December 2022 to October 2023 in a hospital in Shandong Province were selected. The 24-hour dietary recall method and Resident Dietary Nutrition Survey and Intelligent Analysis Software V1.0 were used to investigate and calculate the daily nutrients intake, and then the DII was further calculated. Disease severity included mMRC and CAT scores, as well as clinical symptoms and pulmonary function indicators (FEV1, FVC, etc.) obtained in the medical record. Logistic regression or multiple linear regression was used to analyze the association between DII and the clinical symptoms and lung function.

Results: The median of DII in AECOPD patients was 3.01. DII was positively associated with loss of appetite, mMRC grade, CAT scores, and GOLD classification (r=0.090, r=0.173, r=0.187 and r=0.134, $P<0.05$), while DII was showed significantly negative association with FEV1, FVC, and FEV1%pred (r=-0.174, r=-0.169, and r=-0.128, $P<0.05$). After multiple linear regression analysis, it was found that for each unit increase in DII, FEV1 decreased by 0.08L and FVC decreased by 0.10L in AECOPD patients after adjusting for confounders ($P<0.05$). In addition, no significant association was found between dietary inflammatory index and body inflammatory indexes in AECOPD patients ($P>0.05$).

Conclusion: The whole diet in AECOPD patients was in a pro-inflammatory state. High DII was associated with the increasing risk of reduced lung function. DII was also correlated with appetite and disease severity. Therefore, it is recommended that AECOPD patients should pay attention to appropriately increasing the intake of anti-inflammatory foods such as whole grains, fruits and seafood in their daily diets to maintain a balanced dietary intake.

Keywords： AECOPD, DII, Disease severity, Pulmonary function

The authors declare no conflicts of interest.

4-4 Plant-based diet indices and their interaction with ambient air pollution on the ovarian cancer survival: A prospective cohort study

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Competing Interests The authors declare no competing interests.

Abstract

Background: Ambient air pollution might serve as a prognostic factor for ovarian cancer (OC) survival, yet the relationships between plant-based diet indices (PDIs) and OC survival remained unclear. We aimed to investigate the associations of comprehensive air pollution and PDIs with OC survival and explored the effects of air pollution-diet interactions.

Methods: The present study encompassed 658 patients diagnosed with OC. The overall plant-based diet index (PDI), the healthful PDI, and the unhealthful PDI (uPDI) were evaluated by a self-reported validated food frequency questionnaire. In addition, an air pollution score (APS) was formulated by summing the concentrations of particulate matter with a diameter of 2.5 microns or less, ozone, and nitrogen dioxide. Cox proportional hazard models were applied to calculate hazard ratios (HRs) and 95% confidence intervals (CIs) of overall survival (OS). The modifying effect of PDIs on the relationships between APS and OS was further examined by incorporating interaction terms.

Results: Throughout a median follow-up of 37.60 (interquartile: 24.77–50.70) months, 123 deaths were confirmed. Comparing extreme tertiles, higher uPDI was associated with lower OS of OC (HR=2.06, 95%CI=1.30, 3.28), whereas no significant association was found between overall PDI as well as hPDI and OC survival. Higher APS (HR $_{\text{for per interquartile range}}$=1.27, 95%CI=1.01, 1.60) were significantly associated with worse OC survival, and the associations could be exacerbated by adhering to uPDI. Notably, an additive interaction was identified between combined air pollution and uPDI ($P < 0.005$ for high APS and high uPDI). We also found that adherence to overall PDI aggravated associations of air pollution with OC survival (P-interaction=0.006).

Conclusions: Joint exposure to various ambient air pollutants was significantly associated with lower survival among patients with OC, particularly for those who predominantly consumed unhealthy plant-based food.

Keywords: Air pollution; Interaction; Ovarian cancer; Plant-based diet indices; Survival.

4-5 A study on the correlation between dietary inflammatory potential and cognitive function in patients with mild cognitive impairment

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Abstract

Objective: To explore the correlation between the potential of dietary inflammation and its overall cognitive function and specific cognitive domains in patients with mild cognitive impairment (MCI).

Methods: A total of 372 MCI patients were included in the study, and cognitive function was evaluated using the Montreal cognitive assessment (MoCA), Mini-mental state examination (MMSE), Auditory verbal learning test (AVLT), Verbal fluency test (VFT), Boston naming test (BNT), and Shape trails test (STT). The participants' dietary intake was evaluated using a semi quantitative food frequency questionnaire and the Energy-density Dietary Inflammatory Index (E-DII) score was calculated. Use multiple linear regression to analyze the association between E-DII and various cognitive test scores.

Results: A significant negative correlation between E-DII and MMSE scores (P=0.046); compared with the anti-inflammatory diet group (T1), the pro-inflammatory diet group (T3) was associated with lower VFT and BNT scores (P=0.002, P=0.016), and higher STT-A and STT-B scores (P=0.002, P=0.003).

Conclusions: The higher potential for dietary inflammation in MCI patients is associated with lower overall cognitive function, language, attention, and executive function.

Keywords: Mild cognitive impairment; Dietary inflammation index; Cognitive function

4-6 Live and pasteurized *Akkermansia muciniphila* ameliorates diabetic cognitive impairment by modulating gut microbiota and metabolites in *db/db* mice

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ABSTRACT

Objective:

The established role of disturbances in the microbiota-gut-brain axis in the development of diabetic cognitive impairment (DCI) has long been recognized. It has shown the potential of *Akkermansia muciniphila* (*A. muciniphila*) in improving metabolic disorders and exerting anti-inflammatory effects. However, there remains a lack of comprehensive understanding regarding the specific effects and mechanisms underlying the treatment of DCI with *A. muciniphila*. This study aimed to evaluate the potential of *A. muciniphila* in alleviating DCI in *db/db* mice.

Methods:

Eleven-week-old *db/db* mice were administered either live or pasteurized *A. muciniphila* (5×10^9 cfu/200 μL) for a duration of eight weeks. The assessment of spatial learning and memory was conducted using the Morris water maze test, while alterations in brain pathology and neuroinflammation were evaluated. To gain a comprehensive understanding of the microbiota and metabolic changes in *db/db* mice following *A. muciniphila* intervention, a combination of microbiomics and metabolomics techniques was employed.

Results:

Administering live *A. muciniphila* significantly ameliorated cognitive impairments, improved the synaptic ultrastructure, and inhibited hippocampal neuron loss in the CA1 and CA3 subregions in *db/db* mice. Both live and pasteurized *A. muciniphila* effectively mitigated neuroinflammation. Moreover, live *A. muciniphila* increased the relative abundance of *Lactococcus* and *Staphylococcus*, whereas pasteurized *A. muciniphila* increased the relative abundance of *Lactobacillus, Prevotellaceae_UCG_001*, and *Alistipes*. Supplementation of *A. muciniphila* also induced alterations in serum and brain metabolites, with a particular enrichment observed in tryptophan metabolism, glyoxylate and dicarboxylate metabolism, nitrogen metabolism, and pentose and glucuronate interconversions. Correlation analysis further demonstrated a direct and substantial correlation between the altered gut microbiota and the metabolites in the serum and brain tissue.

Conclusions:

In conclusion, the results indicate that live *A. muciniphila* demonstrated greater efficacy compared to pasteurized *A. muciniphila*. The observed protective effects of *A. muciniphila* against DCI are likely mediated through the neuroinflammation and microbiota-metabolites-brain axis.

Keywords:

Akkermansia muciniphila, type 2 diabetes mellitus, cognitive impairment, gut microbiota, Metabolomics, neuroinflammation

4-7 Effects of an mHealth-based education program on salt-reduction related knowledge-attitude-practice and salt intake in primary school students and their families of Qinhuangdao

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Objective: EduSaltS is an mHealth-based school health education for salt reduction, as a scaling-up program that has been implemented in China. this study aims to evaluate its effects on salt-reduction related knowledge, attitudes, and behaviors, and changes in salt intake.

Methods: Education activity data from the management website were extracted and analyzed to assess the participation in online and offline activities of 18,001 students from 384 classes in 100 schools in Qinhuangdao. Baseline and follow-up surveys were conducted to assess salt-related knowledge, attitudes, and behaviors, and a stratified random cluster sample of 210 students from 10 classes in 10 schools was selected to evaluate salt intake in students and their families through a three-day dietary salt assessment. Data analysis was performed using SAS EG 8.3, with Chi-square test for between-group differences of KAP and paired t-tests used for pre-post salt intake comparisons, where statistical significance was set at $p<0.05$.

Results: The average completion rate of online courses for students was 84.6%, with 96.0% of schools organizing offline activities. Following the intervention, awareness of 5g salt intake recommendation by WHO, excessive salt intake leading to hypertension and correct salt reduction knowledge increased by 14.5% ($P<0.01$), 6.6% ($P<0.01$) and 5.3% ($P<0.01$) respectively, and the adoption of a low-salt diet increased from 34.5% to 47.3% ($P<0.01$). Student salt intake decreased by 0.95 grams ($P<0.01$), while family per capital salt intake decreased by 1.80 grams ($P<0.01$), with fathers showing the largest reduction at 2.92 grams ($P<0.01$).

Conclusion: mHealth-based comprehensive school education for salt reduction can enhance students' salt reduction awareness, improve dietary habits, and reduce salt intake.

Keywords: Salt reduction; KAP (Knowledge, Attitude, Practice); mHealth; Health education; Students

4-8 A quantitative food frequency questionnaire with detailed coarse grain categories in Shaanxi: development and reproducibility

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Competing Interests: The authors have declared that no competing interests exist.

Background: Epidemiological studies have shown that dietary factors can contribute to many chronic diseases in adults and that valid, accurate, and practical assessment methods are important for assessing dietary intake. coarse grain was shown to be beneficial for cardiovascular health, but valid food frequency questionnaire (FFQ) with detailed coarse grain information is lacking.

Objective: This study describes the development and reproducibility of a 12-category, 86-item (including19 types of coarse grains: Corn, Millet, Buckwheat, Oats, Adlay, Broomcorn millet, Barley, Quinoa, Brown rice, Black rice, Purple glutinous rice, Sorghum, Wheat bran, Mung bean, Red bean, Kidney bean, Pale green soybean, Black bean and Lentil) quantitative food frequency questionnaire (FFQ) in citizens in Xi'an Shaanxi.

Method: The data were collected from participants of a nutritional trial aimed to promote cardiovascular health. A total of 96 individuals were included in this analysis, all of whom completed the FFQ twice at three-month intervals. We assessed the reproducibility of the FFQ using Spearman correlation coefficients, intraclass correlation coefficients.

Results: The FFQ1 estimates of food group intake were not significantly different from the FFQ2 estimates except for snack and total coarse grains, and the estimates of nutrients were not significantly different except for fats and fatty acids. The Spearman correlation coefficients ranged from 0.353 (fungus) to 0.620 (meats) for the food groups and 0.245 (Vitamin C) to 0.556 (Cholesterol) for the energy and nutrients. Intraclass correlation coefficients ranged from -0.016 (vegetables) to 0.559 (dairy) for the food groups and from -0.033 (Vitamin C) to 0.318 (I) for the energy and nutrients. The Spearman correlation coefficient between coarse grain intake from FFQ1 and that from FFQ2 was 0.326 ($p < 0.01$).

Conclusions: This study showed satisfying reproducibility of the FFQ with detailed coarse grain information. Overall, the instrument is reproducible and the performance is acceptable.

Keywords: FFQ, coarse grain, dietary intake

Funding sources: National Natural Science Foundation of China (82173504)

4-9 Associations of short-chain fatty acids with blood lipids and dyslipidemias in older adults: a cross-sectional study from western China

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Abstract

Objective: To investigate the associations of short-chain fatty acids (SCFAs) with blood lipid levels and dyslipidemias in the elderly as well as the effect of central obesity on the relationships.

Methods: This study included 954 participants (aged ≥ 60 years) from Lu' an City, Anhui Province, China. Ten SCFAs in serum were monitored through liquid chromatography–mass spectrometry. Multiple linear and binary logistic regression analyses were separately performed to analyze the associations of SCFAs with blood lipids and dyslipidemias. Subsequently, an obesity-stratified analysis was performed.

Results: After adjustment for relevant covariates, multiple linear regression analysis revealed that acetic acid (AA), propionic acid (PA), iso-caproic acid (iso-CA), and total SCFAs were negatively correlated with total cholesterol (TC) levels, whereas total SCFAs was positively correlated with high-density lipoprotein cholesterol levels. In addition, we observed that the higher AA (tertile 3: odds ratio, 0.523 [95% CI: 0.340–0.801]), PA (tertile 3: 0.523 [0.340–0.801]), iso-CA (tertile 3: 0.377 [0.240–0.588]) and caproic acid (tertile 3: 0.575 [0.366–0.898]) were associated with decreased risk of hypercholesterolemia and that higher levels of PA (tertile 2: 0.520 [0.304–0.880]) were associated with decreased risk of hypertriglyceridemia. Furthermore, the study revealed specific differences in the correlation between SCFAs and lipid levels based on the waist circumference values of the participants. The associations of SCFAs with TC levels were stronger in the participants with central obesity.

Conclusion: This study reported the associations between SCFAs and blood lipids, which may provide insights to explore new strategies for lipid regulation and suggest the need to tailor individualized interventions to central obesity to optimize lipid metabolism.

Keywords: Short-chain fatty acids; Blood lipids; Central obesity; Elderly people

4-10 Changes in fatty acyls upon conjugated linoleic acid supplementation and their relationships with body composition changes

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Competing Interests: The authors have declared that no competing interests exist.

Objective: Conjugated linoleic acid (CLA) supplementation may preserve muscle mass during weight loss. This study aimed to investigate CLA-induced changes in the plasma fatty acyls and their associations with body composition variation.

Method: In a randomized, double-blinded, placebo-controlled trial, 65 adults with high body fat (body fat percentage: 35.7 ± 0.1) received either daily 3.2 g CLA or 3.2 g sunflower oil (control) for 12 weeks. 85 fatty acyls were screened from pre- and post-intervention plasma metabolomes analyzed by Untargeted LC-MS metabolomics analysis. Body composition was measured by dual-energy x-ray absorptiometry. Multivariate mixed linear model was used to assess differential fatty acyls after the intervention. The associations of changes in body composition variation with changes in the differential fatty acyls were analyzed with partial spearman correlation.

Results: Compared with placebo, CLA altered 4 metabolites after adjusted for age and sex ($P < 0.10$): citramalic acid, 3-hydroxyvaleric acid, montecristin, and 2,6 dimethylheptanoyl carnitine. CLA-upregulated montecristin was positively correlated with changes in visceral adiposity index (VAI) ($r = 0.658$, $P < 0.001$). There was no significant correlation between changes in muscle mass (MM) or trunk muscle mass (TMM) and changes in differential fatty acyls. However, 2,6 dimethylheptanoyl carnitine showed a marginally significant positive and negative correlation with body muscle percentage (BMP) and trunk fat mass (TFM), respectively (BMP: $r = 0.444$, $P = 0.056$; TFM: $r = -0.419$, $P = 0.085$).

Conclusions: CLA supplementation increased the content of plasma montecristin in adults with high body fat, which may be associated with increased visceral fat.

Keywords: conjugated linoleic acid, body composition, fatty acyls

Funding sources: Nutrition Asia Research Grant (20190201)

4-11 Validation of the Intuitive Eating Scale (IES-2) in Pregnancy and Association with Psychological Characteristic and Diet Quality in a Population of Pregnant Women.

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Abstract

Purpose: Pregnancy is a special period that is strongly influenced by dietary interventions, and many pregnant women develop gestational diabetes caused by conditions such as poor diet. Dietary interventions for women during this period are therefore very important, but unfortunately there is a lack of established studies on intuitive eating in pregnant women. This study is the first study to assess intuitive eating during pregnancy in pregnant women using the Intuitive Eating Scale-2. Method: A total of 581 pregnant women completed the study which included the Intuitive Eating Scale (IES-2), the Depressive Symptom Scale (EPDS), the Anxiety Symptom Scale (SAS), the Parenthood Stress Scale (PPS), and The Dietary Guidelines Adherence Index for Pregnant Women during Pregnancy (CDGCI-PW). Result: The results show that the modified scales have good quality in the Chinese pregnant women population (CMIN/DF =1.756, CFI= 0.925, TLI= 0.909, RMSEA =0.037) and that the scale scores are correlated with depression and anxiety of pregnant women and correlated with overall diet quality during pregnancy. The final six factors (avoiding forbidden foods, avoiding emotional eating, body-food choice congruence, avoiding food-related coping strategies, permission to eat, and reliance on hunger and satiety cues) structure of the revised IES-2 was confirmed. Conclusion: This scale can further assess eating behaviors in different pregnancy states within the Chinese pregnant women population.

Keywords: Intuitive eating scale-2; Pregnant women; Eating disorder; Dietary quality

4-12 Associations of lower-carbohydrate and lower-fat diets with mortality among people with cardiovascular disease

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Abstract

Objectives: This study aimed to prospectively investigate the associations of different types of lower-carbohydrate diets (LCDs) and lower-fat diets (LFDs) with all-cause mortality among individuals with cardiovascular disease (CVD).

Methods: This study included 3,971 adults with CVD from the NHANES 1999–2014. Mortality status was linked to National Death Index mortality data through December 31, 2019. Overall, unhealthy and healthy LCD and LFD scores were determined based on the percentages of energy from total and subtypes of carbohydrate, fat, and protein. Cox proportional hazards regression models were applied to calculate hazard ratios (HRs) and 95% confidence intervals (CIs), and the restricted cubic spline regression with 3 knots (25th, 50th, and 75th) was used to explore the dose-response relationships between diet scores and all-cause mortality.

Results: A higher healthy LCD score was associated with favorable blood lipids and insulin resistance, whereas a higher unhealthy LFD score was associated with lower high-density lipoprotein and higher C-reactive protein at baseline (all *P*-trend < 0.05). During 35150 person-years of follow-up, 2,163 deaths occurred. For per 20-percentile increment in dietary scores, the multivariate-adjusted HRs (95% CIs) of all-cause mortality were 0.91 (0.86, 0.96) for healthy LCD score ($P < 0.001$), 0.94 (0.89, 1.00) for healthy LFD score ($P = 0.04$) and 1.07 (1.00, 1.14) for unhealthy LFD score ($P = 0.04$).

Conclusions: In this study, overall LCD and LFD scores were not associated with total mortality. Unhealthy LFD scores were associated with higher total mortality, whereas healthy LCD and LFD scores were associated with lower mortality among people with CVD.

Keywords：lower-carbohydrate diet, lower-fat diet, cardiovascular disease, mortality, prospective study

4-13 Trends of health-related lifestyle in Chinese population: findings from the China Health and Nutrition Survey (1993-2018)

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Objective: This study aims to examine the trends of the simple and combined health-related lifestyle behaviours over 25 years in Chinese population.

Method: Adults aged 18-79 years participating in at least one out of nine rounds of China Health and Nutrition Survey during 1993~2018 were included for analysis. The health-related lifestyle factors included smoking, alcohol drinking, physical activity (PA), diet, and Body Mass Index. A Healthy Lifestyle Index Score (HLIS) consisting of the above-mentioned five components was used as the combined lifestyle indicator, which is ranged from 0 to 20 with a higher score indicating a healthier lifestyle. The panel data was standardized according to the sex, age, and area specific proportion of the National Population Census in 2020.

Results: A total of 6839 eligible adults were included in 1993 and the sample expanded to over 10,000 in 2011, 2015 and 2018. The average age was 42.3 years, women accounted for 52.8% and participants in rural area accounted for 67.6% in 1993. After standardization, the smoking rate decreased from 34.7% in 1993 to 21.2% in 2018, and alcohol drinking rate declined from 17.3% to 9.3%, with both rates notably higher in men than in women. The active PA rate dropped from 31.1% to 9.8%. The heathy diet rate rose from 2.4% in 1993 to 14.8% in 2011 and then slightly decreased to 11.5% in 2015 and 12.2% in 2018. The normal weight rate decreased from 65.4% to 46.5%, while the obesity rate increased from 3.2% to 15.5%. The HLIS was around 12 in all panels and women showed higher score than men.

Conclusion: There are ups and downs of variant health-related lifestyle factors during the 25 years, which resulted in a relatively steady HLIS over the time. Comprehensive strategy is needed to promote healthy lifestyle to prevent noncommunicable diseases.

Key words: healthy lifestyle, health behaviour, adult, population, time trends

No benefit conflicts to declare from the authors.

4-14 Inter- associations Between Dietary Pattern, Trimethylamine N-Oxide and its precursors in Plasma and Diabetes in Chinese: Evidence from A cross-sectional study

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Conflicts of Interest Disclosures: The authors report no conflicts of interest.

Abstract

Objective: This study aimed to investigate the association between dietary patterns and Trimethylamine N-Oxide (TMAO) and its precursors levels and diabetes in China.

Methods: This was a cross-sectional survey that included 1,612 participants with a semiquantitative food frequency questionnaire (FFQ) in China, in 2021. Dietary patterns were determined through principal components analysis, followed by an examination of the associations between these patterns, TMAO and its precursors, and diabetes using multivariable logistic regression analysis. Subgroup analysis was conducted to study the interaction between Plasma TMAO and diabetes. The dose-response association between TMAO and its precursors and diabetes were assessed using the restricted cubic spline (RCS) analysis.

Results: Four dietary patterns were identified in total participants: “High-protein pattern”, “Traditional Chinese pattern”, “Protein-sweets pattern” and “Rice and tubers pattern”. In all populations, the traditional Chinese pattern was positively associated with diabetes (OR: 2.35, 95%CI: 1.53-3.60). Higher protein-sweets pattern (OR: 0.55, 95%CI: 0.33-0.76) and Rice and tubers pattern (OR: 0.22, 95%CI: 0.15-0.34) associated with lower diabetes risk. TMAO in plasma was positively associated with the risk of diabetes (OR: 1.62, 95%CI: 1.07-2.46), while higher concentrations of carnitine (OR: 0.42, 95%CI: 0.27-0.64) and betaine (OR: 0.60, 95%CI: 0.39-0.92) associated with lower diabetes risk. Moreover, the RCS analysis revealed a linear relationship between Lg-TMAO and its precursors and diabetes.

Conclusion: Our study suggests that following the Protein-sweets and Rice and tubers patterns may lower the risk of diabetes in Chinese adults. Plasma TMAO is positively associated with diabetes, while carnitine and betaine may have a protective effect. These results could guide the creation of dietary recommendations to prevent diabetes in this population.

Keywords: Dietary pattern; Trimethylamine N-Oxide; Diabetes; Metabolomics.

4-15 Study on the anti-aging effect and mechanism of polyphenol of *Phyllanthus emblica L.*

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Abstract:

Objective: To explore the health effects of "medicine and food homology" of *Phyllanthus emblica L.*（PE）, which may provide a solution for aging induced by oxidative stress induced by dietary intervention.

Methods: The subacute senescence model of C57BL/6J mice induced by D-galactose was established to investigate the anti-senescence effect of polyphenol of PE. High throughput 16S rDNA sequencing was used to study the effects of polyphenol on intestinal flora of aging mice. Molecular docking, circular dichroic chromatography, UPLC-QE-MS2 and Western blot were used to explore the molecular mechanism of the anti-aging effect of PE on the regulation of Sirt6/Nrf2/HO-1 pathway by targeting Sirt6 protein.

Results: Polyphenols of PE can restore the changes of organ index, improve the antioxidant capacity of blood and tissues, and improve the ability of autonomous movement, learning and memory of aging mice. Polyphenols are the main active components (about 40% of fresh fruit), among which chebulidic acid, chebuliric acid, ellagic acid and gallic acid are the high content phenolic substances. PE polyphenols can regulate the structure and composition of intestinal flora in aging mice, restore the decreased diversity and richness of aging mice, increase the abundance of Bacteroides in aging mice, reduce F/B value, and increase the relative abundance of beneficial bacteria. Polyphenols in PE can interact with Sirt6 protein through hydrogen bonding, hydrophobic and electrostatic interactions, and change the secondary structure of Sirt6 protein, thus affecting the deacetylase activity of Sirt6. At the same time, Sirt6/Nrf2/HO-1 signaling pathway in aging mice was up-regulated to play an anti-aging role.

Conclusion: The "drug and food homology" has good anti-aging effect, which may be realized by regulating intestinal flora or Sirt6/Nrf2/HO-1 signaling pathway.

Key words: *Phyllanthus emblica L.*; polyphenols; anti-aging; intestinal flora; Sirt6/HO-1

4-16 Analysis of a survey on Food and Nutritional Literacy (FNLIT) among primary school students: a cross-sectional study in Sichuan

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Objective: As living standards improve and dietary choices diversify, unbalanced eating habits are becoming more common among children. This trend increases the risk of nutrition-related diseases and hinders the healthy growth of children, especially in rural areas. A high level of food and nutritional knowledge and skills is essential in health promotion, but there is a lack of research in this field in Xuyong County.

Method: This cross-sectional study adopted stratified random cluster sampling method, and included a total of 966 students from two classes in each of the third to fifth grades across four primary schools in Xuyong County. They were instructed to independently complete a 92-point paper questionnaire (FNLQ-SC), which was divided into two domains: cognitive and skills; three levels: functional, interactive and critical; and five dimensions: concept, knowledge, food choosing, preparing and eating.

Results: The FNLIT scores ranged from 12.5 to 89.0, and the mean was 58.29±7.98, the possession rate of high-level literacy(⩾82 points) was only 0.5%. Notably, higher scores were demonstrated in the conceptual dimension (70.26±19.27), the interaction level (72.66±15.44), and the FNLIT cognitive domain (68.62±10.52). Furthermore, FNLIT scores were higher among students who attended urban schools, were female, had parents with high levels of education and socioeconomic status (SES), were willing to learn about more nutrient topics, had more exercise and fewer video screen time (p<0.05). According to multiple linear regression analysis, individual behavioral habits have a greater impact on FNLIT levels than demographic characteristics.

Conclusions: The FNLIT mean scores and possession rates are low, particularly in the skills domain. High attention needs to be paid to students with low SES and parental education levels, little time on sports, and excessive time spent on watching electronic screens.

Keywords: Food and Nutritional Literacy; Rural areas; primary school students;

Conflict of Interest: No conflict of interest.

4-17 Ultra-processed food consumption and risk of cardiovascular events: a systematic review and dose-response meta-analysis

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Background

Ultra-processed food (UPF) consumption continues to increase worldwide. However, evidences from meta-analyses are limited regarding the effects on cardiovascular events (CVEs).

Methods

A meta-analysis was performed to assess the dose–response relationship of UPF consumption and CVEs risk (including the morbidity and mortality of cardiovascular causes, and myocardial infarction, stroke, transient ischemic attack, coronary intervention). Databases (PubMed, EMBASE, Cochrane Library, and Web of Science) were searched for observational studies published in English language up to October 24, 2023. Generalized least squares regression and restricted cubic splines were used to estimate the linear/nonlinear relationship. PROSPERO CRD 42023391122.

Findings

Twenty studies with 1,101,073 participants and 58,201 CVEs cases with a median follow-up of 12.2 years were included. A positive linear relationship between UPF intake and CVEs risk was identified. In addition, positive correlation between coronary heart disease and UPF consumption in terms of daily serving and daily energy proportion. No significant association of UPF consumption with the risk of cerebrovascular disease was observed. Briefly, 10% increase of UPF by daily weight proportion was associated with a 1.9% increase of CVEs risk (RR = 1.019; 95% CI, 1.007–1.031; P = 0.002), an additional daily serving corresponding to 2.2% CVEs risk increase (RR = 1.022; 95% CI, 1.013–1.031; P < 0.001), and 10% increase by daily energy proportion corresponding to 1.6% CVEs risk increase (RR = 1.016; 95% CI, 1.002–1.030; P = 0.022).

Interpretation

UPF consumption were associated with a higher risk of CVEs in the positive linear relationship. Our findings highlight the importance of minimizing UPF consumption for cardiovascular health and might be help to pursue public health policies in control of UPF consumption.

Keywords: Ultra-processed food; Cardiovascular events; Coronary heart disease; Dose–response; Meta-analysis

4-18 Daily intakes of sucrose and sweeteners diversely affect exercise-induced improvements on cardiac functions of obese mice

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Objective: To investigate whether daily consumptions of sucrose and sweeteners, i.e., sucralose and isomaltooligosaccharide (IMO) could influence aerobic exercise-improved cardiac functions of obese mice and underlying mechanisms.

Methods: Healthy male C57BL/6 mice (n = 56, weighing 15-18 g) were randomly divided into two groups: a normal control group (NC, n = 7) and a high-fat diet plus tap water containing 20% fructose group (HFHF, n = 49) for eight weeks. After eight weeks of HFHF feeding, 49 mice were then randomly assigned to an aerobic exercise group (EX, n = 28), a group changed their daily diet from HFHF to normal chow without exercise (DR, n = 7), a group underwent intermittent fasting (IF, n = 7). EX groups were fed with normal chow and had free access to tap water (EX+W, n=7), water supplemented with 0.01% sucralose (EX+TGS, n=7), 0.4% IMO (EX+IMO, n=7) and 10% sucrose (EX+SUG, n=7), respectively. The exercise protocol for the mice was a 3-day acclimatization turret training followed by 3 weeks of continuous training at a speed of 5 m/min for 30 min per day with a 0° incline.

Results: HFHF significantly increased body weight and induced serious fibrosis, inflammatory cell infiltration, nuclear atrophy and lipids accumulation in the heart tissues, along with elevated MDA and lowered SOD compared with NC group. HFHF also shortened EF and FS, decreased left ventricular internal dimension at LVIDd and LVIDs as assessed by the cardiac ultrasound ($P < 0.01$). ($P < 0.01$). DR, IF and EX with/without consumptions of sucrose and sweeteners significantly reduced body weight, with EX showing pronounced effects. Specifically, EX+W effectively mitigated HFHF-induced cardiac dysfunctions, suppressed HFHF-induced abnormal expressions of key proteins and genes involved in fatty acid metabolism, fibrosis, apoptosis and inflammation ($P < 0.01$), significantly affected fatty acid profiles of heart tissues. However, such benefits were largely counteracted by the daily consumptions of SUG and TGS during exercise. By contrast, IMO synergistically enhanced EX-improved cardiac functions via activating Sirt1- PPAR-α signaling.

Conclusion: Our results provide novel insights into adverse effects of daily drinking sucrose and sucralose-sweetened water on counteracting exercise-improved cardiac functions and suggest the potential of IMO as a dietary supplements favouring cardiac health during weight loss.

Keywords: Aerobic exercise, sweeteners, cardiac function, fatty acid metabolism

Conflict of interest: There are no conflicts of interest to declare.

4-19 Isomaltooligosaccharide potentiates alleviating effects of intermittent fasting on obesity related cognitive impairment during weight-loss and the rebound weight gain

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Aims: Obesity related cognitive dysfunction pose a significant threat to public health. The present study aimed to investigate alleviating effects of intermittent fasting (IF) on high-fat-high-fructose diet induced cognitive decline and to assess whether isomalto-oligosaccharides (IMO), a well-known prebiotic, could augment such benefits.

Methods: We investigated impacts of IF and its combination with IMO supplementation (IF+IMO) on the cognitive impairments in an obese mouse model induced by a high-fat-high-fructose diet (HFHF) and explored mechanisms by integrating hypothalamus transcriptome and gut microbiome. A fecal microbiome transplantation (FMT) experiment was conducted to confirm the involvement of the gut microbiome in mediating the beneficial effects of treatments on cognitive functions. We further investigated the protective effects of IF and IF-IMO on cognitive impairments triggered by rebound weight gain subsequent to HFHF diet-induced weight loss.

Results: IMO augmented effects of IF on reversing HFHF-induced glucose intolerance, insulin insensitivity and cognitive decline. Such cognition protection could be attributed to the suppression of TLR4/NFκB signaling, oxidative phosphorylation and neuroinflammation, with IF +IMO exerting more pronounced impacts. IF +IMO specifically remodeled gut microbiota composition and promoted production of short chain fatty acids. FMT confirmed the direct impacts of IF+IMO derived microbiota on improvement of cognitive impairment in obese mice, via suppressing TLR4/NFκB signaling while increasing BDNF. IF+IMO-modulated gut microbiota, metabolites and molecular targets associated with cognitive impairments were further verified in humans by retrieving data from Gmrepo, a database of curated and consistently annotated human gut metagenomes and gutMgene, a database for target genes of gut microbes and microbial metabolites. Notably, the previous exposure to IF+IMO effectively prevented weight regain-induced cognitive impairment, regulated expressions of key proteins in the TLR4/NFκB signaling and inflammatory cytokines in the hippocampus, and protected against the weight regain caused gut dysbacteriosis, without influencing body weight.

Conclusion: Our study for the first time highlights that IMO augmented alleviating effects of IF on obesity related cognitive impairment particularly during weight-loss and weight-regain, likely through modulation of the microbiota-gut-brain axis.

Keywords: Obesity, Cognitive impairment, Gut-brain axis, Isomalto-oligosaccharides, Intermittent fasting.

Conflict of interest

There are no conflicts of interest to declare.

4-20 Logistic regression and decision tree model based on the status quo and influencing factors of nutrition and health education of floating population in western China

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Abstract: Objective: To analyze the status of nutrition literacy and its influencing factors among floating population in western China, and to provide an empirical reference for nutrition and health education among floating population in this region.

Methods: A total of 45 129 participants were selected from the 2016 National Floating Population Dynamic monitoring survey. The $\chi 2$ test was used to compare the nutritional health education availability of the floating population with different characteristics, and binary Logistic regression and decision tree model were used to analyze the influencing factors of nutritional availability. **Results:** The acceptance rate of nutrition and health education among the floating population in western China was 53.13%, and publicity materials and bulletin boards were still the main ways for them to receive health education. There were statistically significant differences in nutrition and health education among the floating population in western China with different gender, age, education level, sample site type, employment status, range of migration, duration of migration, reason for migration, type of medical insurance, and resident health records ($P<0.05$). The results of decision tree model and binary Logistic regression model showed that the main influencing factors were the range of mobility, whether to establish residents' health records, and the types and methods of health education.

Conclusion: Health education resources should be appropriately tilted for the marginalized floating groups, and nutrition and health literacy education and other types of health education should be improved in multiple ways to help the improvement of health literacy of floating groups.

Key words: western region; The floating population; Nutrition and health literacy; The influencing factors; Decision tree model

No conflict of interest

4-21 Higher Adherence to Diverse Diet Lowers Cardiovascular Diseases Risk in High-Risk Cardiovascular Populations: A Cross-Sectional Study

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Objective: The Dietary Diversity Score (DDS) is crucial for assessing dietary quality and has been extensively studied regarding its association with chronic diseases. However, there is controversy surrounding its association with cardiovascular diseases (CVDs), and research specifically targeting high-risk populations for CVDs has not yet been conducted. Therefore, this study explores the relationship between DDS and CVDs risk among high-risk cardiovascular populations.

Methods: This study included 26,614 high-risk individuals for CVDs based on the Programme of Screening and Intervention for High-Risk Cariovascular Disease in Chongqing. The DDS is calculated based on the "2022 Chinese Residents' Dietary Guidelines," which outline 8 main food categories. Each category earns 1 point if consumed at least weekly, resulting in scores ranging from 0 to 8. CVDs were assessed through self-reported diagnoses of heart failure, coronary heart disease, angina, myocardial infarction, and stroke. The association between DDS and CVDs was analyzed using restricted cubic spline models and binary logistic regression, followed by stratified and sensitivity analyses.

Results: The participants, with an average DDS of 5.59 ± 1.66, were grouped into T1 (DDS ≤ 5), T2 (DDS: 6-7), and T3 (DDS: 8). Findings revealed that individuals with the highest DDS (T3) had a substantially reduced risk of CVDs compared to those with the lowest DDS (T1) (OR: 0.58, 95% CI: 0.49-0.68), demonstrating a nonlinear correlation ($P < 0.05$, P for nonlinearity = 0.012). Higher DDS (> 6) showed a protective effect against CVDs. Analyzing food group data revealed that consuming protein-rich foods like fish, eggs, soybeans, milk, and dairy products (excluding meat) was associated with reduced CVD risk. Increased fruit intake also notably decreased CVD risk.

Conclusion: This study highlights the significance of dietary diversity as a modifiable behavior in reducing the risk of CVDs among high-risk populations.

Keywords: Dietary diversity score; Cardiovascular diseases ; Cross-sectional study

Conflict of Interest： All authors declare no potential conflicts of interests.

4-22 Effects of bovine colostrum supplementation on immune function and health status in middle-aged and elderly people: A double-blind, randomized, controlled trial

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Abstract：

Objective： The rapid population aging is becoming a serious health crisis. Aging and a gradual decline in immune function are strongly correlated. This study aims to evaluate the effects of bovine colostrum supplementation on enhancing immunity and health in middle-aged and elderly people.

Methods： A total of 188 people aged 50 to 85 years participated in this 90-day randomized, double-blind, controlled trial and were randomly assigned to intervention or control groups. The intervention group received bovine colostrum supplement containing rich probiotics and whey protein twice a day, while the control group received regular milk powder daily. The primary outcome was the change in the concentration of saliva secretory immunoglobulin A.

Results： There were 171 participants completed the research. The concentration of saliva secretory immunoglobulin A increased in both groups. After intervention, the concentration change value of the intervention group is 76.94 (45.09, 122.16) μg/ml, and the difference is significant ($P < 0.01$). At the end of the intervention, the level of serum immunoglobulin A in the intervention group was significantly higher than that in the control group, and the difference was statistically significant ($P < 0.05$). In self-reported health status, both groups showed significant improvements in sleep quality score (8.27vs 5.15) and the incidence of oral ulcers （19.7% vs 8.8%) ($P < 0.05$).

Conclusions： The results show that bovine colostrum supplement powder intervention for 3 months can significantly improve the immunity of the participants, and improve their health status.

This trial was registered at chictr.org.cn as ChiCTR2400079567.

Keywords： Bovine colostrum; Immune; Secretory immunoglobulin A (sIgA); RCT

4-23 A scoping review of the effectiveness of intermittent fasting in patients with hyperlipidaemia

Wang Mengqi[1]、Liang Moxuan、Cheng Jingmin[2]

Abstract：

Objective To systematically analyse relevant studies on the application of intermittent fasting in patients with hyperlipidaemia, summarise the specific protocols of intermittent fasting, and discuss the intervention effects of this dietary approach applied in patients with hyperlipidaemia.

Methods According to the research method of scope review, domestic and international databases were searched with the time limit of the search from the establishment of the database to 1 January 2024, after which the included literature was categorised and analysed.

Results A total of 12 papers were included. Intermittent fasting programmes in the included literature included time-restricted eating and alternate-day fasting. Intervention formats included offline interventions as well as combined online and offline interventions. Intervention durations ranged from a minimum of 6 weeks to a maximum of 18 months. The intervention had varying degrees of impact on physiological indicators, psychological outcomes, and blood biochemistry, while patient adherence to intermittent fasting and the safety of the programme were explored.

Conclusion This article provides a more adequate theoretical basis for the application of intermittent fasting to clinical practice, which can be combined with individual needs and professional guidance to develop an appropriate dietary programme to intervene in the progression of hyperlipidaemia.

Keyword： intermittent fasting、hyperlipidaemia、scope review

Conflict of Interest: none

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4-24 Association between adiposity related Dietary Patterns and Metabolic Syndrome: Results from Tibetan Adults in China

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Abstract

Aim:

This study aims to elucidate dietary patterns (DPs) associated with elements of metabolic syndrome (MetS) related to body fat composition. Concurrently, it examines the potential interactions between MetS and variables such as gender and altitude.

Methods:

We employed reduced rank regression (RRR) analysis to identify DPs associated with MetS from 26 food groups. We utilized adiposity as mediating variable in our study to ensure that the relative risk ratios accurately captured the influence of body fat on the association between dietary patterns and MetS. Subsequently, mixed-effects logistic regression analysis was utilized to evaluate the associations between tertiles of two DP scores and MetS, as well as its components. We were able to more accurately estimate the influence of dietary patterns on MetS risk, considering individual differences and potential confounding variables.

Results:

Two distinct dietary patterns were identified; DP1 was characterized by high Tsamba and offal intake, and DP2 predominantly featured beef and mutton consumption. Notably, individuals with higher scores in DP1 exhibited a reduced risk of MetS, whereas those with higher scores in DP2 were at an increased risk. Moreover, the association between dietary patterns and MetS varied across gender and altitude, indicating that these factors play a regulatory role in the observed relationships.

Conclusion:

Our findings underscore the importance of considering both gender and altitude when designing dietary interventions aimed at preventing or mitigating metabolic syndrome in Tibetan populations. Tailored approaches that take into account these demographic and environmental factors are likely to be more effective in reducing the burden of MetS in this unique population.

Keywords:

metabolic syndrome (MetS); reduced rank regression; dietary patterns; Tibetans; high altitude

Declaration of interest:

All authors disclosed no relevant relationships

4-25 How neoliberalism shapes dietary practices and results in the increase of non-communicable diseases and extension of existing social inequality in the Philippines

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Abstract

Background: Evidence suggests that traditional diets are transiting to more industrial diets in many countries, including the Philippines. Many features and negative consequences of neoliberalism and neoliberal diets, such as the transnational corporate-controlled food supply and value chains, the increasing consumption of industrial foods, high consumption of additives such as sugar, salt, and oil, increasing incidence rates of non-communicable diseases, and extension of existing inequality have also been observed in the Philippines.

Objectives: To better understand the phenomenon, this paper utilizes the theory of neoliberalism and neoliberal diets as the conceptual tool to explore the mechanism of the shift of diets in the Philippines and how it results in the increase of non-communicable diseases and extension of existing social inequality.

Results: This paper briefly introduce the theory tradition of neoliberalism and neoliberal diets and use the evidence in the Philippines to argue that neoliberalism has created the shift of diets, resulted in higher incidence rates of non-communicable diseases, and extended existing social inequality in the Philippines since the early 1980s.

Conclusion: The conclusion is that neoliberal food policies and neoliberal diets are the causes of the increase of non-communicable diseases and the extension of existing social inequality in the Philippines. The national policies should be blamed for the negative consequences caused by neoliberalism and neoliberal diets rather than only

blaming victims. A reflection should also be explored to consider what role the government should play to control social inequality and NCDs caused by neoliberal food policies and neoliberal diets.

Keywords: Neoliberalism; the Philippines; Nutrition Transition; Health Inequality

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Conflict of interest: No.

4-26 Flatbreads in Cross-border Kazakh, Kyrgyz, and Uighur Groups and the Potential Role of Flatbreads in Regional Sustainable Food System Transformation along the Silk Road Countries

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Abstract:

Background: Flatbreads are various types of comparably thin bread and are widespread in the Mediterranean area, the Arabian peninsula, the Indian subcontinent, the Anatolian peninsula, the Balkan region, the Caucasian region, North and East Africa, Central Asia, and up to Xinjiang, China. People embed flatbreads with special cultural meanings and adapted local ingredients for baking flatbreads. More attention has been focused on flatbreads in recent years. However, how the cross-border Kazakh, Kyrgyz, and Uighur groups use flatbreads is understudied.

Objective: To understand how the cross-border Kazakh, Kyrgyz, and Uighur groups use flatbreads.

Methods: The current paper reviews existing English, Mandarin, and some Russian literature to summarize how the Kazakh, Kyrgyz, and Uighur groups use flatbreads.

Results: The results show that these three ethnic groups prepare and use flatbreads in multiple aspects. According to existing literature, the Kazakh, Kyrgyz, and Uighur people use 23, 9, and 17 types of flatbreads respectively. The flatbreads used by the Kazakh and Kyrgyz people have more overlapping than those of the Uighur people while the relevant studies of Kyrgyz people are more understudied. This resemblance may be because of the closer nomadic lifestyle and the similar influences of Russia and the USSR. The ingredients of flatbreads are aligned with the local ecosystems and have been evolving consistently in the past centuries because of the changes in technology, politics, lifestyles, health perceptions, acculturation, and globalization.

Discussion and Conclusion: Because of the eco-friendly features of flatbreads and the widespread use of these foods, flatbreads have a high potential to support a regional strategy for sustainable food system transformation and planetary health along the Silk Road countries. To achieve this goal, more studies should be conducted to contribute missing information about ingredients, cooking methods, features, and regional differences in using flatbreads; more nutritious and bio-diverse recipes of flatbreads and the most eco-friendly cooking energy resources for baking flatbread should be identified; new meanings should be given to flatbreads to promote the use of flatbreads with local bio-diverse ingredients.

Keywords: Flatbread; Planetary Health; Sustinable Food Systems; Silk Road Countries; Nomadic People Email address: zey.wang@mail.utoronto.ca;

Conflict of interest: No.

4-27 Fish, Omega-3 PUFAs and Cardiometabolic Risk in Chinese Adults: Accumulative data from Epidemiology Investigations to Randomized Controlled Trials

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Aim: High cardiometabolic risk is a major public-health challenge in China. Limited data was reported to demonstrate the effects of omega-3 PUFAs on cardiometabolic risk in Chinese. We aimed to clarify the role of omega-3 PUFAs in preventing against cardiometabolic risk among Chinese using our groups' data from epidemiology studies to randomized controlled trials (RCT).
Methods: Prospective cohort, cross-sectional study, RCT and meta-analysis were used to analyze associations of fish and omega-3 PUFAs (food or biomarker) with cardiometabolic disease risk (e.g., hypertension, diabetes) in Chinese adults.
Results: A nationwide cohort of 104,816 participants aged 40-70yrs found that increased intake of fish was inversely associated with the incident diabetes. A large-scale cross-sectional study of 2,884 participants aged 35-75 yrs demonstrated that increased serum compositions of omega-3 FA were associated with decreased prevalence of hypertension, especially EPA and DHA. In a case-control study characterizing serum FA profile in hypertensive patients compared with normotensive controls, available data indicated that DHA was most efficacious in discriminating hypertensive patients from normotensive persons, and increased DHA levels in serum were associated with decreased odds of newly diagnosed hypertension. Data from our RCT supported that omega-3 PUFAs had a notable BP-lowering and anti-inflammatory effect in hypertensive patients. Finally, our data from the network meta-analysis of 43 RCTs showed that EPA is the optimal lipid treatment in preventing against the major cardiovascular events. The mechanisms of omega-3 PUFAs' cardiovascular protection might link to the effects of anti-inflammation and stabilization of endothelial function from PUFA's derivatives including eicosanoids and the special pre-resolving mediators (SPMs).
Conclusions: Increased intakes of fish and omega-3 PUFAs were beneficial for cardiometabolic status, which may provide new insight in applying supplemental omega-3 fatty acids to reducing cardiometabolic risk in Chinese adults.
Keywords: Fish, Omega-3, EPA, Cardiometabolic disease, Obesity
Declarations of competing interest: None.

4-28 Nuciferine as a promising natural component: benefits and mechanism in inflammatory diseases

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Nuciferine, a major aromatic aporphine alkaloid derived from the leaves of *Nelumbo nucifera*, has been shown pharmacological activities to human health from Chinese ancient pharmacopoeia, such as stopping bleeding, anti-obesity, and lowering blood lipid, which are closely associated with inflammation. Inflammation, a fundamental innate immune response, is considered a hallmark of chronic diseases so that suppression of inflammation is a therapeutic target. However, the effect of the nuciferine on inflammatory diseases have not been fully evaluated and the potential mechanism remains unclear. In our work, we characterized the bioactivities of nucuferine in different inflammation-related animal models and found that the nuciferine significantly restores impaired glucose tolerance and insulin resistance in high-fat diet treated diabetic mice and attenuates the inflammation-induced colitis and related cancer. Moreover, nuciferine improves lipid profiles and hepatic steatosis in liver injured mice. Fecal microbiota transplantation results demonstrated that fecal microbiota from nuciferine-treated mice is effectively improved inflammation compared to the control group. The inflammatory genes, including COX-2, TNF-α, and IL-6, as well as the related signal pathways, including mitogen-activated protein kinases (MAPK)/IL-17 and PPARα/PGC1α pathway are regulated. More studies are needed to explore the specific link among the target signaling as well as metabolites of gut microbiota. Altogether, our study indicated that nuciferine is the promising natural component against inflammation for food and medicinal application.

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4-29 Adherence to a planetary health diet, genetic susceptibility, and incident cardiovascular disease: a prospective cohort study from the UK Biobank

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Abstract

Background

The influence of adherence to a planetary health diet (PHD) proposed by the EAT-Lancet Commission on cardiovascular disease (CVD) is inconclusive. Besides, whether genetic susceptibility to CVD can modify the association of PHD with CVD remains unknown.

Objective

We aimed to investigate the association between adherence to PHD and CVD, and to evaluate the interaction between PHD and genetic predisposition to CVD.

Methods

This study included 191,110 participants who completed at least one 24-hour dietary recall questionnaire and were initially free of cardiovascular disease from the UK biobank. Dietary intake was assessed using repeated 24-hour recall questionnaires and was used to calculate the PHD score. Genetic risk was evaluated using the polygenic risk score. Incidence of total CVD, ischemic heart disease (IHD), and stroke were identified via electronic health records. Cox proportional hazard regression models were used to estimate the hazard ratios (HRs) and 95% confidence intervals (CIs).

Results

During a median follow-up of 12.6 years, 18,545 (9.7%) incident CVD cases were documented. Compared to participants with the lowest adherence to PHD, those with the highest adherence had lower risks of incident CVD (HR 0.83, 95% CI 0.79, 0.87), IHD (HR 0.78, 95% CI 0.73, 0.83), and stroke (HR 0.81, 95% CI 0.72, 0.91) (all *P*-trend <0.001). No significant interaction between genetic risk of CVD and PHD was observed. Participants with high genetic risk and low PHD score, as compared with those with low genetic risk and high PHD score, had a 46% (95% CI, 40%, 52%) higher risk of CVD. The population-attributable risk (95% CI) of CVD for poor adherence to PHD ranged from 6.07% (3.15%, 8.79%) to 10.27% (6.20%, 13.94%).

Conclusions

These findings suggest that higher adherence to PHD was associated with lower risks of total CVD, IHD, and stroke in populations across all genetic risk categories.

Keywords

EAT-Lancet diet, CVD, genetic susceptibility, nutritional epidemiology

Conflict of Interest

The authors declare no conflict of interest.

4-30 乳制品及其血浆代谢组学标志物与 2 型糖尿病发生风险的前瞻性队列研究

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利益冲突：无

摘要

目的：评估不同乳制品摄入水平与 2 型糖尿病（T2D）发生风险之间的关系，并确定可能介导这种关系的血浆代谢物。

方法：本前瞻性队列研究纳入了 1991-1996 年间招募的 26,461 名参与者（平均年龄：58.0±7.6 岁，男性：38.7%），随访至 2020 年 12 月 31 日。通过改良的饮食史方法评估基线时的乳制品摄入量。T2D 通过疾病登记数据库确定。在子样本中（n=893），用质谱法测定血浆代谢物。通过弹性网络回归模型确定与乳制品摄入相关的血浆代谢物。使用 Cox 比例风险模型计算 *HR*（95% *CI*）。

结果：在中位 24.3 年随访期间，共新发 4,552 例 T2D。当调整人口统计学、生活方式和疾病史等混杂因素后，在摄入高水平牛奶（>1000 克/天 vs. <200 克/天 *HR*=1.40, 95% *CI*: 1.12, 1.74）和奶酪（>100 克/天 vs. <20 克/天 *HR*=1.23, 95% *CI*: 1.07, 1.41）的参与者中 T2D 发生风险增加，而在摄入高水平酸奶（>300 克/天 vs. 0 克/天 *HR*=0.88, 95% *CI*: 0.74, 1.41）、奶油（>50 克/天 vs. <10 克/天 *HR*=0.77, 95% *CI*: 0.64, 0.92）和黄油（>50 克/天 vs. 0 克/天 *HR*=0.82, 95% *CI*: 0.71, 0.94）的参与者中观察到 T2D 风险降低。在对身体质量指数进行额外调整后，这些关联略有减弱。此外，反映奶油摄入量的代谢谱得分与 T2D 发生风险呈负相关（每增加一个标准差 *HR*=0.76, 95% *CI*: 0.63, 0.92），而其他乳制品的代谢物谱得分与 T2D 没有显著关联。

结论：摄入高水平牛奶和奶酪与 T2D 发生风险呈正相关，而摄入高水平的酸奶、奶油和黄油与 T2D 发生风险呈负相关。奶油的代谢物谱得分与 T2D 风险也呈负相关。

关键词：乳制品，牛奶，酸奶，奶酪，奶油，黄油，代谢组学，2 型糖尿病

4-31 Long-term effects of salt reduction: 2-year follow-up after a randomised controlled trial in home cooks and their families

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Objective To examine the long-term effects of salt reduction interventions targeted at home cooks on urinary sodium and blood pressure by carrying out a 24-month post-trial assessment.

Methods In the original cluster randomised controlled trial (2018-2019), 1576 participants from 60 communities in northern, central, and southern China were allocated to either intervention group or control group after baseline survey. After 12-month intervention on salt reduction, 1419 participants were assessed and showed significant decrease in urinary sodium and blood pressure. At the post-trial survey(2021), 24 months after the intervention ended, 24-hour urinary sodium and blood pressure were measured.

Results 1272 participants completed the post-trial survey. Among them, 1198 participants have qualified urine results(582(48.6%) men; mean age 58.9(SD 10.6) years). During the 36 month follow-up, the urinary sodium excretion decreased from 189.9(SD 81.8) mmol per 24 hours to 166.4(67.3) mmol per 24 hours in the intervention group (n=580), and from 192.1 (85.8) mmol per 24 hours to 181.1 (72.5) in the control group (n=618). Compared with the control group, adjusted multilevel mixed linear model analysis showed that the 24-hour urinary sodium excretion in the intervention group was reduced by 14.6(95% CI: 5.2 to 23.9) mmol per 24 hour(P=0.002); the systolic and diastolic blood pressures were reduced by 1.3 (95% CI:-0.6 to 3.2) (P=0.19) and 0.6 (95%CI: -0.6 to 1.8) mm Hg (*P*=0.31), respectively.

Conclusions

The comprehensive salt reduction interventions targeted at home cooks and family members was effective in sustainably lowering salt intake in the long term, whereas the effect on blood pressure was attenuated. To maintain the effects of lowering blood pressure in the long term, more efforts should be made.

4-32 Temporal trends in prevalence of child growth failure in China from 2000 to 2019, with projections of prevalence to 2030

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Conflict of Interest Disclosures: None reported.

ABSTRACT

Background Child growth failure (CGF), expressed as stunting, wasting, and underweight in children under five years, is the main manifestation of malnutrition. To examine trends in stunting, wasting, and underweight among Children under five years in China, from 2000 to 2019, and predict the CGF by 2030.

Methods Using data from the local burden of disease, we examine trends in CGF among Children under five years in China, from 2000 to 2019, and predict the CGF by 2030.

Results In 2019, Prevalence of stunting, wasting, and underweight decreased to 12%, 3%, and 4%, by 37%, 25%, and 43 %, respectively. The prevalence of CGF decreased rapidly from 2000 to 2010, and the downward trend has slowed down after 2010. Most provinces had stagnated processes of trends after 2017. The age group with the highest stunting prevalence was children aged 1 to 4 years, with the highest prevalence of wasting and underweight was early neonatal infants. During 2000 to 2019, prevalence of CGF declined in all age groups of children. The largest relative decrease in stunting and underweight occurred in children aged 1 to 4 years, as well as in wasting occurred in early neonatal infants. Prevalence of stunting, wasting, and underweight in China was estimated to decrease to 11.4%, 3.2%, and 4.1% by 2030. China had nationally meet the World Health Organization's Global Nutrition Targets for 2030 (WHO GNTs) for stunting, but not meet for wasting.

Conclusions This study provides prevalence and trends of CGF among children under five years and reports declines in CGF; there remain areas with slow progress in China. Most units had achieved the goal in stunting prevalence, but not in wasting prevalence. Early intervention and targeted strategies are crucial.

Keywords: Child growth failure; Stunting; Wasting; Underweight; Trends; Projections

4.33 Associations of Serum 25-hydroxyvitamin D and Vitamin D Receptor Polymorphisms with Risks of Cardiovascular Disease and Mortality among Patients with Chronic Kidney Disease: A Prospective Study

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Abstract

Background: Evidence regarding the relationships of serum 25-hydroxyvitamin D (25[OH]D) with cardiovascular diseases (CVD) and mortality among patients with chronic kidney disease (CKD) is limited and inconsistent.

Objective: This study aimed to investigate the associations between serum 25(OH)D and CVD incidence and mortality among patients with CKD.

Methods: This prospective study included 21,507 participants with CKD and free of CVD in the UK Biobank. Incidences of total and subtypes of CVD and mortality were ascertained via electronic health records. Cox proportional hazards regression models were used to estimate the hazard ratios (HRs) and 95% confidential intervals (CIs) for CVD incidence and mortality.

Results: The median serum 25(OH)D concentration was 44.0 nmol/L (interquartile range: 30.1, 60.6 nmol/L). After multivariable adjustment, compared with CKD patients with serum 25(OH)D <25 nmol/L, those with serum 25(OH)D ≥75 nmol/L had HRs (95% CIs) of 0.80 (0.71, 0.90) for total CVD incidence, 0.82 (0.69, 0.97) for ischemic heart disease, 0.56 (0.41, 0.77) for stroke, 0.64 (0.46, 0.88) for myocardial infarction, 0.62 (0.49, 0.80) for heart failure, 0.60 (0.43, 0.85) for CVD mortality, and 0.62 (0.52, 0.74) for all-cause mortality. In addition, these associations were not modified by VDR polymorphisms, with no significant interaction was detected.

Conclusions: Higher serum 25(OH)D concentrations were significantly associated with lower risks of total and subtypes of CVD incidence and mortality among individuals with CKD. These findings highlight the importance of maintaining adequate vitamin D status in the prevention of CVD and mortality in patients with CKD.

Keywords: vitamin D; cardiovascular diseases; chronic kidney disease; vitamin D receptor; prospective study

Conflict of interest disclosure: All authors have declared they have no competing interests or relationships relevant to the contents of this paper to disclose.

4-34 Piperine promotes the absorption of lutein: A Randomized Controlled Trial

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Purpose: The main aim of this study was to carry out a randomized, triple-blind intervention trial to evaluate the absorption of lutein in the human body following a single supplementation. Furthermore, the study sought to investigate the impact of black pepper on lutein bioavailability and establish a scientific foundation for the appropriate supplementation of lutein in the population.

Methods: In this study, 60 young adults aged 18 to 25 were randomly assigned to one of three groups using the random number table method. Each group received a specific intervention involving microencapsulated lutein ester, microencapsulated lutein ester with MCT (medium-chain triglycerides), and black pepper extract in microencapsulated lutein ester with MCT. Following a single oral administration, blood samples were collected at 0h, 6h, 12h, 24h, 72h and 144h six different time points for the measurement of plasma lutein concentration using high-performance liquid chromatography (HPLC). Dietary control measures were implemented throughout the study to regulate lutein intake.

Results: Sixty volunteers, comprising 30 women and 30 men, participated in the study. The concentration of lutein exhibited an initial increase followed by a decrease over time (P time<0.001). In the MCT group, lutein concentration rose between 6 hours to 24 hours before declining. The black pepper group experienced a significant increase in lutein concentration from 0 to 24 hours, followed by a decrease. Combining lutein with black pepper extract resulted in a prolonged maintenance of lutein plasma concentration compared to lutein alone (12h:24h).

Conclusion: Black pepper could improve the bioavailability of lutein.

Key words: Lutein, metabolize, adults, absorption

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

5-1 High temperature increases animal-specific injuries morbidity risk and burden: a case-crossover study in Southern China

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Abstract

Objective: Animal injury is a major injury, but little is about the effects of ambient temperature on animal injury. This study aimed to examine the animal injury morbidity risk and burden attributed to temperature in Guangdong Province, China.

Methods: Animal-specific injury data and meteorological data in 2011, 2015 and 2016 were collected in Guangdong Province. Conditional logistic regression combined with a distributed lagged nonlinear model (DLNM) was applied to investigate temperature-animal injury association. Then we also conducted stratified analysis by region, sex, age, occupation and location of injury occurrence. Finally, we assessed the morbidity burden attributable to temperature.

Results: A total of 105,640 animal injury cases were included in the study. Animal injury increased 2.27% (95% CI: 1.94% - 2.61%) for a 1°C rise in temperature with much higher risk (ER=8.28%, 95% CI: 6.70% - 9.87%) for non-mammalian injury than that for mammalian injury (ER=1.97%, 95% CI: 1.62% - 2.31%). For total animal injury, we found that ER was higher for urban (2.30%, 95% CI: 1.94% - 2.66%), female (2.31%, 95% CI: 1.84% - 2.79%), people aged ≥60 years (2.91%, 95% CI: 1.64% - 4.19%), agriculture (4.19%, 95% CI: 2.71% - 5.69%) and agricultural area (9.85%, 95% CI: 6.96% - 12.82%) than their correspondents. For mammalian injury, rodent bites had the highest risk (ER=2.46%, 95% CI: 1.07% - 3.87%), while for non-mammalian injury, snake injury was most influenced by temperature (ER=14.12%, 95% CI: 8.74% - 19.77%). Compared to the 2020s, we projected 8.5 times increase of injury cases and 15.6 times of attributable fraction due to temperature change driven by global warming in the 2090s under SSP585 scenario in Guangdong Province.

Conclusion: Temperature was positively associated with animal-specific injuries, and temperature-related animal injuries will increase in the future due to climate change.

Key words: Global warming; Temperature; Animal injury; DLNM; Case-crossover study
No competing interests

5-2 Rotenone-Induced Parthanatos Is Enabled by the Positive Feedback Loop of PARP1-HDAC6-LAMP2A

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Rotenone, a naturally occurring organic compound, is extensively used as an insecticide and piscicide. However, its potential to trigger Parkinson's disease (PD) poses a significant concern. Despite this, the underlying regulatory mechanisms that govern Parthanatos death induced by rotenone, remain elusive. This study aims to delve into the role of the PARP1-HDAC6-LAMP2A axis and uncover a novel feedback mechanism. Our findings reveal that rotenone activates PARP1-dependent Parthanatos both in vivo and vitro. Mechanistically, PARP1 indirectly regulate HDAC6 poly(ADP-ribosyl)ation modification and activate HDAC6. Furthermore, HDAC6 inhibit chaperone mediated autophagy (CMA) activity by regulating the deacetylation of LAMP2A the key protein of CMA. Moreover, we found that PARP1 is an important substrate for CMA, which means that the decrease in CMA activity further exacerbates PARP1 activation. To further verify that this closed loop promotes parthanatos, inhibiting PARP1/HDAC6 and activating CMA in vivo can effectively alleviate parthanatos and and affect the loop. Together, these results found a PARP1-HDAC6-LAMP2A positive feedback loop for Parthanatos death in rotenone-induced PD. Our studies uncover the positive feedback loop among Poly(ADP-ribosyl)ation,acetylation and CMA on layer of epigenetic regulation.

Keywords: PARP1,HDAC6,LAMP2A,rotenone,Parthanatos

5-3 Effects of Residential Greenness Exposures on Disability: Findings from the Cohort Study on Global AGEing and Adult Health (SAGE) in China

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Declaration of interests:
We declare that we have no competing interests.

Abstract

Objective: With the accelerating population ageing globally, disability has become a major public concern. Residential greenness may be one of the influencing factors of disability, but the relevant epidemiological evidence is limited. We aimed to investigate the effects of greenness exposures on the risk of disability in the elderly.

Methods: Data of 8,408 participants aged 50 years or over were obtained from the Chinese parts of World Health Organization Study on Global AGEing and Adult Health (WHO SAGE). Participants were matched to the three-year summer average Normalized Difference Vegetation Index (NDVI) and Enhanced Vegetation Index (EVI). Disability was measured by 12-item WHO Disability Assessment Schedule 2.0 (WHODAS 2.0). The association was examined using the linear mixed model. We also calculated the prevented fractions (PF, %) to assess the burden of disability attributable to residential greenness.

Results: Significant negative associations of greenness with the total WHODAS score [$NDVI_{500m}$:β=-0.232, 95% Confidence Intervals (95%CI): -0.408, -0.056; EVI_{500m}:β=-0.362, 95CI%:-0.605, -0.119] were observed, as well as in the domains of cognition (EVI_{500m}:β=-0.378, 95CI%:-0.705, -0.050), mobility ($NDVI_{500m}$:β=-0.505, 95CI%:-0.772, -0.239; EVI_{500m}:β=-0.591, 95CI%:-0.959, -0.224), and participation ($NDVI_{500m}$:β=-0.310, 95CI%:-0.521, -0.100; EVI_{500m}:β=-0.424, 95CI%:-0.715, -0.133). The associations with total WHODAS score were more pronounced for the participants with living alone ($NDVI_{500m}$:β=-0.905, 95CI%:-1.483, -0.328), less education level ($NDVI_{500m}$:β=-0.494, 95CI%:-0.786, -0.202), and lower family annual income ($NDVI_{500m}$:β=-0.391, 95CI%:-0.642, -0.140). Quantitatively, 4.29% (PF, 95% CI: 1.06, 7.31) and 4.57% (95% CI: 1.55, 7.42) of the disability score could be attributable to the greenness exposures.

Conclusion: Residential greenness may reduce the risk of disability, particularly for domains of cognition, mobility, and social participation. The protective effects of greenness were greater for people living alone, with less level education, and lower family income.

Keywords: Greenness, Disability, Normalized Difference Vegetation Index, Enhanced Vegetation Index, Cohort study

5-4 National mortality burden attributable to the unprecedented heatwaves in 2022 in China

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Objective: To assess the heatwave-related mortality burden in 2022 in China through in comparison with that during 2000-2021.

Methods: We collected daily number of non-accidental deaths in 364 counties/districts across China from 2006–2017 and obtained daily maximum temperatures at city-level during 2000–2022 from ERA5 reanalysis. Heatwave defined by 2 or more consecutive days with daily maximum temperature exceeding the 92.5th percentile during 2006-2017, and the cumulative excessive degree-day (CEDD) of heatwave defined as the sum of daily maximum temperatures exceeding the heatwave threshold. A two-stage approach, including a distributed lag nonlinear model (DLNM) and a multivariate meta-analysis, was used to estimate exposure-response associations of heatwave with mortality in 364 counties/districts during 2006-2017 across China, which were then applied to assess the mortality burden attributable to heatwave exposures.

Results: During the warm season of 2022, mainland China experienced 2,795 heatwaves at the city level, resulting in a CEDD of 31,626 degree-days, which marked the highest values recorded during 2000–2022. The 2022 heatwaves were associated with 76,957 [95%CI (confidence interval): 67,158–86,062] deaths across China, of which 48,653 (95%CI: 42,182–54,566) were from cardiovascular diseases, 41,807 (95%CI: 35,982–48,363) were females, and 66,838 (95%CI: 58,929–75,301) were in people over 65 years. Spatially, greater heatwave-related mortality in 2022 was observed in Eastern-Central China. Compared with 2000–2021, the attributable fraction (AF) of heatwave-related deaths in 2022 increased by 62.9% (95%CI: 37.5%–91.2%).

Conclusion: This study highlights the unprecedented nature of the 2022 heatwaves, underscoring their substantial impact on mortality. The prospect of more intensive and frequent heatwaves in the future, driven by climate change and an aging population, poses a significant threat to public health in China.

Keywords: Climate change; heatwave; mortality burden; China

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5-5 Association between short-term exposure to ambient air pollutants and the risk of hospital visits for acute upper respiratory tract infections among adults: A time-series study in Ningbo, China

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Objectives Acute upper respiratory tract infections (AURTIs) are prevalent in the general population. However, studies on the association of air pollution with the risk of hospital visits for AURTIs in adults are limited. This study aimed to explore the short-term exposure to air pollutants among Chinese adults living in Ningbo.
Methods Quasi-Poisson time serious regressions with distributed lag non-linear models (DLNM) were applied to explore the association between ambient air pollution and AURTIs cases. Outpatients ≥18 years from three hospitals, being representative for urban, urban-rural junction and rural were included in this retrospective study.
Results In total, 104441 cases with AURTIs were enrolled in hospital during 2015-2019. The main results showed that particulate matter with an aerodynamic diameter less than 2.5 μm ($PM_{2.5}$), nitrogen dioxide (NO_2) and nitrogen dioxide (SO_2), were positively associated to hospital visits for AURTIs, except for nitrogen dioxide (O_3), which was not statistically significant. The largest single-lag effect for $PM_{2.5}$ at lag 8 days (RR=1.02, 95%CI: 1.08-1.40), for NO_2 at lag 13 days (RR=1.03, 95%CI: 1.00-1.06) and for SO_2 at lag 5 days (RR=1.27, 95%CI: 1.08-1.48), respectively. In the stratified analysis, females, and young adults (18-60 years) were more vulnerable to $PM_{2.5}$ and SO_2 and the effect was greater in rural areas and urban-rural junction.
Conclusions Exposure to ambient air pollution was significantly associated with hospital visits for AURTIs. This study provides epidemiological evidence for policymakers to control better air quality and establish an enhanced system of air pollution alerts.
Keywords acute upper respiratory tract infection, hospital visits, ambient air pollutant, time-series analysis, China
Competing interests
The authors declared no conflict of interest.

5-6 Short-term Effects of Ambient Gaseous Air Pollution on Blood Platelet Mitochondrial DNA Methylation and Myocardial Ischemia

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Abstract

Background

The potential effects of short-term exposure to major ambient gaseous pollutants (ozone: O_3, carbon monoxide: CO, and sulfur dioxide: SO_2) on platelet mitochondrial DNA (mtDNA) methylation have been uncertain and no studies have examined whether platelet mtDNA methylation levels could modify the associations between ambient gaseous pollutants and the risks of ST-segment depression (STDE) and T-wave inversion events (TIE), two indicators of myocardial ischemia.

Methods

This study used data from a randomized, double-blind, placebo-controlled intervention study with a standardized 24-hour exposure protocol among 110 participants in Beijing. Absolute changes in platelet mtDNA methylation (ACmtDNAm) levels were determined by two repeated measurements on platelet mtDNA methylation levels in blood samples collected before and after the 24-hour exposure period. A multivariable linear regression model and a generalized linear model with a Poisson link function were used to investigate the associations of ambient gaseous pollutants with platelet mtDNA methylation levels, STDE, and TIE, respectively.

Results

Short-term O_3 exposure was significantly associated with decreased ACmtDNAm at *ATP6_P1* but increased ACmtDNAm at *mt12sRNA*, *MT-COX1*, and *MT-COX1_P2*; short-term CO and SO_2 exposures were significantly associated with decreased ACmtDNAm at *D-loop*, *MT-COX3*- and *ATP*-related genes. Moreover, short-term O_3 exposure was significantly associated with increased risks of STDE and TIE, and ACmtDNAm at *MT-COX1* and *MT-COX1_P2* modified the association between short-term O_3 exposure and STDE events. L-Arg supplementation attenuated the effects of ambient gaseous pollutants, particularly O_3, on ACmtDNAm and STDE.

Conclusions

Platelet mtDNA methylation levels are promising biomarkers of short-term exposure to ambient gaseous air pollution, and are likely implicated in the mechanism behind the association of ambient O_3 pollution with adverse cardiovascular effects. L-Arg supplementation showed the potential to mitigate the adverse effects of ambient O_3 pollution.

Keywords: gaseous pollutants; methylation; myocardial ischemia; platelet mitochondrial DNA; ST-segment depression

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

5-7 The relationship between job burnout and presenteeism among medical staff: a moderated mediating model

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【Abstract】
Objective: This study aimed to examine the relationship between job burnout and presenteeism in healthcare workers in China and explored the potential mediating role of depressive symptoms, as well as the moderating role of coping styles and organizational support in these associations.
Methods: Data were obtained from 992 medical personnel at all types and levels of healthcare facilities in China through an online survey conducted from September to December 2021. Presenteeism was assessed using the Stanford Presenteeism Scale (SPS-6). A moderated mediation model was used to understand the moderating relationship between job burnout (X), depressive symptoms (M) mediated recessive presenteeism (Y), coping styles (W1), and organizational support (W2), controlling for all possible covariates.
Results: Among the 992 medical staff in the survey, 68.85% were women and 37.30% were aged 30-39. 65.8% had job burnout, 49.8% had depressive symptoms (PHQ-9≥5), and the mean (standard deviation) of presenteeism score was 16.86±5.73. There was a positive correlation between job burnout and presenteeism (β = 1.275, 95%CI: 0.899~1.652). Mediation analysis showed that depressive symptoms significantly mediated this relationship (indirect effect = 0.975, 95%CI: 0.719~1.254). The hierarchical regression results showed that the interactions of coping styles W1 and job burnout were negatively correlated with depressive symptoms of medical staff, and the interactions of organizational support W2 and depressive symptoms were positively correlated with presenteeism, indicating that the more positive coping styles, the lower the organizational support, the milder the depressive symptoms, and the lower the frequency of presenteeism.
Conclusion: The higher degree of job burnout and depressive symptoms may be contribute ro presenteeism among medical staff. Positive coping styles and lower organizational support can buffer the harmful effects by reducing job burnout and depressive symptoms.

【Key words】 job burnout, depressive symptoms, coping styles, organizational support, presenteeism

Conflict of interest
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

5-8 Study on the relationship between work intensity, physical activity, life style and depressive symptoms among nurses in hospital

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【Abstract】
Objective: This study aimed to quantitatively assess the prevalence of depressive symptoms in nurses, pay close attention to how nurses' lifestyle, physical exercise, and work intensity affect their depression symptoms, and propose pertinent solutions and countermeasures for particular issues based on prior research.
Methods: We conducted a cross-sectional study by stratified cluster sampling of 19 hospitals in southern Jiangsu, 8 hospitals in Northern Jiangsu and 6 hospitals in Northern Jiangsu. 14355 nurses were assessed for life style, physical activity (International physical activity questionnaire, IPAQ), depressive symptoms (Self-rating Depression Scale, SDS) and work intensity. The OLS regression and subgroup analysis were used to explore the susceptibility of nurses to depression. A mediation model was used to test the role of life style (M) in the relationship between working hours (X) and depressive symptoms (Y).
Results: There were 14355 participants, including 295 males (2.06%) and 14060 females (97.94%). The average age of nurses was 34.67±8.18 years. Regression analysis of depressive symptoms showed that after controlling for the basic demographic characteristics, nurses with high work intensity had higher depression scores than those with low work intensity, and nurses with an unhealthy lifestyle had higher depression scores than those with a healthy lifestyle. Subgroup analysis showed that nurses with primary professional titles and female nurses are more susceptible to depression when the same factors are at play; Working hours was positively associated with depressive symptoms score (r =0.14, $p < 0.001$). Mediation analysis demonstrated that life style could partly mediate the relationship between working hours and depressive symptoms (indirect effect = 0.19; $p < 0.001$).
Conclusion: Under the same circumstances, female nurses and those with primary titles are more prone to depression. Life style had a mediating role in the association of working hours with depressive symptoms among nurses.

【Key words】 Nurses, Work intensity, Physical activity, Life style, Depressive symptoms

5-9 Associations of compound hot extreme in warm season with adults' blood pressure and its potential driving factors: a panel study

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Conflict of Interest
All authors disclosed no relevant relationships.

Abstract
Objective: This study aimed to explore the associations of compound hot extreme with adults' blood pressure and its potential driving factors.
Methods: A panel study design was used, and 35 adults in Panyu district, Guangzhou city, Guangdong province were followed up during May to October of 2020. Participants were required to carry portable temperature and humidity data recorders during the study period, which was used to collected their real exposure of temperature and humidity. They were also required to measure blood pressure once a month. A randomized effect model with cross-basis function of distribution lag non-linear model was used to explore the association of compound hot extreme with blood pressure, heart rate, aldosterone, angiotensin II (Ang II), homocysteine, high-sensitivity C-reactive protein (hs-CRP) and alcohol consumption.
Results: Compared to the normal day, independent hot day and hot night were not significantly associated with adults' blood pressure. Compound hot extreme was related to 8.35 (95%CI: 2.54 ~ 14.15) mmHg of systolic pressure and 6.55 (95%CI: 1.49 ~ 11.60) mmHg increase of diastolic pressure. However, significant associations of independent hot day and independent hot night on blood pressure were not observed. With regard to the physiological drivers, exposed to compound hot extreme was associated with 28.29 (95%CI: 1.52 ~ 55.07) pg/mL increase of Ang II and 1.24 (95%CI: 0.25 ~ 2.46) mg/L increase of hs-CRP. With regard to the behavioral drivers, people tended to drink more beer (change of consumption: 200.69 mL, 95%CI: 79.16 ~ 322.22) mL when exposed to compound hot extreme.
Conclusion: With climate change, more attention should be paid on compound hot extreme, and improve the adaption and warning ability, which could alleviate its health impact.

5-10 The association between exposure to phthalates and N-terminal pro-B-type natriuretic Peptide in US adults

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Abstract

Objective: N-terminal pro-B-type natriuretic Peptide (NT-proBNP) is a well-established biomarker for diagnosing and monitoring several cardiovascular diseases, especially heart failure. The association of phthalates exposure with cardiovascular diseases has been widely explored, but few studies have examined the association between phthalates and NT-proBNP. The purpose of this study is to investigate the relationship between phthalates exposure and NT-proBNP.

Methods: We analyzed cross-sectional data from the 1999-2004 National Health and Nutrition Examine Survey. Concentrations of four phthalate metabolites in the urine of 2,760 participants aged ≥ 20 years were detected using chemical analyses assay. Linear regression models were used to assess the associations between phthalate exposure and NT-proBNP. Weighted quantile sum (WQS) regression models, quantile g-computation (Qgcomp) regression models, and Bayesian kernel machine regression (BKMR) models were used to examine the associations between co-exposures to multiple phthalates and NT-proBNP.

Results: We found positive associations between mono-benzyl phthalate (MZP) and mono-n-butyl phthalate (MBP) exposures and increased serum NT-proBNP concentrations (β: 0.063; 95% CI: 0.031, 0.096 for MZP and β: 0.058; 95% CI: 0.012, 0.105 for MBP). Co-exposures to four phthalate metabolites were also positively related to elevated serum NT-proBNP concentrations according to the results from both WQS regression (β: 0.033; 95% CI: 0.011, 0.053) and Qgcomp regression models (β: 0.007; 95% CI: 0.078, 0.135), of which MZP showed the highest contribution to these associations. A significant dose-response relationship between phthalate mixtures and NT-proBNP levels was found in the BKMR model.

Conclusions: Our findings suggested that phthalate mixtures were positively associated with elevated levels of NT-proBNP in US adults, and MZP was the greatest contributor. Large prospective studies are needed to warrant our findings and explore the potential mechanisms.

Keywords: Phthalates; NT-proBNP; NHANES; WQS; Qgcomp; BKMR

5-11 Heatwaves increase road traffic injury morbidity risk and burden in China and its provinces

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Abstract
Objective Previous studies have demonstrated health impacts of climate change, but evidence on heatwaves' associations with road traffic injury (RTI) is limited. This study aimed to estimate the associations of short-term exposure to heatwaves with RTI morbidity, and to project the heatwave-related RTI across China.
Methods In this study, individual information of RTI cases in May-September during 2006-2021 in China were obtained from the National Injury Surveillance System. Daily maximum temperatures (TM_{max}) during 2006-2021 were collected from the ERA-5 reanalysis, and the projected daily TM_{max} during 2020-2099 were obtained from the latest Coupled Model Intercomparison Project Phase 6 Shared Socioeconomic Pathways scenarios (SSPs). We used a time-stratified case-crossover analysis to investigate the association between short-term exposure (lag01 days) to heatwaves (exceeding the 92.5^{th} percentile of daily TM_{max} for ≥three consecutive days) and RTI, and to project heatwave-related RTI until 2099 across China.
Results A total of 1,031,082 RTI cases were included in this study. Compared with non-heatwaves, the risks of RTI increased by 3.61% during heatwaves. Greater associations were found in people aged 15-64 years, in people with transportation occupation, for non-motor traffic vehicle injuries, for severe RTI cases, and in Western China particularly in Qinghai province. We projected substantial increases in attributable fraction (AF) of heatwave-related RTI in the future, particularly in Western and Southwest China. The national average increase in AF (per decade) during 2020s-2090s was 0.036% for SSP1-2.6 scenario, and 0.267% for SSP5-8.5 scenario.
Conclusion This study provided evidence on the associations of heatwaves with RTI, and the heatwave-related RTI will substantially increase in the future.

Key words Heatwave, road traffic injury, projection, morbidity burden, China

No competing interests

5-12 The Associations between Long-term Exposure to Temperature, $PM_{2.5}$, O_3 and Occurrence and Progression of Multimorbidity in the Middle-aged and Old Populations

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Objective: In the context of population aging, the increasing rate of multimorbidity in China makes it a significant public health issue. This study aims to investigate the individual and combined effects of long-term exposure to temperature, $PM_{2.5}$, and O_3 on the development of multimorbidity.
Methods: Data were obtained from World Health Organization Study on global AGEing and adult health (WHO-SAGE) project. The annual average temperature was from the European Centre for Medium-Range Weather Forecasts atmospheric reanalysis (ERA5). $PM_{2.5}$ and O_3 data came from the Atmospheric Composition Analysis Group. The individual and joint effect between annual average temperature, $PM_{2.5}$ and O_3, on the onset of chronic diseases at each stage of multimorbidity development were developed using a multi-state regression model.
Main results: Temperature exhibited a "U" shaped association, while $PM_{2.5}$ and O_3 showed a positive association with the development of multi-morbidity. After linearization, the risk from health to the first chronic disease decreased or increased by 5% (95%*CI*:4$-6%) and 8% (95%*CI*:7%-10%) for per 1°C change below or above threshold(MMT=13°C), and increased by 22% (95%*CI*:20%-25%) and 44% (95%*CI*:38%-52%) for per 10μg/m^3 increase in $PM_{2.5}$ and O_3, respectively. The risk from first chronic disease to the second chronic disease was 1.06 (95%*CI*:1.04-1.07), 1.09 (95%*CI*:1.08-1.11) for temperature below or above threshold, 1.25 (95%*CI*:1.20-1.29) for PM2.5, and 1.49 for O23(95%*CI*:1.43-1.54), respectively. The risk from second chronic disease to the third chronic disease was 1.05 (95%*CI*:1.03-1.08), 1.08 (95%*CI*:1.04-1.12) for temperature below or above threshold, 1.20 (95%*CI*:1.13-1.30) for $PM_{2.5,}$ and 1.40 for O_3 (95%*CI*:1.27-1.62), respectively. The joint effect of temperature, $PM_{2.5}$, and O_3 showed a "J"-shaped relationship with the multimorbidity development process. After linearization, for each 10 percentiles increase in combined exposure, the transition from health to the first disease, from the first disease to the second chronic diseases, and from the second chronic disease to the third chronic disease was 1.26 (95%*CI*:1.23-1.29), 1.25 (95%*CI*:1.22-1.28) and 1.19 (95%*CI*:1.13-1.31), respectively.
Conclusions: Long-term exposure to annual average temperature, $PM_{2.5}$, and O_3 is individually and jointly associated with the development of multimorbidity.
Key words: Temperature, $PM_{2.5}$, O_3, combined exposure, multi-state model

5-13 Long-term effect of time-weighted fine particulate matter components and ozone exposure on incident cardiovascular disease: exploring causal relationships and high-dimensional mediating roles of metabolic risk factors

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Abstract

Objective: Evidence has linked long-term outdoor air pollution with cardiovascular disease (CVD), while the potential causal relationships of air pollutant exposure with CVD and mediation roles of metabolic risk factors remain under-explored.

Methods: We evaluated time-weighted exposure to fine particulate matter ($PM_{2.5}$), ozone (O_3), and $PM_{2.5}$ components for 21,102 participants from the CHCN-BTH cohort. Well-validated online databases, participants' outdoor activity durations, and pollutant infiltration factors were used to assess the time-weighted exposure. We employed the targeted maximum likelihood estimation (TMLE) approach to estimate the potential causal relationships between air pollutants and incident CVD. High-dimensional mediation analyses were used to further investigate the mediating roles of metabolic risk factors.

Results: Compared with exposures at the first quartile concentration (Q1), participants in the highest quartile of exposure (Q4) to air pollutants demonstrated statistically significant increased risk of CVD incidence: $PM_{2.5}$ [RR: 3.309; 95%CI: 2.531–4.324)], warm-season O_3 [1.293 (1.006–1.660)], black carbon (BC) [4.872 (2.821–8.414)], ammonium (NH_4^+) [1.943 (1.343–2.811)], nitrate (NO_3^-) [1.706 (1.136–2.562)], sulfate (SO_4^{2-}) [2.869 (2.246–3.663)], and organic matter (OM) [4.301 (2.381–7.768)]. The effect estimates remained robust in two-pollutant models. High-dimensional mediation analysis indicates that high-density lipoprotein-cholesterol (HDL-C) played a mediating role, accounting for 9.92%, 23.04%, 34.11%, and 22.87% of the total effects of $PM_{2.5}$, BC, SO_4^{2-}, and OM, respectively. Meanwhile, systolic blood pressure (SBP) mediated 16.51% of the total effects attributable to warm-season O_3.

Conclusion: This study may provide the potential causal linkage between air pollutants and CVD risk. Notably, our findings reveal the roles of HDL-C and SBP in mediating the effects of CVD induced by air pollutant exposures.

Keywords: Air pollution; $PM_{2.5}$ components; cardiovascular disease; targeted maximum likelihood estimation; high-dimensional mediation analysis

5-14 Associations of $PM_{2.5}$ and its chemical constituents with gestational diabetes mellitus in northern China

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Objective: Evidence has supported $PM_{2.5}$ exposure associated with the risk of gestational diabetes mellitus (GDM), but few studies examined the effects of chemical constituents of $PM_{2.5}$ on GDM, especially in northern China. Thus we aimed to investigate associations of GDM with pregnancy exposures to $PM_{2.5}$ and its compositions, and to identify critical windows of exposure.

Methods: The participants were involved in a birth cohort conducted between 2017 and 2018 in Tianjin, China. GDM was diagnosed based on an oral glucose tolerance test between 24 to 26 weeks of gestation. The concentrations of prenatal $PM_{2.5}$ and five compositions, including sulfate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^+), organic matter (OM), and black carbon (BC), were estimated using a well-validated spatiotemporal model. Logistic regression models and distributed lag models were used to examine the associations and to identify critical windows of exposure.

Results: A total of 1396 non-smoking women were included, and 270 had the occurrence of GDM. After controlling potential confounders in the single pollutant model, a positive association between $PM_{2.5}$ exposure in the 2nd trimester of pregnancy and GDM risk was observed with odds ratio (OR) of 1.63 (95%CI: 1.17-2.27) per standard deviation increase of $PM_{2.5}$. Exposures to sulfate (OR = 1.15; 95%CI: 1.00-1.34), nitrate (OR = 1.34; 95%CI: 1.07-1.67) and ammonium (OR = 1.33; 95%CI: 1.07-1.65) during the 2nd trimester were significantly associated with increased risks of GDM. Furthermore, using the distributed lag models, we found that risks of GDM were linked to exposure to sulfate, nitrate, ammonium, and black carbon, with largest effect sizes observed during the 21-23 weeks of pregnancy.

Conclusions: This study identified that exposure to $PM_{2.5}$ and its constituents during the 2nd trimester may increase risks of GDM. Further studies are warranted to validate the findings and explore potential biological mechanisms.

Key words: Air pollution, Gestational diabetes mellitus, Chemical constituent, Susceptible window, Birth cohort

Declaration: None

5-15 The association between long-term exposure to ambient formaldehyde and respiratory mortality risk: a national study in China

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Abstract

Objectives: Assessing the association of long-term exposure to ambient HCHO and risk of respiratory (RESP) mortality and associated mortality burden in China.

Methods: The annual and seasonal RESP deaths and tropospheric HCHO vertical columns data were collected in 466 districts/counties during 2013-1016 across China. A difference-in-differences approach combined with a generalized linear mixed-effects regression model was employed to assess exposure-response association between long-term ambient HCHO exposure and RESP mortality risk. Additionally, we computed the attributable fraction (AF) to gauge the proportion of RESP mortality attributable to HCHO exposure.

Results: This analysis encompassed 560,929 RESP deaths. The annual mean ambient HCHO concentration across selected districts/counties was $8.02\times10^{15} \pm 2.22\times10^{15}$ molec.m^{-2} during 2013-2016. Each 1.00×10^{15} molec.m^{-2} increase in ambient HCHO was associated with a 1.61% increase [excess risk (ER), 95% confidence interval (CI): 1.20%, 2.03%] in the RESP mortality risk. The AF of RESP mortality attributable to HCHO was 12.16% (95%CI:9.33%, 14.88%), resulting in an annual average of 125,422 (95%CI:96,404, 153,410) attributable deaths in China. Stratified analyses suggested stronger associations in individuals aged ⩾65 years old (ER=1.87%, 95%CI:1.43%, 2.32%), in cold seasons (ER=1.00%, 95%CI:0.56%, 1.44%), in urban areas (ER=1.65%, 95%CI:1.15%, 2.16%), and in chronic obstructive pulmonary disease patients (ER=1.95%, 95%CI:1.42%, 2.48%).

Conclusions: This study suggested that long-term HCHO exposure may significantly increase the risk of RESP mortality, leading to substantial mortality burden. Targeted measures should be implemented to control ambient HCHO pollution promptly.

Keywords: Formaldehyde; Air pollution; Respiratory mortality; China

Declaration of competing interest

The authors have declared no conflicts of interest.

5-16 Short-term exposure to nitrogen dioxide and cardiopulmonary mortality among the oldest-old people: A nationwide time-stratified case-crossover study in China

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Abstract

Objective This study aimed to estimate the associations of ambient nitrogen dioxide (NO_2) with cardiopulmonary mortality among the oldest-old people (aged more than 80 years), and to estimate the mortality burden attributable to NO_2.

Methods Data on daily average concentration of NO_2 was obtained from monitoring stations of China, and random forest models were used to interpolate missing data. A time-stratified case-crossover study linked to record of deaths from five provinces (Jilin, Tibet, Yunnan, Guangdong, and Zhejiang) in China during 2013-2018 was implemented to explore associations of short-term exposure to ambient NO_2 (lag0-4 days) with cardiopulmonary mortality among the oldest-old people. Conditional logistic regression models were utilized to estimate the effects of NO_2, in which excess risks (ERs) and its 95% confidence intervals (95%CIs) were reported. Mortality burdens, indicated by attributable fraction (AF) and attributable number (AN), caused by NO_2 were also estimated.

Results A total of 1,475,459 deaths from cardiopulmonary diseases in the oldest-old people were enrolled in this study. The risk of overall cardiopulmonary mortality increased by 3.07% (95%CI: 2.80%, 3.35%) for each 10μg/m^3 increment in NO_2 concentration. The AF of NO_2 was 8.52% (95% CI: 7.79%, 9.24%) in all oldest-old cardiopulmonary deaths, 9.04% (95%CI: 8.06%, 10.02%) in females, 10.72% (95% CI: 7.54%, 13.81%) in people aged 95-99 years, 8.85% (95% CI: 7.98%, 9.71%) for cardiovascular mortality, and 7.77% (95%CI: 6.45%, 9.09%) for respiratory mortality. If the WHO's air quality guilds (AQG) standards of ambient 24-h NO_2 could be reached, the AF of NO_2 would decrease to 6.19% (95%CI: 5.66%, 6.72%) in all oldest-old cardiopulmonary deaths, avoiding 59,094 cardiopulmonary deaths across China in 2019.

Conclusion This study suggested substantial risks of cardiopulmonary mortality and corresponding mortality burden caused by short-term exposure to ambient NO_2 pollutant among the oldest-old people.

Key words Nitrogen dioxide, cardiopulmonary mortality, the oldest-old people, mortality burden

No competing interests

5-17 Outdoor Particulate Matter Exposure, Genetic Susceptibility, and the Association with Cardiovascular Disease

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Objective: Cardiovascular disease (CVD) is associated with both genetic and environmental factors. Evidence has suggested that the risk of CVD due to outdoor fine particulate matter ($PM_{2.5}$) exposure may be different in populations differentiated on polygenic risk scores (PRS), but studies focused on Chinese populations with different genetic characteristics from existed studies are still limited. Therefore, we aimed to investigate whether there is an effect of $PM_{2.5}$ exposure interacting with genetic susceptibility on CVD in Chinese population.

Methods: The Prediction for Atherosclerotic cardiovascular disease Risk in China (China-PAR) project covering 15 provinces of China is used establish polygenic genetic risk scores for coronary heart disease (CHD) and stroke in the Chinese population by using over 500 single nucleotide polymorphisms, and divided study population into three genetic risk groups based on PRS scores of 20% and 80%. $PM_{2.5}$ exposure at 1km resolution from 2000 to 2019 was obtained by satellite remote sensing inversion technique and grouped by quartiles. In populations with different subgroups of genetic risk, we used Cox models to estimate the risk of CHD and stroke from different $PM_{2.5}$ exposures and further examined exposure-response relationship curves.

Results: A total of 41,149 and 40,827 adults aged 30-75 years with complete exposure data and genetic information were included in the interaction between long-term $PM_{2.5}$ exposure and genetic risk for the risk of CHD and stroke, respectively. 1,373 CHD incidents and 3,147 stroke incidents were observed over a median follow-up time of more than 10 years. We found that the incident risk of CHD associated with high $PM_{2.5}$ exposure tended to increase in a gradient across the three genetic risk groups, with an increase of 40% (HR = 1.40; 95% CI: 0.76-2.58) in low PRS group, 62% (HR = 1.62; 95% CI: 1.21-2.18) in intermediate PRS group, and 172% (HR = 2.72; 95% CI: 1.83-4.04) in high PRS group. Compared with the participants with low $PM_{2.5}$ exposure and low genetic risk groups, high $PM_{2.5}$ exposure increased the incident risk of stroke of 49% (HR = 2.49; 95% CI: 1.92-3.23), 90% (HR = 2.90; 95% CI: 2.35-3.57), and 155% (HR = 3.55; 95% CI: 2.84-4.44) in those with low, medium, and high genetic scores, respectively.

Conclusions: Genetic susceptibility and long-term exposure to $PM_{2.5}$ increase the risk of CHD and stroke incidence. Thus, the prevention and control of CHD and stroke should be approved based on a combination of both genetic factors and air pollution control.

Key words: Air pollution, Fine particulate matter, Genetic susceptibility, Cardiovascular disease, Cohort

5-18 Long-term exposure to air pollutants and mortality risk in critically ill patients

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Air pollution is an important environmental risk factor of all-cause mortality in general populations. This study examined associations between long-term exposure to air pollutants and mortality risk of critically ill patients. The baseline data of a multi-center cohort study were used in this study, consisting of critically ill patients admitted to intensive care units (ICU) in a Hubei Province Medical Treatment Alliance. The study found that exposure to air pollutants was positively associated with the mortality risk of critically ill patients, with O3 being the main contributor to their joint effect.

6-1 Smart Use in Gerontechnology to Empower Older Adults for Healthy Ageing

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Introduction:
Gerontechnology has the potential to improve the physical activity and well-being of the elderly. However, it has not been widely used in community settings, which may be due to the elderly's low technology literacy and lack of intention to engage in digital games and physical activity. This pilot study explores the feasibility and preliminary effectiveness of using gerontechnology devices (digital physical activity games) in a day care centre.

Method:
A regular "game fun day" with game booths in a day care centre was set up twice weekly for two months for older adults to play games such as virtual reality (VR) games and mobile games for muscular exercises. The "game fun day" served as a weekly challenge to allow older adults to gather with their peers to have a joyful time by engaging in different game booths. Various types of games were prepared: VR immersive, musical, interactive action, cognitive. Participants' outcome assessment on changes in physical activity (International Physical Activity Questionnaire [IPAQ] short form) and well-being (WHO-5 well-being index) at baseline and 2-month follow-up was carried out. A focus group interview to collect their suggestions on improving future service delivery was also conducted.

Results:
20 older adults joined the "game fun day" (mean age of 78.1; 45% male and 55% female). Although there were insignificant differences in IPAQ and WHO-5 scores, the focus group interview revealed that they were happy joining the event, they were encouraged to engage in more physical activity, and that they were very willing to use more gerontechnology devices in daily life.

Conclusion
Older adults embrace the use of gerontechnology, which encourages centre operators and researchers to design and implement more gerontechnology-based interventions to improve the physical activity and well-being of older adults.

Keywords: Gerontechnology, physical activity, well-being, digital game

6-2 Dose-response Relationship between Disability Duration and Depression in Elderly Individual with Disability and Different Internal Differences: based on a Restricted Cubic Spline Model

Abstract

Objective: Currently, few studies have analysed the relationship between disability time and depression among elderly individuals with disabilities. Therefore, this study aims to investigate the dose-response relationship between disability duration and depression risk using the restricted cubic spline (RCS) model.

Methods: In this study, 957 elderly individuals with disabilities were selected from Zhejiang and Jiangsu provinces of China. A logistic regression model was used to analyse the relationship between disability duration and depression. Additionally, stratification by age and disability severity was employed to explore how these factors relate to depression among elderly individuals with disabilities.

Results: The incidence of depression was 47.1%. Those with disabilities ≥10 years faced 2.76 times higher depression risk than those with ≤5 years (OR=2.76, 95% CI: 1.72–4.42). The RCS analysis showed a U-shaped correlation between disability time and depression in elderly individuals with disabilities (nonlinear test χ^2=8.24, P=0.004), with a risk threshold of approximately 3 years. Among those aged 75–89 years and over 90 years, depression risk was 3.31 times (OR=3.31, 95%CI: 1.76–6.21) and 5.36 times (OR=5.36,95CI%:1.32–21.73) higher, respectively, for disabilities ≥10 years compared with ≤5 years. In elderly individuals with mild to moderate disabilities, depression risk was 2.48 times (OR=2.48, 95% CI: 1.41–4.38) and 5.94 times (OR=5.94, 95% CI: 1.44–24.52) higher for duration ≥ 10 years compared to ≤ 5 years.

Conclusion: Disability time and depression have a nonlinear relationship. Initially, depression risk decreases, then increases with more disability time. Identifying the depression risk point is crucial for intervention.

Keywords: Disability, elderly, limb, depression, mental health

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Declaration of interests：

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

6-3 The Saturation Effect of Body Composition on Bone Mineral Density for Older People

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Ethics statement
The data that support the findings of this study are available from UK Biobank project site, subject to registration and application process. UK Biobank has approval from the North West Multi-center Research Ethics Committee (MREC) as a Research Tissue Bank (RTB) approval. All participants signed informed consent.

Declaration of interest
The authors declare that they have no competing interests.

Acknowledgements
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Abstract

Objective: To investigate the association between body composition and BMD in older people, and to investigate whether there was a saturation effect value that existed to maintain optimal BMD.

Methods: A cross-sectional study of 12,648 males and 10,608 females aged 46 to 82 years from the UK Biobank database was included. The linear association between body composition and BMD was explored using inverse probability weighting, while smooth curve fitting and the LRT test were used to determine the presence of nonlinear associations. Threshold effect points were calculated using segmental regression.

Results: The analysis showed that BMI, LMI, and ALMI were positively associated with Z-scores of femoral neck BMD in both sexes (both $P < 0.05$). In males, BF% and A/G were negatively associated with Z-scores of femoral neck BMD, whereas in females they were positively associated (both $P < 0.05$). Smoothed curve fitting showed that the relationship between body composition and BMD was not simply linear and that saturation values existed. Saturation effect analysis showed that in males, BMI had a saturation effect value of 26.34 kg/m^2 with femoral neck BMD. BF% and A/G had a saturation effect value of 27.79% and 0.80. The saturation effect value for LMI and ALMI were 17.93 kg/m^2 and 8.28 kg/m^2. In females, BMI had a saturation effect value of 27.57 kg/m^2 while BF% and A/G were 36.64% and 0.48. The saturation effect value for ALMI with femoral neck BMD was 6.58 kg/m^2.

Conclusion: In the middle-aged and older population, keeping BMI and BF% at slightly overweight (males: BMI and BF% around 26 kg/m^2 and 26%, females: BMI and BF% around 27 kg/m^2 and 33%) may contribute to achieving a good balance between body composition and BMD.
Keywords: bone mineral density; body composition; UK biobank; Osteoporosis

6-4 The effect of social isolation on the cognitive ability of the oldest old in Chinese nursing homes in post-COVID-19: A moderated chain mediation model

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Abstract

Background: Both pre- or post-COVID-19, older adults residing in nursing homes are at significant risk for social isolation, which is negatively associated with cognitive ability. Currently, the elderly aged 80 years and older are the fastest-growing age group globally. The extent of social isolation within this group post-COVID-19 and its impact on cognitive abilities remain inadequately explored.

Objective: This research aimed to evaluate the prevalence of social isolation among the oldest old in Chinese nursing homes post-COVID-19 and to investigate the mediating and moderating roles of basic activities of daily living (BADL), depression, and subjective socioeconomic status in the relationship between social isolation and cognitive ability.

Methods: This cross-sectional study included 453 participants aged 80 or older from 11 nursing homes in Ningbo, Zhejiang Province, China. Social isolation was assessed using the Lubben Social Network Scale-6 (LSNS-6), cognitive ability using the Mini-Mental State Examination (MMSE), BADL using the Barthel Index (BI), and depression using the Patient Health Questionnaire-9 items (PHQ-9). Mediation and moderation effects were statistically analyzed using SPSS 23.0 and PROCESS 3.5.

Results: The mean age of the study sample was 87.13±3.84 years, among whom 60.3% (n=273) were female, and 56.07% experienced social isolation, with 41.06% and 63.05% being isolated from family and friends, respectively. Social isolation indirectly affected cognitive ability through BADL and depression, respectively, and through the chain mediation effect of BADL and depression. Subjective socioeconomic status moderated the relationships between social isolation and BADL and between social isolation and depression. However, no moderating effect of subjective socioeconomic status was found between social isolation and cognitive ability.

Conclusion: This study deepens our understanding of the current state of social isolation and its mechanisms of action in the oldest old post-COVID-19 and provides a new basis for future public health policy development and related research.

Keywords: COVID-19; nursing home; oldest old; social isolation; cognitive ability; basic activities of daily living; depression; subjective socioeconomic status.

6-5 Does community environment have an impact on the health of middle-aged and older adults?——Evidence from China Health and Retirement Longitudinal Study

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Abstract
Background Population aging is a global trend, and China officially became a significantly aged society in 2021, with the community attracting much attention as a new model for aging. Although there have been an increasing number of studies on the relationship between community environment and health, the relationship between community environment and aging health, and the mechanism behind the influence of the former on the latter, are rarely mentioned.
Objective To reveal the pathways through which community environments influence the health of older adults and understand the relationship between community environments and health in older adults, to help promote active aging.
Methods This study was based on the China Health and Aging Tracking Survey (CHARLS) 2011 national baseline community questionnaire data and the 2018 national follow-up household survey data, with self-assessed health and biomarkers selected as the health outcome indicators, the composite score of community environment determined by factor analysis, and generalized ordered logistic regression used to analyze the impact of community environment on middle-aged and older adults in varying degrees of health. A healthy lifestyle was used as a mediator to analyze the mechanism of action.
Results The community environment has a greater impact on residents with health statuses of "fair" or lower. The community environment had a significant positive impact on health outcomes that were "very poor" and "poor" compared to "fair", "good," and "very good" health outcomes, with one unit of improvement in the community environment being associated with a 25.40% increase in health status changes. The community environment did not play a significant role with regard to biomarkers compared to self-assessed health. The community environment appeared to affect health through lifestyle, and the mediating effect accounted for 23.48%.
Conclusion: Community environments should be built to focus on the needs of older adults with varying degrees of health, and to enhance inclusiveness. Self-assessed health is more sensitive to community environments, compared to biomarkers. Creating supportive community environments and emphasizing personal health behaviors are the most effective interventions for promoting health in middle-aged and older adults with poor health statuses.
Keywords: community environment, middle-aged and older adults' health, lifestyle, mediation, generalized ordered logistic regression

6-6 Plump Beauty for the middle-aged and older Chinese populations upon Healthy Aging: Redefining obesity as a protective agent enhancing cognitive function and mitigating dementia risk

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Abstract:
Overweight and obesity is viewed as unequivocal public health challenges. But emerging research suggested that they may paradoxically play a role in reducing the incidence of dementia and mortality among the elderly. Yet, the influence on cognition remains underexamined. Given that cognitive function serves as a predictive indicator of dementia and considering middle-aged individuals as a potential dementia risk cohort, the primary goal of our analyses was to investigate the association between body mass index (BMI) and cognitive function in middle-aged and older adults in China. This analysis included 18808 samples (aged 45+ years) who participated 4 waves from the 2011 to 2018 wave and did not have a diagnosis of dementia (mean [SD] age: 61.87 [8.88] years). BMI was measured by weight and height as a continuous value, then further categorized as dummy: underweight (<18.5), normal (18.5–23.9), overweight (24.0–27.9), obese (≥28.0). Cognitive function was assessed by immediate recall, delayed recall, visuospatial abilities, Telephone Interview for Cognitive Status (TICS), and global cognition. The association was performed in a fixed model regression with one lag period. Firstly, compared to normal weight, we found significantly negative association between underweight and overall cognition (ß = -0.658; 95% CI: -1.334–0.017), while overweight (ß = 0.493; 95% CI:0.07–0.916), and obesity (ß = 0.677; 95% CI:0.042–1.312) were all significantly associated with higher cognitive score. Secondly, the optimal BMI was identified at 33.4 kg/m^2 when using global cognition index. Thirdly, moderating effect represents that social participation and physical exercise play a vital role in increasing cognitive function. Lastly, heterogeneity analysis found that male and urban cohorts experience more pronounced cognitive benefits with an escalating BMI. Our results lend support to the notion that the ideal BMI for “the middle-aged and older” may be around the mild obesity range.

Keywords: BMI; cognitive function; fixed model; middle-aged and older adults

6-7 Study on Disease-free Life Expectancy of the Young-Elderly People (60-74 Years Old) in Shaanxi Province and Its Changing Trend

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Background: With the acceleration of the aging process and the change in the disease spectrum, how to improve the health of the young-elderly (60-74 years old) has become a key topic of social concern.

Objectives: This research discusses the health status of the young-elderly in Shaanxi province based on Disease-free Life Expectancy (DFLE) of chronic disease.

Data scores: The data used in this study come from published data or literature, such as the Shaanxi Provincial Health Statistical Yearbook, and National Population Census.

Method: Generalized linear models were used to adjust and estimate Under-five Mortality Rate (U5MR) and Adult Mortality Rate (AMR); Life Expectancy (LE) was calculated by the Brass-Logit model life table, then DFLE and Living with Disease (LwD) were calculated by the Sullivan method. Jointpoint5.0 software was used to calculate the Average Annual Percentage Change (AAPC) of LE, DFLE, LwD, and DFLE/LE.

Results: From 2004 to 2018, LE, DFLE, LwD, and DFLE/LE in the young elderly in Shaanxi Province showed an increasing trend. LE, DFLE, and LwD in urban areas and women were higher than in rural areas and men, respectively. At 60-64 years group, 65-69 years and 70-74 years, in males, DFLE increased by 1.38 years, 1.30 years and 1.09 years, respectively, the AAPC of DFLE/LE was 0.18% (95%CI: -0.50%, 0.87%), 0.56% (95%CI: -0.54%, 1.67%), 1.62% (95%CI: 0.85%, 2.65%); in women, DFLE increased by 2.86 years, 2.30 years and 1.59 years, respectively, the AAPC of DFLE/LE was 0.58% (95%CI: -0.08%, 1.48%), 0.70% (95%CI: -0.11%, 1.82%), 0.40% (95%CI: -0.48%, 1.70%).

Conclusions: DFLE and DFLE/LE in the young-elderly people in Shaanxi Province from 2004 to 2018 showed an increasing trend, which belonged to the disease compression state.

KEYWORDS: Life expectancy; Disease-free life expectancy; Chronic diseases.

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There is no conflict of interest in this study.

6-8 Investigation on Health Risk Perception and Adaptive Behavior of the Elderly During Heat Waves.

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Abstract: Objective: To investigate the effects of subjective risk perception and objective adaptive behavior on health of the elderly in China under high temperature and heat wave. **Methods:** Four regions in China's central, eastern and western were selected as survey points, 1418 elderly people were surveyed with questionnaire and analyzed with statistical software of SPSS22.0. **Results:** The elderly have a clear perception of the risks and health effects of heat waves, but their expertise is inadequate. Heat waves have an impact on the physical and mental health of the elderly. The elderly will cool down through a variety of ways, but the effect is limited. More social contact will also give the elderly adequate health support. The eldery who bought insurance were more likely to adapt their behaviors and health conditions. **Conclusion:** High temperature warning system should be established. Strengthen knowledge popularization and publicity of heat wave. The hydropower and telecommunications infrastructure and medical and health care in underdeveloped areas should be improved. Focus on vulnerable populations and strengthen coordination among departments.

Key words: The elderly; Heat wave; Subjective cognition; Objective adaptation

6-9 Multimorbidity patterns and associations with activities of daily living function among older Chinese adults: A longitudinal population-based cohort study

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Background: Elderly individuals are vulnerable to multiple non-communicable chronic diseases (NCDs), leading to an increased risk of activities of daily living (ADLs) disability. Whether the associations were modified by sociodemographic factors are not yet clear. We aimed to identify multimorbidity patterns and explore their associations with ADLs.
Methods: This study included 14,018 older adults (≥ 60 years) from five waves of the China Health and Retirement Longitudinal Study (CHARLS 2011-2020). Multimorbidity patterns were identified among the 13 NCDs using exploratory factor analysis. The associations between multimorbidity patterns and ADLs (basic ADL, BADL; instrumental ADL, IADL) were examined using mixed-effects models. Stratified and interaction analyses were used to explore the influence of sociodemographic factors on the associations.
Results: Multimorbidity prevalence increased steadily from 2011-2018, but decreased in 2020. Four multimorbidity patterns were identified: visceral-skeletal diseases, respiratory system diseases, neurodegenerative diseases, cardiometabolic diseases. Higher factor scores of multimorbidity patterns were associated with increased risk of BADL and IADL disability, especially for neurodegenerative diseases pattern (T3 vs. T1, BADL: OR 1.56, 95% CI 1.46-1.67; IADL: OR 1.49, 95% CI 1.39-1.59). The positive associations between neurodegenerative diseases and BADL and IADL disability were stronger for urban individuals. The inverse associations between cardiometabolic diseases and BADL and IADL disability were stronger for educated individuals than illiteracy.
Conclusion: Multimorbidity was prevalent and independently associated with the risk of BADL and IADL disabilities among elderly individuals in China. Residential area and educational level may modify these associations.

Key words: Older adults; Multimorbidity pattern; Activities of daily living; Socioeconomic disparity

Conflict of interest： None declared.

6-10 Association between elder neglect and cognitive function: A moderated mediation of loneliness and social engagement

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Abstract

Aims: Minimal research so far has explored the impact of elder neglect on cognitive function among Chinese senior citizens. This study seeks to uncover the correlation between elder neglect and cognitive impairment while analyzing the potential moderating mediating influence of social engagement and loneliness.

Methods: We extracted data from the 2018 Waves of the Chinese Longitudinal Healthy Longevity Survey (CLHLS) for 12,588 adults aged 65 or older. Using logistic regression analyses, we assessed correlations between elder neglect, social engagement, loneliness, and cognitive function. To investigate the effect of social engagement and loneliness on the relationship between elder neglect and cognitive function, we performed mediation analyses and moderated mediation analyses, fully considering all confounding factors.

Results: The logistic regression analyses revealed a significant correlation between elder neglect, social engagement, and loneliness and cognitive function. The odds ratios were 1.709 (95% confidence interval (CI): 1.534, 1.904), 0.914 (95% CI: 0.905, 0.923), and 1.190 (95% CI: 1.068, 1.327), respectively, in the fully adjusted models. Social engagement appeared to partially mediate the relationship between elder neglect and cognitive function (β = -0.367; 95% CI: -0.389, -0.343). Meanwhile, loneliness affected the mediation effect of social engagement on the connection between elder neglect and cognitive function via indirect path a (β = 0.229; 95% CI: 0.146, 0.311) and path b (β = 0.074; 95% CI: 0.040, 0.107).

Conclusions: Loneliness moderates the effect of social engagement on the link between elder neglect and cognitive function. Enhancing empathetic care for seniors and promoting their participation in social activities could potentially mitigate the adverse effects of elder neglect on cognitive function.

Keywords: elder neglect, cognitive function, social engagement, loneliness

There is not competing interests.

6-11 Hearing Loss and Cognitive Impairment, and Their Relationship Among Community-Dwelling Older Adults— 3 Provinces, China, 2019–2020

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Abstract
Purpose To provide an update on the current status of hearing loss (HL) among elderly in China, and also provide evidence about the relationship between HL and cognitive impairment.
Methods
This study utilized the data from the Prevention and Intervention on Neurodegenerative Disease for Elderly in China (PINDEC), which was conducted in 2019-2020 in 12 districts/counties across 3 provinces. A stratified multi-stage cluster sampling method was used to select adults aged 60 years or older in community level. Hearing loss was measured by pure-tone audiometry and cognitive function was assessed with a Chinese version of Mini-Mental State Examination (MMSE). The Chi-square test was used to analyze the differences between subgroups, and a multivariable logistic regression was used to examine the association between HL and cognitive impairment.
Results
Among the study sample 10,347, 57.2% were female and 58.6% lived in rural areas. In 2019–2020, among older adult aged 60 years and above, the prevalence rates of mild HL, moderate HL, severe or profound HL were 47.2% (95% CI: 46.3%–48.2%), 18.0% (95% CI: 17.3%–18.8%) and 4.5% (95% CI: 4.1%–4.9%) respectively. The prevalence of cognitive impairment was 19.1% (95% CI: 18.3%–19.8%) overall and increased gradually with the severity of HL both in male and female. Compared with older adults without HL, the odds ratio for cognitive impairment were 1.23(1.08-1.40) for mild HL, 1.55(1.32-1.82) for moderate HL, 1.87(1.47-2.39) for severe or profound HL.
Conclusions
Hearing loss was highly prevalent and maybe a risk factor for cognitive impairment. Enhance public awareness of hearing protection and early prompt hearing loss intervention is important for preventing cognitive impairment.
Key words: Elderly, Hearing Loss, Cognitive Impairment

6-12 A Study on the Current Status and Relationship between Self-rated Health and Social Support among Rural Elderly People in Shandong Province

SI Mingshu

Abstract：Objective To understand the current situation of social support and self-rated health among elderly people in rural areas of Shandong province, explore the relationship between the two and the relevant factors affecting self-rated health, and provide better decision-making basis for comprehensively promoting the construction of healthy rural areas and promoting elderly health. **Methods** A multi-stage stratified random sampling method was used to conduct a questionnaire survey on 1 981 rural elderly people aged 60 and above in east, central and west three cities of Shandong province, using self-made questionnaires, European quality of visual analogue scale (EQ-VAS), and social support rating scale (SSRS). Multiple linear regression analysis was used to analyze the influencing factors of self-rated health among rural elderly people. **Results** The surveyed 1 981 rural elderly people in Shandong province had an EQ-VAS score of (70.27±17.48) and an SSRS score of (30.53±6.88). The results of multiple linear regression analysis showed that high social support scores (β=0.176), confident expectations for rural elderly care (β=6.192), living in areas with rural happy homes providing no service (β=2.039), living in areas with rural happy homes providing basic life care services (β=2.137), occasional loneliness (β=8.704), no anxiety or depression (β=15.033) and occasional anxiety or depression (β=10.947) were protective factors for rural elderly people's self-rated health (all P<0.05). 70~<80 years of age (β=−2.322), ≥80 years of age (β=−4.25) and low-income level (β=−8.128) were risk factors for rural elderly self-rated health (all P<0.05). **Conclusions** Social support is significantly related to the self-evaluation health status of the rural elderly. We should comprehensively promote the construction of a healthy countryside, strengthen social support for the rural elderly, strengthen the care for the rural low-income elderly and the elderly of advanced age, carry out rural activities popular with the elderly, and support Chinese path to modernization with high-quality development of the elderly population health.

Keywords：Rural elderly people; Social support; Self-rated health; Influencing factors

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6-13 Dysregulated Tryptophan Metabolism Contributes to Metabolic Syndrome in Chinese Community-Dwelling Older Adults

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Abstract

Objectives: We aim to investigate the relationship between the metabolism components of tryptophan (TRP) and the risk of metabolic syndrome in older adults.

Methods: A cross-sectional survey was conducted in Lu'an, China. 986 individuals were included in our study. Ultra-performance liquid chromatography tandem mass spectrometry was used to detect TRP and its 7 metabolites. Physical examination included the following indicators: blood pressure, body mass index, triglyceride levels, and high-density lipoprotein cholesterol (HDL-C) levels. Multiple linear regression, restricted cubic spline curve, binary logistic analysis, and a sex-stratified analysis were use to explore the relationship between the metabolites and the risk of metabolic syndrome in older adults.

Results: The results indicated that with covariates adjusted for, high levels of TRP, kynurenine (KYN), kynurenic acid (KA), and xanthurenic acid (XA) were risk factors for metabolic syndrome (*P* for trend < 0.05). By contrast, high ratios of 5-hydroxytryptamine to TRP which indicates the activity of tryptophan hydroxylase, and high ratios of indole-3-propionic acid to TRP were protective factors against metabolic syndrome (*P* for trend < 0.05). The levels of TRP, KYN, KA, and XA influence the risk of metabolic syndrome in the presence of central obesity and hypertriglyceridemia. High levels of TRP, KYN, KA, and XA increased the risk of metabolic syndrome in female.

Conclusions: Tryptophan hydroxylase may serve as a protective factor against metabolic syndrome with fasting blood glucose, central obesity, low HDL-C, and hypertriglyceridemia. Among older adults, the relationship between TRP metabolites and the risk of metabolic syndrome varies by sex.

Keywords: metabolic syndrome, tryptophan, metabolism, older adults

Fundings

This work was supported by the National Natural Science Foundation of China (82073558), Research Fund for Scientific Research Level Improvement Plan of Anhui Medical University (2022xkjT007).

Conflicts of Interest

The authors declare no conflicts of interest.

6-14 The association of socioeconomic status with the risk of depressive symptoms and the role of social activities and loneliness in adults aged 50 years and older across 24 countries: a multi-country prospective cohort study

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Objective We aimed to estimate whether social activities and loneliness mediate the association between socioeconomic status (SES) and depression, and the extent of interactive or joint relations of SES, social activities, and loneliness with depression.

Methods We did a multi-country prospective cohort study utilizing nationally-representative surveys across 24 countries from 2008 to 2019. SES was defined as high- and low-level by latent class analysis based on family income, education, and work status. Depression was assessed by 8-item or 10-item Center for Epidemiological Studies Depression Scale (CES-D) and EURO-D. Cox proportional hazard models were applied to estimate the association of SES with depression. Random effects models were used to obtain the pooled results from different surveys. The effects within SES, social activities, and loneliness on depression in our study included interaction, mediation, and joint relations.

Findings A total of 79638 participants were included in our study, with a total follow-up of 463115 person-years. Compared with participants in high-level SES, those in low-level SES had a 29% (pooled Hazard Ratio [pHR]=1.29, 95%CI: 1.19-1.39) higher risk of depression. The proportions of the association between SES and depression mediated by social activities and loneliness were 10.18% (95%CI: 3.11-33.79%) and 6.65% (95%CI: 1.60-21.30%), respectively. Only a significant multiplicative interaction of SES and loneliness with depression was observed (pooled aHR for product term=0.84, 95% CI: 0.77-0.90). Compared with participants who were in high-level SES, socially-active, and not lonely, the risk of depression was higher in participants with opposite characteristics (pHR=2.33, 95%CI: 2.06-2.61).

Conclusion Social inactivity and loneliness positively mediated a small proportion of socioeconomic inequality in depression, indicating that other measures in addition to interventions on social isolation and loneliness were required. Additionally, the joint effects of SES, social activities, and loneliness highlighted the benefits of simultaneous and integrated interventions to reduce global burden of depression.

Key words Socioeconomic status; loneliness; social activity; depression; older adults

Declaration of interests The authors declare no competing interests.

6-15 Measurement of aging degree and construction of anti-aging programs for middle-aged and elderly people in southern China

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Abstract: OBJECTIVE To understand the aging status of middle-aged and elderly people in southern China, and put forward targeted anti-aging programs. **METHODS** The PPSHAS scale was used to measure the aging degree of the subjects, to clarify the different groups of people who were "significantly younger in state age" and "significantly older in state age". Meanwhile, an epidemiological questionnaire with diet type and lifestyle as the main contents was implemented. The variables were screened by univariate and multivariate analysis, and the optimal model was constructed by classification algorithm, and finally the anti-aging programs were constructed. **RESULTS** A total of 1,902 subjects were included, with a male to female ratio of 1.04:1, the average aging score was 46.69±9.22, the state age was 61.39±5.01years, which was 6.87±5.13 years younger than the actual age. 528 people(27.76%)were significantly younger($<P_{25}$), 428 (22.50%) were significantly older ($>P_{75}$).There were differences in aging score, state age and aging distribution among different age groups ($P<0.001$). Women are younger than men; The lower the education level, the younger the age; Individuals and freelancers are significantly younger; The middle income group is relatively younger. Compared with the four models, XGBoost has the highest prediction rate (98.80%), and final constructs of sleep duration (≥6h), fish and shrimp (≥ 200g/w), static behavior duration(<8h), livestock meat (≥800g/w), milk (≥250ml/w), eggs (<100g/w), and combined medication (no) in the A×B joint scenario (contribution rate：80%). **CONCLUSION** The state age of the middle-aged and elderly population in southern China is on the young side compared to their actual age.The XGBoost model predicted the performance screening as the optimal model, and the anti-aging program suitable for southern China was successfully constructed, including life and behavior habits and dietary types.

Keywords: anti-aging; PPSHAS scale; southern region; geriatrics

The authors declare there are no competing interests.

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6-16 Household air pollution from solid fuel use, hypertension, and the mediating role of physiological dysregulation

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Abstract

Household air pollution caused by solid fuel use poses an environmental threat to human health and leads to chronic diseases, including the prevalence of hypertension. While some existing works studied the association between the two, the underlying mechanism associated with the effect of household air pollution on hypertension, and the role of physiological dysregulation are largely unexplored. Here we explored this using the China Health and Retirement Longitudinal Study (CHARLS). Physiological dysregulation was calculated from the Mahalanobis distance, which during the past decade proved to be an effective indicator of aging and predictor of various age-related diseases and mortality. By constructing a formal mediation model, we found that respondents who used solid fuels exhibited a significantly positive association with the prevalence of hypertension compared to those who used clean fuels. Moreover, there was a significant positive association between household air pollution and physiological dysregulation, and the latter mediated the impact of household air pollution on hypertension as a mechanism of influence.

Key words: Household air pollution; Hypertension; Physiological Dysregulation; Mechanism; Mediation

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6-17 Projecting Long-term Care Costs among Older Adults with ADL Disability and Cognitive Impairment in China

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ABSTRACT

Background: There is increasing evidence that cognitive impairment is strongly linked with difficulties in performing activities of daily living (ADL disability). This study estimates and projects the number of older adults in China with ADL disability and cognitive impairment and their associated long-term care (LTC) costs over the next two decades.

Methods: Data from 37,942 individuals aged 65 and older from the 2005-2018 waves of the Chinese Longitudinal Healthy Longevity Survey (CLHLS) were analyzed. A Markov model was applied to simulate the transitions between four disability-cognition states among older Chinese adults for the upcoming 20 years. We also utilized a two-part model to estimate per capita LTC costs, including both direct and indirect expenses.

Results: Our projections suggest a slight increase in the proportion of older adults with ADL disability without cognitive impairment (from 4.0% in 2022 to 4.3% in 2040) compared to those with both ADL disability and cognitive impairment (from 3.5% in 2022 to 4.1% in 2040). The indirect LTC costs for cognitively impaired, disabled older adults are expected to rise from 316 billion yuan in 2022 to 4,399 billion yuan in 2040, and from 197 billion yuan to 1,697 billion yuan in the same period for those without cognitive impairment.

Conclusions: Our findings suggest that policymakers should consider cognitive assessments in determining LTC needs and may need to allocate increased compensation in LTC insurance for individuals with cognitive impairments.

Keywords: disability rate; dementia; informal care; Markov model; CLHLS

6-18 Latent profile analysis of depression among Chinese disabled elderly and its influencing factors

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Objectives: Disabled elderly in China are at higher risk of psychological issues like depression due to declining physical health, social isolation, financial strain and other factors. To explore their subgroups, analyze their influencing factors, then enhancing their quality of life

Methods: Using data from the 2018 China Longitudinal Healthy Longevity Survey (CLHLS), Latent Profile Analysis (LPA) was employed to identify subgroups of depressed disabled elderly individuals. Chi-square test and Kruskal-Wallis test were used to analyze the differences in several aspects of characteristics among different subgroups, and multiple logistic regression analysis was conducted to explore the influencing factors.

Results: A total of 2365 eligible elderly individuals aged 65 and above were included. Through LPA, the sample of disabled elderly individuals was divided into four subgroups, named as low depression risk (14.76%), high depression risk (13.91%), low-level depression (44.01%), and high-level depression (27.31%). The aspects of variables included demographic characteristics, economic status, health conditions, lifestyle, and indoor air quality. The univariate analysis showed that economic region of residence, marital status, adequacy of living sources, community health service needs, vision status, chronic disease status, self-reported health, cognitive ability, anxiety status, and indoor air ventilation were all significantly different across subgroups ($P < 0.05$). Multiple logistic regression analysis showed that chronic diseases, community health service needs, adequacy of living sources, economic region of residence, cognitive status, and indoor ventilation were correlated with the risk of depression among disabled elderly individuals. Marital status, adequacy of living sources, indoor ventilation, and chronic diseases were correlated with the level of depression.

Conclusion: Depressed disabled elderly face various challenges in health, social, emotional, and economic aspects. Hence, offering tailored care and support is vital for enhancing their quality of life and rehabilitation.

Keywords: Elderly, Depression, Disability, Latent profile analysis, Influencing factor

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Competing interests: The authors declare no conflict of interest.

6-19 Association study of 5-hydroxymethylcytosine in plasma DNA with geriatric diabetic nephropathy: a case-control trial

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Purpose: Diabetic kidney disease (DKD) is a microvascular complication caused by diabetes. DNA methylation/demethylation epigenetic modifications may play an important role in its occurrence and development. Therefore, this study aims to explore the association between DNA demethylation and DKD through case-control studies.
Method: A case-control study included 207 elderly patients over the age of 65 years. Basic information of the subjects was collected by questionnaire survey and physical examination, and the blood biochemical index and urea levels were detected using an automatic biochemical analyzer. The estimated glomerular filtration rate (eGFR) was calculated using the CKD-EPI formula; serum α-Klotho levels and renal function indicators were measured using enzyme-linked immunosorbent assay (ELISA). Epigenetic modification markers were detected by Dot Blot.
Result: The concentrations of FBG and HbA1c in the DM and DKD groups were higher than those in the CON group (P<0.05); The Scr, urea, mALB, and UACR in the DKD group were significantly higher than those in the CON group (P<0.05); The eGFR and serum in DM and DKD groups α-Klotho serum was significantly reduced compared to the CON group, and the eGFR in the DKD group was lower than that in the DM group (P<0.05). The Dot Blot results showed that the DNA 5mC in the CON and DKD groups were significantly higher than those in the DM group (P<0.05); The DNA 5hmC and 5fC in the DKD group were significantly lower than those in the DM group (P<0.05). Correlation analysis showed a positive correlation between DNA 5hmC and eGFR(r=0.304, P<0.05) ; there is a negative correlation between Scr (r=-0.268, P<0.05) and urea (r=-0.261, P<0.05).
Conclusion: The occurrence and development of DKD and the decline of renal function are closely related to the inhibition of DNA demethylation process.

Key words: diabetic nephropathy; DNA demethylation; case-control study; Klotho

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

6-20 The effect of age-adjusted Charlson comorbidity index on in-hospital death in elderly stroke patients and a nomogram prediction model

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【**Abstract**】**Objective:** To assess the degree of comorbidities in elderly stroke patients with age-adjusted Charlson Comorbidity index (aCCI), to analyze its relationship with in-hospital death in elderly stroke patients, and to construct a prediction model and evaluate its value. **Method:** The inpatient medical record data of 1989 elderly stroke patients from the First Affiliated Hospital of Shihezi University from 2022 to 2023 were retrospectively analyzed, and the association between aCCI and other factors and in-hospital death was analyzed by multivariate logistic regression analysis. The nomogram prediction model of in-hospital death of elderly stroke patients was constructed based on the analysis results. Receiver operating characteristic (ROC) curve, decision curve and calibration curve were used to evaluate the predictive value of the model. **Results:** Of the 1989 patients included, 113 died in hospital. Multivariate Logistic regression analysis showed that surgery, medical payment methods and aCCI were prognostic factors for in-hospital death in elderly stroke patients (all $P<0.05$). A nomogram prediction model based on these risk factors had an area under the ROC curve of 0.755. The maximum value of Jorden's index was 0.437, the sensitivity was 78.8%, and the specificity was 64.9%. **Conclusion:** The nomogram prediction model established in this study, which includes surgery, medical payment methods and aCCI, can be used to evaluate and predict the risk of in-hospital death in elderly stroke patients.

【**Key words**】Stroke；nomogram prediction model；Hospital mortality

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

6-21 Longitudinal Transitions in Intrinsic Capacity Profiles and Their Associations With Subsequent Adverse Outcomes Among Chinese Older Adults: A Nationwide Prospective Cohort Study

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Abstract

Background: Although limited research established an association between intrinsic capacity (IC) profiles and adverse outcomes, it remains uncertain whether dynamic changes in IC profiles can predict adverse outcomes. This study aimed to characterize individual changes in IC profiles over time and investigate their prospective associations with adverse outcomes.

Methods: Data were obtained from three waves (2011, 2014, and 2018) of the Chinese Longitudinal Healthy Longevity Survey. An individual-centred approach utilizing latent profiles and transition analyses identified IC profiles and their changes during the 2011 and 2014 waves. Cox proportional hazards and logistic regression models explored the prospective associations of profile transitions with all-cause mortality, activities of daily living (ADL) disability, instrumental activities of daily living (IADL) disability, and recurrent severe diseases in the 2018 wave.

Results: Among 5012 participants, high IC without physio-cognitive decline (HPCD, 83.65%) and low IC mainly physio-cognitive decline (LPCD, 16.35%) profiles were identified. Approximately 85.89% remained stable over time, 12.53% transitioned to LPCD, and 1.58% transitioned to HPCD. Compared with the consistently maintained HPCD profiles, individuals who transitioned to and remained in LPCD profiles had increased risks of all-cause mortality, ADL/IADL disability, and recurrent severe diseases. However, transitions to HPCD profiles reported similar outcomes with consistently maintain HPCD profiles.

Conclusions: Our results indicate the dynamic nature of IC among older adults. Those temporarily reporting LPCD may have similar risks with those consistently reporting HPCD. However, older adults failing to transit to HPCD have elevated risks of adverse outcomes. Interventions should aim at improving LPCD profiles and maintaining HPCD to prevent adverse outcomes.

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6-22 Study on the Current Situation and Dilemma of Older People's Participation in Physical Exercise in the Perspective of National Fitness

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Purpose of the study:

The National Fitness Plan (2021-2025), issued by the State Council, points out that it will increase the performance appraisal of stadiums open to the elderly, improve the use of fitness equipment and facilities for the elderly, study and promote sports and leisure programs for the elderly, and organize and carry out sports activities for the elderly. By analyzing the current situation and difficulties of the elderly in participating in physical exercise, we can grasp the current situation of the elderly's participation in physical exercise and analyze the factors affecting the elderly's participation in physical exercise. The study is intended to provide advice and suggestions for strengthening the health and improving the physical quality of the elderly.

Research Methodology:

Bibliographic method, logical analysis.

Findings:

1. The current situation of the participation of the elderly in physical exercise: The current state of elderly participation in physical activity involves various activities such as walking, jogging, tai chi, square dance. the elderly do not often appear in the stadium, the elderly are more inclined to choose the environment of the beautiful and open space to participate in physical exercise, and to participate in physical exercise time is mostly in the morning and the evening; Retired elderly people are able to participate in regular physical exercise and enjoy the process of physical exercise2. the difficulties in the participation of the elderly in physical exercise: including limited access to equipment and uneven venue distribution. Participation is often self-organized by senior citizen groups, lacking professional guidance. Outdoor activities are weather-dependent, and some elderly lack knowledge and motivation for exercise.

Research findings:

According to the current situation of the participation of the elderly in physical exercise, the following suggestions are put forward: firstly, to improve the elderly's knowledge of sports and further transform the traditional thinking; secondly, to optimize the allocation of resources and rationally plan the construction of stadiums, so as to provide choices for the elderly's participation in physical exercise; and lastly, to strengthen the supervision and management of the governmental departments and optimize the grass-roots service system, so as to safeguard the safety of the elderly's participation in physical exercise.

Keywords: Older people; fitness for all; physical activity; physical health;

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6-23 Study on the Impact of Physical Exercise on the Physical Health of the Elderly - Data Analysis Based on the China General Social Survey

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Research Purpose:

This study aims to investigate the impact of physical exercise on the physical health of the elderly, based on an analysis of data from the China General Social Survey (CGSS) 2018. Specifically, we focus on examining the role of physical exercise in the self-rated health of the elderly, while considering other potential influencing factors such as gender, age, education, income, among others.

Methodology:

This study utilizes data from the CGSS 2018 and employs the ologit model for analysis. In the model, self-rated health is the dependent variable, physical exercise is the core independent variable, and variables such as gender, age, education, income, and urban-rural status are controlled for. The sample size consists of 1210 individuals.

Results:

Analysis reveals that physical exercise has a significant positive effect on the self-rated health of the elderly ($\beta=0.331$, $P<0.01$). Additionally, air pollution negatively impacts self-rated health ($\beta=-0.231$, $P<0.1$), as does age ($\beta=-0.017$, $P<0.05$). Furthermore, females tend to have lower self-rated health scores ($\beta=-0.356$, $P<0.001$), while education level ($\beta=0.030$, $P<0.05$) and income ($\beta=0.094$, $P<0.1$) positively influence self-rated health. Urban-rural differences were not significant in this study.

Conclusion:

In conclusion, the results of this study demonstrate that physical exercise plays a significant role in promoting self-rated health among the elderly. Additionally, factors such as air pollution, age, gender, education, and income are closely associated with the self-rated health of the elderly. Therefore, promoting active participation in physical exercise among the elderly, along with measures to improve air quality, enhance education levels, and increase income, can contribute to improving the physical health status of the elderly population.

Keywords: Elderly, Physical Exercise, Self-Rated Health, Air Pollution

7-1 The Community of Border Public Health Governance: Evolution, Current Challenges, and Mitigation Solutions

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Abstract ***Objective:*** To analyze the evolution and current challenges of The Community of Border Public Health Governance, so as to provide policy reference to modernize the governance system and capacity of border public health governance. ***Methods:*** The methods of literature analysis and logical induction is used to comprehend the evolvement and the current deeper problems of The Community of Border Public Health Governance. ***Results:*** Historically, The Community of Border Public Health Governance has undergone four stages of development, while evolving gradually toward a harmonious and coexisting community. Currently, the establishment of The Community of Border Public Health Governance still faces issues such as insufficient coupling between medical and preventive systems, apparent heterogeneity of health risks, disjointed governance coordination, and delays in the establishment of a cross-border public health governance community. ***Conclusion:*** It is imperative to comprehensively establish The Community of Border Public Health Governance in an All-round Way, guided by the cultivation and consolidation of shared values, with a focus on building and enhancing comprehensive governance systems and mechanisms. Furthermore, it is essential to ensure the stimulation and enhancement of collective action effectiveness.
Key words: Public Health Governance; Community; Borderland; Evolvement logic; Holistic Governance

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7-2 How to Effectively Improve People's Medical Security and Service Level under the Perspective of Common Prosperity? - Empirical Analysis Based on CHARLS Data

Fangqi Guo,Yuexia Gao

Abstract: This study focuses on the medical insurance and service level of the universal medical insurance system based on the data from four waves (2011, 2013, 2015, and 2018) of the China Health and Retirement Longitudinal Study (CHARLS). On this basis, the study employed a mixed OLS regression and Heckman model to analyze the medical security and service level. The results show that: First, although the reimbursement rate has increased overall, there are still regional, urban and rural disparities in medical security and service level. Second, the reimbursement rate of primary medical institutions and hospitals above the municipal level, as well as the family medical economic burden, have increased overall. Compared with primary medical institutions, the reimbursement rate is lower and the family medical economic burden is heavier when visiting hospitals above the municipal level. However, the phenomenon of "Center of gravity shift" in the focus of treatment institutions is obvious. Third, income grouping is one of the factors that influence the medical security and service level. Overall, the reimbursement rate of the high-income group is lower, and the low-income group may benefit from subsidies from the high-income group. The medical insurance and service level at the policy level is better, but the family medical economic burden of the low-income group is heavier, and the sense of obtaining medical insurance for middle-aged and elderly residents is lower. China has made progress in improving medical security and service levels, but a multi-level, unified, fair, and precise medical insurance system needs to be constructed in the future to promote the realization of common prosperity.

Keywords: Common Prosperity; Medical Insurance and Service Level; Level of Treatment Institutions.

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7-3 The Performance of WHO Collaborating Centres in China: Experience and Lessons from Beijing

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Aim: to enhance the capacity of WHOCCs in China to participate in global health and contribute to building a global community of health for all by learn from experience and lessons from Beijing.
Methods: a questionnaire survey covering WHOCCs in China as well as interviews and consultations with 12 selected WHOCCs in Beijing.
Results: With the joint efforts of many parties, the WHOCCs in China have conscientiously fulfilled their responsibilities, carried out relevant practices with their expertise within the unified normative framework of WHO, and achieved positive results, especially in participating in global health governance, contribution to building a healthy China, and strengthening institutional capacity-building.
Conclusion: to enhance the performance of WHO Collaborating centers in China, we suggest: always maintaining tracking the trend of global health, and continuously strengthening theoretical and policy study, studying and judging the development trend of WHOCCs, analyzing their responsibilities, focusing on priorities, and identifying new growth engine for achieving WHO's goals and WHOCC development, integrating resources at all levels to promote the development of WHOCCs; leveraging local government resources for WHOCCs in China to perform their duties and responsibilities, and disseminating good practices throughout China, strengthening coordination and communication with WHO in various ways, and strengthening the World Health Organization's support for the WHO CCs in China in talent development, exchanges and cooperation.

The authors have no competing interests to declare.

Key words: WHO Collaborating Centers, global health, international cooperation

7-4 Unmet health care needs and the association with mortality in older adults: Equality-oriented monitoring toward universal health coverage

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Declaration of interests
The authors declare no competing interests.

Abstract

Background: Universal Health Coverage (UHC) is a central target of the health-related Sustainable Development Goals, and unmet needs could further enrich the measurement of UHC. With population ageing becoming a global trend, the unmet health care needs of older individuals are steadily increasing, potentially leading to a decline in quality of life and increased mortality, whereas the scientific evidence regarding the unmet needs and health outcomes in ageing population was limited.

Methods: A total of 69,443 participants in 31 countries from five international cohorts of ageing were included into current study. We measured the level of unmet health care needs and the inequality across social demographic strata. We further developed an equality-oriented health care service coverage index (ESCI; reflecting unmet health care needs and inequalities) and explored its relation to all-cause mortality in older adults over 55 years of age, and mortality owing to NCDs.

Results: Unmet medication needs in older adults with chronic conditions reached 41.84% (95% confidence interval, CI: 41.47%, 42.21%). Unmet health care needs varied across sociodemographic strata. The highest unmet needs were observed in older age groups and participants with multimorbidity. An inverse association was observed between the ESCI and the rate of all-cause mortality in older adults (β=−16.81, P=0.047, 95% CI: −33.37, −0.24) as well as the mortality rate owing to NCDs (β=−17.58, P=0.041, 95% CI: −34.38, −0.79), after adjusting for gross national income and the proportion of the total population aged 65 years and above. This association was robust for ESCI sub-indexes across sociodemographic levels.

Conclusion: ESCI could serve as a process evaluation indicator in assessing the progress toward UHC, which cannot be universal without considering healthy ageing. Our findings reinforce the importance of measuring the unmet needs and equality-oriented health care service coverage of older adults.

7-5 A study on the utilization of basic public health services and its influencing factors among female migrant population

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Abstract: Objective To understand the current situation of the utilization of basic public health services for female floating population and explore its influencing factors, so as to provide references and suggestions for relevant departments to improve the level of health services for female floating population. **Methods** Using the data of 73,956 female population aged 15-90 years from the 2018 national mobile population health and family planning dynamic monitoring data, we conducted a descriptive analysis of female mobile population health service utilization and analyzed its influencing factors using logistic regression. **Results** Among the floating female population, only 29.9% of them have established health records, and 81.6% of them have received at least one type of health education, mainly in the form of publicity materials and propaganda columns. Logistic regression analysis showed that the higher education level, non-agricultural and other household register, married, intercity flow range for the province and across the county in the city, the average monthly income of 5000 yuan the following, the employment status for the employees, want to stay at the local and floating population have medical insurance is a women use of health records document service advantage; Other than young, highly educated, non-agricultural registered permanent residence registered permanent residence properties, flow range for intercity in the province and across the county in the city, the average monthly income of 5000 yuan the following, the employment status for the employees, self-report good health condition， want to stay at the local and have medical insurance are women take advantages of the health education services of the floating population. All the above were statistically significant ($P < 0.05$, $P < 0.001$). **Conclusion** The overall level of basic health service utilization of female floating population is low. Relevant departments should strengthen the intervention measures of basic public health service for female.

Key words: Female migrants, Basic public health services, Health records, Health education

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7-6 The Impact of Integrated Medical Insurance System on Rural Labor Mobility

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Abstract： The construction of social security urban-rural integration is a fundamental project to promote the mobility of labor between urban and rural areas and promote the construction of new urban areas. This article is based on panel data from CFPS2014 and CFPS2018, using Difference-in-differences model to study the impact of Integrated medical insurance system on rural labor mobility. Research has found that the implementation of integrated medical insurance system can "unlock" rural labor and increase the probability of rural labor mobility in counties by 7.2%; There are different impact of Integrated Medical Insurance System on rural labor force with different health conditions and generations; The research on impact mechanisms indicate that the integrated medical insurance system promotes the mobility of rural labor by improving the condition of health human capital and reducing the incidence of medical economic risk. Based on this, this article suggests continuing to promote the reform of the medical and health system, fully leveraging the policy advantages of integrated medical insurance system, focusing on the medical security of vulnerable groups, promoting the free and sustainable mobility of factors between urban and rural areas, and thus promoting the integrated development of urban and rural areas.

Key words: integrated medical insurance system；rural labor mobility；health human capital；medical economic risk

7-7 Burden of multiple high-risk factors in pregnancy before and after the universal two-child policy in Chinese women: an observational study

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Abstract
Aim
The impact of universal two-child policy on the burden of multiple high-risk factors in pregnancy (MHFP) in China is little known. We aimed to estimate the prevalence, intercorrelation, and outcomes of MHFP before and after the policy implementation.
Methods
We obtained the whole pregnant women before (2015) and after (2020-21) the implementation of two-child policy in Huai'an. Based on the "Five-Colour Management" framework, 33 risk factors were included and MHFP was defined as having two or more factors. Changes of the prevalence of each single factor and their coexistence were estimated. Network analysis was performed to assess the intercorrelations across factors and logistic regression models were conducted to evaluate MHFP-related pregnancy outcomes.
Results
There was an increasing prevalence of MHFP after policy implementation (25.8% in 2015 *vs.* 38.4% in 2020-21). Among these factors, chronic conditions (e.g., gestational diabetes mellitus, abnormal body mass index) had the largest increase. Cardiovascular disease and hypertensive disorders were central factors of network structures. Correlations of advanced maternal age with abnormal pregnancy history and scarred uterus increased significantly from 2015 to 2020-21. MHFP was associated with multiple pregnancy outcomes including preterm birth (odds ratio [OR]=2.57, 95% confidence interval [CI]=2.39-2.75), low birthweight (2.77, 2.54-3.02), low Apgar score (1.41, 1.19-1.67), perinatal death (1.75, 1.44-2.12), and neonatal death (1.76, 1.42-2.18). Moreover, increasing number of factors was associated with higher odds of pregnancy outcomes. For example, the OR (95% CI) of preterm birth increased from 1.67 (1.52-1.87) for one risk factor to 8.03 (6.99-9.22) for ≥4 risk factors.
Conclusions
Chinese women experience higher burden of multiple high-risk factors after the two-child policy, particularly those with advanced maternal age, obesity, and chronic conditions. Strategies targeting chronic conditions for women with MHFP should be prioritised and a shift to a multiple-factor-oriented framework is needed in the expanding Chinese maternal healthcare system.
Keywords
Pregnancy, high-risk pregnancy, multiple high-risk factors in pregnancy, universal two-child policy
Competing interests
All the authors declare no competing interests.

8-1 A Digital Health Intervention in Patients with Chronic Obstructive Pulmonary Disease: A Protocol for a Pilot Trial

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Objectives
This study explores the feasibility (usability and acceptability), and short-term clinical effects of a digital health intervention designed to enhance self-efficacy and patient activation in disease self-management in COPD patients.

Methods
COPD patients aged 18 years or older, diagnosed with COPD, who can speak and read Chinese and are mentally and cognitively capable of responding to a questionnaire will be invited to participate in a four-month digital health intervention. Participants with other significant lung diseases, Class 4 heart failure, serious active infections, inability to walk, or diagnosed psychiatric illness (with or without medication) will be excluded.

The intervention comprises three components: ***Part I:*** A 30- session at baseline to establish rapport with the patient, listen to their problems and needs, and enhance self-efficacy in managing the disease. ***Part II:*** An app featuring theory- and theme-based information schedules, and self-monitoring and goal-setting platforms for 4 months to increase patients' knowledge, skills, and confidence in managing their COPD. ***Part III:*** Three scheduled phone calls (at weeks 2, 8, and 12) to regularly assess the patient's progress and needs, answer specific questions, and further empower self-monitoring and adherence to the action plan.

Results:
The primary outcome is self-management and self-efficacy. Secondary outcomes include general quality of life, physical activity, smoking habits, medication use, dyspnea level, anxiety and depression, sleep quality, acceptance of illness, social support, and satisfaction and usability of the app. Participants' demographics and baseline scores will be presented as frequencies and percentages. Linear regression will be used to compare the changes in outcome scores between the baseline and the 4-month assessment. Individual Interviews will be conducted, recorded and transcribed verbatim, and analysed using thematic content analysis.

Conclusions
The program's content should be tailored to meet COPD patients' age, literacy, and expectations to enhance the intervention's usability and acceptability.

Keywords: COPD, digital health, self-management.
300 words

8-2 Feasibility Study on the Possibility of Estimating Arterial Stiffness Using Photoplethysmogram Sensors

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Keywords: Photoplethysmogram, Atherosclerosis risk, Digital health

Declare conflicts of interest: The authors declare no conflicts of interest associated with this manuscript.

Introduction

The non-reversible progression of atherosclerosis emphasizes the need for early detection and prevention. Wearable devices with Photoplethysmogram (PPG) sensors present a user-friendly alternative for regular monitoring. This study investigates the use of PPG in assessing arterial stiffness in the radial artery, taking advantage of the ease of access provided by wearable technology.

Methods

Prior research has shown that vascular age can be estimated from the fingertip's second derivative of photoplethysmogram (SDPTG), providing insights into arterial stiffness. However, for everyday monitoring, the radial artery at the wrist, more accessible for continuous measurement, is preferred. Previous studies used near-infrared light for its experiment, but it lacked the noise resistance. This study evaluates the effectiveness of using green light for SDPTG measurements at the radial artery to predict arterial stiffness.

Results

The result of Fig. 2, featuring 18 participants (9 males, 23.3±3.7; 9 females, 24.7±7.3), shows that SDPTG can estimate vascular age at the fingertip using both green and near-infrared light, although estimates varied as the box plot illustrates. Near-infrared light SDPTG exhibited greater variability at the fingertip, whereas green light SDPTG at the wrist ('guan') provided reliable vascular age estimates for only 4 participants (1 male, 26; 3 females, 23±1), suggesting site-specific differences in measurement accuracy.

Discussion and Conclusion

The discovery of significant individual differences in SDPTG features emphasizes the necessity for personalized models over a one-size-fits-all approach for vascular age assessment in the radial artery. This study confirms that while SDPTG is informative, it cannot serve as a comprehensive index of vascular function at the radial artery on its own. Future research should enhance personalized models and delve into more PPG indices and waveform analysis to improve arterial stiffness measurements.

8-3 Wearable accelerometer-derived physical activity during pregnancy and preterm birth: a prospective cohort study among women with gestational diabetes

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*This paper is under revision in the **Diabetes Care**.*

Abstract

Objective

To examine the prospective association of accelerometer-derived physical activity metrics and pattern with preterm birth among women diagnosed with gestational diabetes mellitus (GDM).

Research Design and Methods

The present study was based on a prospective cohort study of pregnant women with GDM in China. Physical activity of the participants was objectively measured via wearable accelerometer at median 25.4 weeks (IQR:24.6-26.6). Preterm birth was determined through the examination of delivery records. Multivariable logistic regression was used to assess the associations of physical activity metrics and pattern with the risk of preterm birth, adjusted for potential confounders.

Results

Among the 1,427 women meeting the inclusion criteria, the mean (SD) age was 31.3 (3.8) years, and there were 80 cases of preterm birth. Per standard deviation difference in Moderate-to-Vigorous Intensity Physical Activity (MVPA) and the fraction of physical activity energy expenditure derived from MVPA exhibited an inverse association with preterm birth, with odds ratio of 0.55 (95% CI: 0.32 - 0.96) and 0.69 (0.55 - 0.88), respectively. In the dose-response analysis, we observed a progressive decrease in the odds of preterm birth with an increasing duration of MVPA per day, reaching a plateau at approximately 74 minutes per day. Furthermore, our findings indicated that active MVPA (MVPA ≥ 30 min/day), whether it was concentrated into a few days or followed a more regular pattern, had similar beneficial association with preterm birth.

Conclusions

These findings underscore the potential benefits of engaging in MVPA during pregnancy for women with GDM.

Keywords: Gestational diabetes; Physical activity; Preterm birth.

Conflict of interest

The authors declare no competing financial interests.

9-1 Texture analysis based on 2D gray-scale ultrasound to evaluate plaque neovascularization grade

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Abstract
Objectives: Obtain the relationship between the ultrasound image features of carotid plaque and the grade of plaque neovascularization by contrast-enhanced ultrasound (CEUS), based on AI plaque segmentation and special diagnosis extraction.
Methods: Through cross-sectional studies, 81 patients with 178 carotid plaques were studied by standard and contrast-enhanced ultrasound imaging between August 2022 to October 2023. Interpretation of neovascularization (IPNV) was graded by the visual appearance of contrast within the plaque as follows: CEUS (increasing IPNV from 0 to 3). According to the receiver operator characteristic (ROC) curve, the predictive ability and cut-off value of plaque characteristics on CEUS grade were determined.
Results: A total of 178 plaques were recorded, with 48.9% CEUS grade Ⅰ, 32.6% grade Ⅱ, and 18.5% grade Ⅲ. Multinomial ordered logistics regression revealed that high CEUS grade plaques exhibited significant 2D features including Juxtaluminal Black Area (JBA) rate, Discrete White Areas (DWA) rate, grey scale median (GSM), maximum stenosis area (MAS), and Gray-Weale classification. ROC curve analysis showed that DWA rate was the highest indicator for CEUS grade Ⅰ vs.> Ⅰ (AUC=0.789), while JBA rate was highest for CEUS grade Ⅲ vs. <Ⅲ (AUC=0.825).
Conclusion: The learning framework for generating virtual contrast images based on 2D plaque images can realize the contrast synthesis of common carotid artery vessels and plaque contours, but further data expansion and algorithm optimization are needed to realize the generation of IPNV. In addition, the plaque-based matching strategy provides an idea for solving the comparability of ultrasound images at different time.

Key words： Atherosclerosis; Artificial intelligence; Contrast-enhanced ultrasound; Texture analysis; Angiogenesis.

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9-2 Exploration of the generative model of carotid plaque 2D gray-scale ultrasound virtual generation of contrast-enhanced ultrasound

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Abstract
Objectives: Realize the virtual contrast imaging of the two dimensional (2D) ultrasound image of the plaque and the visualization of the neovascularization in the plaque by using the deep learning algorithm to learn and mine the features of the 2D image of the plaque.
Methods: The patients with clinical indications for carotid ultrasound imaging between August 2022 to October 2023 were enrolled. The final included dataset included a total of 130 videos from 69 patients, with a total of 4550 images for training. Image feature pairing was used to evaluate the consistency of image matching. The generative model was trained with a variety of deep learning algorithms, including diffusion models, conditionally generated adversarial networks (Pix2Pix), CycleGAN, and CycleGAN-$L_{\text{-content}}$. Subsequently, the validity of the resulting contrast-enhanced ultrasound images is evaluated by visual analysis.
Results: According to the method of randomization, the training, verification and test sets were divided into 70%, 15% and 15%, and a total of 3850 images were used for training and verification and 700 images were used for testing. In the generation of carotid arteries, all generative models can be used to generate the contrast agent distribution in the trunk, and CycleGAN-$L_{\text{-content}}$ has the best effect. In the contour generation of plaques, CycleGAN-$L_{\text{-content}}$ can accurately display the contours of plaques, while several other models are not accurate in displaying the contours of plaques. In the interpretation of neovascularization (IPNV), the above model has not been able to clearly identify the IPNV information in plaque.
Conclusion: The learning framework for generating virtual contrast images based on 2D plaque images can realize the contrast synthesis of common carotid artery vessels and plaque contours, but further data expansion and algorithm optimization are needed to realize the generation of IPNV. In addition, the plaque-based matching strategy provides an idea for solving the comparability of ultrasound images at different time.
Key words： Atherosclerosis; Artificial intelligence; Contrast-enhanced ultrasound; Plaque vulnerability; Angiogenesis.

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9-3 Effect of Digital Therapeutics Intervention on Improving Hypertension Management in Adults: A Meta-analysis of Randomized Controlled Trials

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Abstract

Background: Long-term management of hypertension is an effective way to improve the current low control rate of blood pressure (BP) in hypertensive patients. Digital therapeutics (DTx) intervention is an emerging therapy for the treatment and long-term management of disorder or disease.
Objective: This study aimed to systematically compile available evidence to determine the overall effect of DTx intervention on blood pressure control and other risk factors for people with hypertension.
Methods: The systematic review and meta-analysis of randomized controlled trials (RCTs) was conducted. PubMed, EMBASE, Web of Science, and Cochrane Library were searched to identify eligible RCTs published between Jan 1, 1982 and Sep 10, 2023. Random-effect models were utilized to pool estimates of net changes in systolic BP, diastolic BP, BP control rate, body mass index, weight, waist circumference, and physical activity between the DTx intervention group and control group.
Results: Fifteen RCTs were included, with a total sample size of 3789 participants. Compared with the control group, DTx intervention was associated with significant changes in systolic BP, diastolic BP, and BP control rate of –3.75mmHg; 95%CI –5.74 to 1.77, –1.79 mmHg; 95% CI –2.81 to –0.77 and 1.47%; 95%CI 1.10 to 1.95, respectively. In addition, DTx intervention was statistically significant for improving other anthropometric characteristics such as lower BMI (-0.5kg/m^2, 95%CI –0.86 to -0.15), increased physical activity (66.73 min/week, 95%CI 49.64 to 83.81), and reduced waist circumference (-2.91cm, 95%CI -5.15 to -0.66). No difference between groups was demonstrated concerning weight(P=0.30). Subgroup analyses revealed consistent effects of the change in SBP and DBP (P>0.05).
Conclusions: DTx intervention may be useful for lowering BP and long-term management of general hypertensive adults. More large-size trials and studies providing evidence are needed to validate the role of DTx as a comprehensive intervention in the management of hypertension.

Keywords: hypertension; digital therapeutics; blood pressure; lifestyle; digital therapy; health management

Conflicts of Interest

None declared

9-4 The application of large data based on the Internet of Things in the management mechanism of patients with chronic diseases

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Abstract

Objects： In recent years, with the vigorous development of the Internet, cloud computing, big data, artificial intelligence and other next-generation information technologies, as well as their application in the medical field, especially the integration of artificial intelligence technology, it has opened up a new way to improve the efficiency and quality of chronic disease management. Based on the new generation of information technologies such as big data, a new process of management for patients with chronic diseases.

Methods: Firstly, the existing problems in the management of chronic disease patients at home and abroad and the application status of information technology in chronic disease management were retrieved by using databases such as CNKI, Google Scholar, Wanfang and Pubmed.

Results: The new process has the advantages of lower input costs, greater sense of physician involvement, more controllable implementation, and more accurate quality.

Conclusion: It attaches great importance to the management of chronic diseases in China, actively explores effective chronic disease management methods, trains non-physician personnel, and supports patients self-management. On the one hand, the new process of managing patients with chronic diseases constructed in this study is helpful to improve the management and control effect of medical staff on patients with chronic diseases and improve the compliance of patients with chronic diseases. On the other hand, it can improve patients' self-management ability and self-help efficiency, and improve their quality of life.

[Key words]: big data; Artificial Intelligence; chronic disease management

9-5 Construction and practice exploration of medical quality control management information platform in county medical community.

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Abstract
Objective: To explore a new medical quality evaluation and management model for the homogenization and informationization of county medical community units.
Methods: Focusing on the process and timeliness of regional medical quality control management application, based on the management plan of regional smart medical information platform and regional medical quality control center, through the construction of medical quality control index system and management information system of primary medical institutions in the county medical community, after collecting, cleaning and integrating relevant indicator data, form medical quality control management information platform of county medical community.
Results: The county medical community medical quality control management platform has been established to provide the internal medical quality control index system and related data for the regional medical quality control center, more than 20 professional quality control sub-centers and 10 township health centers.
Conclusions: The management platform can provide unified data services and hierarchical authorization management, form a new model of medical quality control management in county medical communities, and improve the efficiency of quality control management.

Key words: County medical community, Basic medical institution, Medical quality control, Management information platform

9-6 Effectiveness of digital media-based intervention on obesity: a systematic review and meta-analysis

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Abstract

Background: Obesity is a major public health issue globally. Digital media-based interventions are increasingly being used for obesity prevention and treatment. This systematic review and meta-analysis aims to evaluate the effectiveness of digital media-based interventions on weight-related outcomes in individuals with overweight or obesity.

Methods: A systematic search was conducted in EMBASE, Scopus, ACM Digital Library, PsycINFO, EBSCO(Library, Information Science & Technology Abstracts), MEDLINE, Pubmed, Web of Science Core Collection, IEEE Xplore,the Cochrane Central Register of Controlled Trials , Spring Direct databases from April 2023 inception to April 2024. Randomized controlled trials (RCTs) comparing digital media-based interventions to control conditions for individuals with overweight or obesity were included. The primary outcome was change in body weight. Secondary outcomes included changes in body mass index (BMI), waist circumference, body fat percentage, and health-related quality of life. Risk of bias was assessed using the Cochrane Risk of Bias tool. Meta-analysis was performed using random-effects models.

Results: We collectively screened 3643 articles, and ultimately included 46 articles with a total of 25672 eligible participants, of which 26 studies were included in the meta-analysis. The meta-analysis revealed that Digital media-based interventions led to significantly greater reductions in body weight loss (Standard Mean Difference [SMD] = -1.14 kg, 95% CI: -1.65 to -0.63, $p < 0.001$), BMI (SMD = -1.09 kg/m2, 95% CI: -1.67 to -0.51, $p < 0.001$), and waist circumference (SMD = -0.3 cm, 95% CI: -0.52 to -0.008, $p < 0.01$) compared to control conditions. No significant differences were found for body fat percentage or health-related quality of life. Subgroup analyses showed that interventions using mobile apps, frequency of intervention greater than 7 times a week, and with duration ≤ 3 months were more effective（-1.79 [-2.46, -1.12] VS -0.20 [-0.51, 0.10], $p < 0.0001$）. The overall risk of bias was moderate.

Conclusions: Digital media-based interventions are effective in promoting weight loss and improving obesity-related outcomes in individuals with overweight or obesity. Future research should focus on identifying the most effective intervention components and long-term sustainability of weight loss.

Keywords: Obesity, digital media, eHealth, mHealth, weight loss, systematic review, meta-analysis
Declaration of interest: All authors disclosed no relevant relationships

9-7 The performance of deep learning on thyroid nodule imaging predicts thyroid cancer: A systematic review and meta-analysis of epidemiological studies with independent external test sets

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Abstract

Aims: It is still controversial whether deep learning (DL) systems add accuracy to thyroid nodule imaging classification based on the recent available evidence. We conducted this study to analyze the current evidence of DL in thyroid nodule imaging diagnosis in both internal and external test sets.

Methods: Until the end of December 2022, PubMed, IEEE, Embase, Web of Science, and the Cochrane Library were searched. We included primary epidemiological studies using externally validated DL techniques in image-based thyroid nodule appraisal. This systematic review was registered on PROSPERO (CRD42022362892).

Results: We evaluated evidence from 17 primary epidemiological studies using externally validated DL techniques in image-based thyroid nodule appraisal. Fourteen studies were deemed eligible for meta-analysis. The pooled sensitivity, specificity, and area under the curve (AUC) of these DL algorithms were 0.89 (95% confidence interval 0.87–0.90), 0.84 (0.82–0.86), and 0.93 (0.91–0.95), respectively. For the internal validation set, the pooled sensitivity, specificity, and AUC were 0.91 (0.89–0.93), 0.88 (0.85–0.91), and 0.96 (0.93–0.97), respectively. In the external validation set, the pooled sensitivity, specificity, and AUC were 0.87 (0.85–0.89), 0.81 (0.77–0.83), and 0.91 (0.88–0.93), respectively. Notably, in subgroup analyses, DL algorithms still demonstrated exceptional diagnostic validity.

Conclusions: Current evidence suggests DL-based imaging shows diagnostic performances comparable to clinicians for differentiating thyroid nodules in both the internal and external test sets.

Keywords: Deep learning; External validation; Imaging diagnosis; Meta-analysis; Thyroid nodule.

Conflict of interest: The authors declare no conflict of interest.

9-8 Research on the clinical application effect of transcranial ultrasound patch probe

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Abstract
Objective: To evaluate the performance of the self-developed transcranial ultrasound patch probe as well as its stability and safety in clinical applications.
Methods: Thirty healthy subjects were randomly divided into two groups. The transcranial Doppler ultrasound (TCD) examinations were performed using the self-developed transcranial ultrasound patch probe and normal TCD probe alternatively in each group from squatting to sitting and then to standing posture. Two experienced sonographers each completed one test for the same subject using the above two different probes. TCD parameters of the middle cerebral artery (MCA) using the two probes with different positions were compared. The operator satisfaction for using the two different probes when scanning was surveyed; The stability of signal acquisition of transcranial ultrasound patch probe was also evaluated. The occurrence of discomfort/unforeseen events were recorded and compared.
Results: There was no significant difference in the detection of various ultrasound parameters of MCA ($P>0.05$) between using the transcranial patch probe and the normal TCD probe. The overall satisfaction of transcranial ultrasound patch probe and normal TCD probe was quite similar. The transcranial ultrasound patch probe acquired favorable and stable signals. There were no adverse events/accidents during the examination of the subjects using the transcranial ultrasound patch probe as well as the normal TCD probe.
Conclusions: TCD examinations could be well performed using the transcranial ultrasound patch probe, which might provide a potential new method for real-time monitoring and evaluating of cerebral blood flow of a moving subject.

9-9 GPS—technology delivered interventions targeting physical activity for weight management: A systematic review and meta-analysis.

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Abstract

Objective—To evaluate the effectiveness of GPS—technology based interventions targeting physical activity (PA) for body weight management.

Design— Systematic review and meta-analysis (Prospero Registration ID:545777, under review）

Method—We searched the following databases: PubMed, Embase, Scopus, Web of Science, and Medline, from January 2000 to the present. The inclusion criteria included English-language intervention trials (RCTs and other designs) with adults who have a BMI ≥24. Hedges' g was used to compute effect sizes. The random effect models were conducted for all analyses.

Results— A total of 11 studies with 2389 participants from 4 different countries were included. The combined results showed that GPS-technology delivered interventions significantly improved PA (Standardized mean difference (SMD): 0.50,95%CI: [0.35, 0.65], P=0.037) compared to control group.The interventions showed an average increase of 7.82 minutes/day in daily physical activity.The BMI change showed a significant mean reduction of 1.75 kg/m²(95%CI: [1.31, 2.19],P=0.031) .The GPS-delivered PA interventions resulted in a significant mean weight loss of 3.10 kg (95%CI [2.46, 3.74], P=0.032). GPS-technology delivered interventions also led to a significant reduction in systolic blood pressure(Standardized Mean Difference (SMD): -0.205,95% (CI): [-0.363, -0.046],P=0.011).

Conclusions: GPS—technology delivered interventions significantly enhanced physical activity and resulted in effectively reducing body weight, BMI and systolic blood pressure. Additionally, seasonal variations impact physical activity levels independently of participant characteristics and data collection methods.

Keywords：geographic information system, physical activity, weight management,overweight and obesity,intervention study

10-1 The Vulnerability Paradox in Global Mental Health: Psychologist Density, Social Development, and the Disease Burden of Mental Disorder

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Abstract
Introduction: Global efforts underscore the imperative of increasing the mental health workforce to improve mental health. However, the "vulnerability paradox" in global mental health questions the effectiveness of an increased workforce. Evidence is lacking on whether mental health workforce input can reduce the disease burden of mental disorders at different levels of social development.
Methods: Data from the Global Burden of Disease Study 2019, United Nations Statistics and Our World in Data. The concentration index (CCI) and slope index (SI) assessed psychologist density inequality across 204 countries and territories from 1990 to 2019. Generalized additive mixed model was used to analyze the nonlinear associations among psychologist density, the socio-demographic index (SDI), and age-standardized rates (ASRs) of DALY for mental disorders.
Results: Psychologist density increased globally from 1990 to 2019, excluding Zimbabwe. The psychologist density SI increased from 3.8 in 1990 to 10.5 in 2019. CCI decreased from 66.8 in 1990 to 52.8 in 2019. The psychologists were concentrated in countries and territories with higher SDI rankings. Psychologist density had a negative nonlinear association with DALY ASR (EDF:5.86, P<.001), with a slowing decline as psychologist density increased. SDI correlated positively with DALY ASRs (EDF:6.36, P<.001). In the interaction between psychologist density and SDI, as SDI increased, the impact of the increase in psychologist density on the reduction of DALY ASRs for mental disorders gradually weakened.
Conclusion: Despite an overall increase, substantial global inequality persists in psychologist density. Psychologist density has a notable negative nonlinear association with the disease burden of mental disorders, but varying input-response relationships across different SDI levels. Formulating equity-oriented mental health workforce policies, and allocating resources to low human resources for mental health and underdeveloped areas are imperative. And consider reshaping mental health services rather than just increasing the mental health workforce, especially in high-development areas.

Keywords: Human resources for mental health; Mental disorder burden; Socio-demographic Index; Inequality

10-2 How to promote the use of physical examination services for middle-aged and elderly people in China?——Evidence from five rounds of CHARLS panel data

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Abstract
Aims Preventive health services play an important role in maintaining and improving the health status. This study aimed to explore an effective way to improve the utilization rate of physical examination(PE) among middle-aged and elderly residents(aged ≥ 45 years)in China, based on the data of the China Health and Retirement Longitudinal Study (CHARLS).
Methods The two-way fixed-effect logit model was used to explore the influencing factors of the utilization of PE. We considered the impact of respondents' basic information, health status, family status, and health insurance situation. Health status included self-rated health, alcohol history, smoking history, and exercise status. Family status included the number of surviving children. Stata 18.0 software was used for statistical analysis, and the test level $\alpha=0.05$.
Results 88,102 valid samples were included in this study. Age, medical insurance for urban and rural residents and exercise status had a positive impact on the utilization of PE. When the age of the respondents increased by one unit, the probability increased by 4.6% ($P<0.05$). Compared with those without medical insurance, the probability increased by 24.7% ($P<0.05$). Compared with those who did not exercise, the probability increased by 22.1% ($P<0.05$). Self-rated healthy and the number of surviving children had a negative effect on the utilization of PE. Compared with the respondents with poor self-rated health, the probability was reduced by 9.3% ($P<0.05$).When the number of surviving children increased by one unit, the probability was reduced by 13.4% ($P<0.05$).
Conclusion The government should intensify efforts to promote awareness of PE among middle-aged and elderly residents, especially among the elderly.Guiding them to understand that the care and attention of their children are not substitutes for PE is crucial.
Keywords Utilization of preventive health services, physical examination, middle-aged and elderly people, panel data, The two-way fixed-effect logit model

10-3 Changes and Trends in the Utilization of Physical Examination Services among Middle-aged and Elderly People in China: evidence from 2011-2020

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Abstract

Aims Physical examination plays an important role in maintaining and improving health status.As the population aging in China accelerates, the health monitoring of the elderly is more important. This study aimed to investigate the use of physical examination services by middle-aged and elderly residents in China from 2011 to 2020, explore future trends, and provide reference for formulating more targeted health policies.

Methods Data for this study were obtained from five waves of the China Health and Retirement Longitudinal Study (CHARLS). Utilization of physical examination services includes two situations: the past 1 year and the past 3 years, which refers to individuals or groups receiving physical examination services provided by medical institutions.The Utilization Rate of Physical Examination (URPE) was used to represent the current status of physical examination service utilization. The JoinPoint model was employed to analyze the trends in URPE, with the Annual Percentage Change (APC) used to indicate the changes. Stata 18.0 software was used for statistical analysis.

Results 87,870 valid samples were included in this study. The URPE within one year for the middle-aged and elderly people in China were 39.39%, 21.39%, 24.80%, 29.28%, and 26.03%(APC = -2.259%, P = 0.535). The URPE within the past three years were 67.10%, 41.71%, 42.70%, 48.14%, and 46.69% (APC = -2.3778%, P = 0.431), indicating a potential downward trend in URPE (Figure 1).

Conclusion The URPE among the middle-aged and elderly people is relatively low, and there may be a decreasing trend. More attention should be paid to the utilization of physical examination services among this demographic group. Encouraging active participation in physical examinations through preferential policies or incentive measures can help increase the utilization rate of physical examination services and advance health management.

Keywords Middle-aged and Elderly people, Utilization of Physical Examination Services; Changes, Trend Analysis, JoinPoint Model

10-4 Associations of adverse childhood experiences and group-based depression trajectory model in rural Chinese adolescence: A multi-method analysis

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Abstract

Objective: This study seeks to employ a multi-method approach to investigate the correlation between Adverse childhood experiences (ACEs) and Adolescent Depression (AD) in rural China. Moreover, it aims to replicate and expand previous network analyses exploring the association between ACEs and AD by examining the developmental trajectories of depression in adolescents.

Methods: The study consisted of 520 middle school students residing in rural areas of Hubei province, China, with mean age of 12.5 years (SD = 0.50) at baseline and 275 (53%) being male. Data were collected in three waves: 2020, 2022, and 2023. At baseline, participants reported 12 adversities along with their occurrence periods. Depression assessments were conducted in all three waves, and the trajectory of AD (ADT) was delineated using a group-based trajectory model. Four analytical approaches were employed: single adversities, cumulative risk, latent class analysis (LCA), and network analysis.

Results: When examined individually, most ACEs were associated with ADT. There were cumulative effects of total ACEs, threat-related ACEs, and deprivation-related ACEs on ADT. The LCA-derived class characterized by emotional abuse and household violence showed an association with ADT compared to the low adversities class. Network analyses revealed emotional abuse emerged as the most central node and exhibited the strongest association with other adversities, evident in both binary and chronic adversity networks.

Conclusions: Adolescents who experienced multiple ACEs and some specific combinations of ACEs are prone to have consistently higher depressive scores in middle school. Intervening on emotional abuse could potentially disrupt the entire ACE network. The pervasive occurrence of ACEs and its persistent impact on ADT require attention, as timely interventions may alleviate the onset of depression during adolescence.

Keywords: Adolescent depression; Adverse Childhood Experiences; Network analysis; Latent class analysis

Conflict of Interest Disclosures: None reported.

10-5 Risk Factors Associated with Smoking Behavior among Residents in North China: A Cross-Sectional Study

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Abstract

Objective: To analyze the risk factors associated with smoking behavior among 75,866 residents in North China and provide evidence for developing smoking cessation strategies.

Methods: A total of 75,877 samples of residents' behavioral activities were collected from a database of typical regional behavioral activity patterns in North China. Logistic regression was used to identify risk factors for smoking behavior, and a nomogram model was established to predict the risk of smoking behavior.

Results: The smoking prevalence among residents in North China was approximately 47.6%. Logistic regression analysis showed that gender（*OR*=8.879，95%*CI*：8.602~9.612，*P*＜0.05）, age（*OR*=1.035，95%*CI*：1.03~1.039，*P*＜0.05）, weight（*OR*=1.024，95%*CI*：1.021~1.027，*P*＜0.05）, education level（*OR*=1.714，95%*CI*：1.586~1.852,*P*＜0.05）, occupation（*OR*=6.876，95%*CI*：5.522~8.564，*P*＜0.05）, main activity location（*OR*=0.717，95%*CI*：0.049~0.588,*P*＜0.05）, working status（*OR*=2.527，95%*CI*：2.097~3.046，*P*＜0.05）, and activity type（*OR*=0.755，95%*CI*：0.682~0.834，*P*＜0.05） were significantly associated with smoking behavior . A nomogram model was constructed based on these factors to predict the risk of smoking behavior. Age had the greatest impact on smoking behavior (0-100 points), followed by occupation (0-97.5 points), weight (0-62.5 points), gender (0-40 points), main activity location (0-32.5 points), working status (0-18.5 points), education level (0-12.5 points), and activity type (0-10 points).

Conclusion: Gender, age, weight, education level, occupation, main activity location, working status, and activity type were identified as risk factors for smoking behavior among residents in Jinan and Baoding cities. Governments, communities, and individuals should pay close attention to these factors and take targeted interventions to reduce the occurrence of smoking behavior.

Keywords: Smoking behavior; Risk factors; Logistic regression; Nomogram; North China

10-6 Research on the impact of the use of health science popularization short video on health communication effect of residents

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【Abstract】

Objective Based on the theory of use and satisfaction, the use of health science popularization short videos among residents in Beijing was investigated, and its impact on health communication effect was analyzed, so as to provide theoretical basis for further promoting health literacy and health behaviors of residents through short video channels.

Methods From November to December 2023, residents in 17 districts of Beijing were selected by convenient sampling method to conduct a questionnaire survey. The main contents of the survey include the use and satisfaction of health science popularization short videos, health literacy, new media communication effect and health communication effect. Binary Logistic regression model was used to analyze the main factors affecting the health communication effect.

Results A total of 3291 residents were included in this study, with an average age of 42.27±11.79 years old. 22.7% had chronic diseases and 58.6% had used health science popularization short videos. Among the residents who had used health science popularization short videos, 80.6% had the effect of new media communication, 28.3% had the effect of health communication, and 87.1% had at least one of the effects. The results of binary Logistic regression analysis showed that, taking high school or below as reference, college/bachelor's degree and master's degree or above were negatively correlated with the effect of new media communication, *OR*(95%*CI*) being 0.541(0.380,0.770) and 0.414(0.227,0.755), respectively. With ≤34 years old as reference, the incidence of health transmission effect was lower in 35-49 years old residents, *OR*(95%*CI*) was 0.777(0.610,0.992). The incidence of health communication effect was higher in those with health literacy, *OR*(95%*CI*) was 1.263(1.010, 1.578).

Conclusion The utilization rate of health science popularization short videos among residents is acceptable, the effect of new media communication is good, but the effect of health communication is not not impressive. health science popularization short videos should strengthen the guidance of health behavior change, establish and improve the services such as consultation and appointment on short video platform, and promote the effect of health communication among residents.

Keywords **Short video; Health science popularization; Health communication effect; Use and satisfaction**

Competing interests The authors have no competing interests to declare that are relevant to the content of this article.

10-7 Shaping Global Health Promotion: A Comprehensive Analysis of the 10 Global Conferences on Health Promotion Conferences (1986-2021)

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Abstract

Objective: This study analyzed how the ten Global Conferences on Health Promotion have played a significant role in shaping and promoting a worldwide consensus and actions on health promotion, effectively addressing diverse health challenges that evolved over different periods.

Methods: The textual analysis method was used in this study and text encoding was conducted to systematically examine the declarations and reports presented by the 10 Global Conferences on Health Promotion held during 1986-2021. We summarized the themes and key achievements, and key vocabulary in the conference declarations was extracted and analyzed to construct the global health promotion consensus and actions.

Results: The fundamental principles of the conferences are to foster consensus and initiate actions in the realm of health promotion on a global scale. The primary purpose and goal are to promote health from regional to global. Significantly, our findings highlight a transition in the primary actors driving health promotion. It underscores a shift in health promotion from being driven primarily by organizations like the WHO, governments, and international bodies, to a more inclusive approach involving non-governmental organizations and the general public. This development implies that health promotion has evolved into a collective global endeavor, demanding the proactive involvement of various stakeholders, and forging new alliances in public health. Meanwhile, the COVID-19 pandemic has further shaped the landscape of health promotion, underscoring the need for intensified focus on areas including disease prevention, health education, and the integration of digital health technologies, and emphasizing the importance of a multidimensional, responsive approach in public health initiatives.

Conclusions: Sustained collaboration and innovative strategies are pivotal to advancing health promotion globally. Countries, together with public and private entities, should intensify cooperation. Multisectoral collaboration among partners such as healthcare, education, social security, and the industry is vital for health promotion and achieving global health goals.

Keywords:
Global Conference on Health Promotion; Health Promotion; Consensus and Actions

10-8 Mindfulness-based Zentangle for reducing depression and anxiety symptoms in parents: a pilot randomised controlled trial

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Abstract

Objective: To assess the effectiveness of mindfulness-based Zentangle interventions for reducing depression and anxiety symptoms in parents with mild to severe depression or anxiety.

Methods: A pilot randomised controlled trial was conducted on 60 parents who have at least one primary or secondary school child. A Certified Zentangle Teacher delivered two 2-hour weekly face-to-face group sessions to the intervention group. The content included simple mindfulness practice, step-by-step explanation and demonstration of various patterns of Zentangle drawings, and interactive sharing of participants' artworks. The waitlist control group received the training after completing all assessments. The outcome measurements included depressive and anxiety symptoms measured by Patient Health Questionnaire (PHQ)-9, General Anxiety Disorder (GAD)-7, Short Warwick-Edinburgh Mental Well-being Scale, Mindfulness in Parenting Questionnaire (MIPQ), Perceived Stress Scale (PSS)-10 and subjective changes. Outcomes were measured at baseline, immediately post-intervention and three months. After adjusting for baseline differences, we compared mean differences in the outcomes between two groups.

Results: Most participants were female (96.4%), with an average age of 42.5 (SD: 5.61) years. At post-intervention, intervention participants showed a significant improvement in MIPQ compared with control group (between-group mean difference in score = 13.1, 95% CI, 1.9 to 24.2), whereas no significant between-group differences was shown in the other outcomes. For subjective changes, 76.5% reported a little or much improvements in their mental health. Participants who had home practice reported an average of 2.1 times (SD: 1.82) of mindfulness practice lasting for 17 minutes and 1.8 times (SD: 2.49) of Zentangle practice in the past two weeks. Participants rated a high satisfaction towards the programmes (score 9 out of 10).

Conclusion: The mindfulness-based Zentangle interventions showed feasibility and preliminary effect in improving mindful parenting and mental health in parents. A definitive trial is warranted to further assess the effectiveness of the interventions.

Keywords: Zentangle; Mindfulness; mental health; parents; wellbeing; depression; anxiety

Funding: This study was supported by Research and Development Fund, Hong Kong Metropolitan University (reference number: RD/2023/1.17).

Author Disclosure Statement: No competing interests exist.

Note: The study is still ongoing as of 23 April 2024. The results at 3 months will be updated during the presentation if the abstract is accepted for presentation in the conference.

10-9 A comprehensive study on the knowledge, attitudes, and practices of Chinese parents with infants (aged 0-3 years) regarding immunity, gut microbiota, and probiotics

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Conflicts of Interest: The authors declare no conflicts of interest.

Abstract

Objective In the wake of the COVID-19 pandemic, there has been an increasing focus towards infant immunity. The development and maintenance of the immune system are significantly influenced from birth, and is shaped by early-life infant feeding behavior. The purpose of this study is to explore the influence of parental knowledge, attitude and practice (KAP) on shaping the immune system of their infants.
Methods A total of 2369 parents across 19 cities in China were surveyed using a self-designed online questionnaire. The KAP questionnaire assessed three domains: immunity, gut microbiota, and biotics (prebiotics, probiotics, and synbiotics).
Results Diarrhea (78.88%), colds (74.76%), nighttime crying (73.56%), regurgitation (71.84%) and food retention (66.12%) were the major health issues reported. Positive correlations were found between the KAP scores of immunity, KAP scores of gut microbiota and KAP scores of biotics. Parental knowledge score on immunity was negatively correlated with diarrhea, colds, nighttime crying, regurgitation and food retention. On the other hand, parental attitude and practice scores toward immunity were negatively correlated with food retention and night time crying. In regards to gut microbiota, parental knowledge score was negatively correlated with diarrhea, overflow, food retention and nighttime crying whereas practice score was negatively correlated with diarrhea, regurgitation and food retention. Practice scores toward biotics was negatively correlated with the occurrence of colds and food retention. **Conclusion** This study demonstrated that significant gaps and misunderstandings exist among parents regarding immunity, gut microbiota health, and biotics. Positive correlations were observed between parental KAP related to immunity and gut microbiota. An inverse correlation was identified between parental KAP and the incidence of health problems in infants. Both public education and additional interventions are crucial for enhancing parental knowledge and practices, thereby improving infant immunity.

Keywords: infants; KAP; immunity; gut microbiota; biotics

10-10 Cessation intention and behavior of E-cigarettes and associated factors among 18-44 Chinese adults: based on Protection Motivation Theory (PMT).

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Abstract

Background E-cigarettes are novel devices that simulate conventional tobacco smoking and have gained popularity in recent years. The efficacy of e-cigarette as an aid for smoking cessation remains inconclusive, but their adverse health effects are increasingly recognized. Young adults constitute the majority of e-cigarette users in China, where insufficient or inaccurate knowledge of e-cigarettes may contribute to addictive behavior. Based on the Protection Motivation Theory (PMT), this study aims to investigate the current status and determinants of cessation intention and behavior among Chinese adults who use e-cigarettes.

Methods This cross-sectional study used a nationally representative data from the 2023 E-cigarette Use among Chinese Adults Survey, covering a total of 31 provinces and involving 4,265 adults aged 18-44 in mainland China. To estimate the influencing factors of cessation intention and behavior among the 550(12.89%) current e-cigarette users, multiple linear regression models were used after adjusting sociodemographic factors. In addition, we performed subgroup analyses based on the smoking status of the participants, distinguishing between those who used both electronic and conventional cigarettes and those who only used e-cigarette.

Results In this study, 57.5% of e-cigarette users expressed cessation intention and 31.6% had attempted to quit in the past. After adjusting for covariates, we found that cessation intention was influenced by threat appraisal pathway such as severity (β=0.14), vulnerability (β=0.12) and extrinsic rewards (β=-0.11) and by coping appraisal pathway such as response efficacy (β=0.25) and self-efficacy (β=0.28), based on PMT constructs. Cessation behavior was positively associated only with severity (β=0.20) among threat appraisal pathway and with cessation intention (β=0.19) among adults aged 18-44. For subgroup analysis, both dual users of e-cigarettes and cigarettes and e-cigarette-only users showed positive associations between cessation intention and both threat appraisal (β=0.31, β=0.20) and coping appraisal (β=0.21, β=0.23) pathway. However, cessation behavior in two groups was associated only with the threat appraisal pathway (β=0.10, β=0.25).

Conclusion The findings suggest that PMT provides a valuable theoretical model for explaining the determinants of the cessation of e-cigarette use among adults. According to PMT, the factors related to the threat appraisal pathway not only influence the quitting intention, but also affect the actual quitting behavior. Furthermore, the impact of PMT factors varies depending on the smoking status of the users, indicating that future interventions could be tailored based on PMT to address the needs of distinct subgroups of e-cigarette quitters.

Keywords: e-cigarettes, cessation intention, cessation behavior, Protection Motivation Theory, adults, China

10-11 Mediating effect of depression on the relationship between adverse childhood experiences and cognitive function in older adults: A national cross-sectional survey in China

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Abstract
Objective: Cognitive dysfunction has a significantly impact on the quality of life for older adults and cause heavy economic burden to families and society. Depression and adverse childhood experiences (ACEs) are important factors that contribute to cognitive dysfunction. However, there is limited studies exploring their complex interaction. Therefore, this study aims to elucidate the mediating effect of depression on the relationship between ACEs and cognitive function in the older adults.

Methods: This national cross-sectional study utilized data from the 2020 China Elderly Social Tracking Survey (Chinese Longitudinal Aging Social Survey, CLASS). Information regarding depression, adverse childhood experiences and cognitive function was collected from individuals aged 60 and above. A structural equation model (SEM) was applied to examine the mediating effect of depression on the relationship between ACEs and cognitive function.

Results: A total of 7,409 patients were included in this study. The mean total score of cognitive function in older adults was 13.69 ± 2.794. The SEM results revealed that adverse experience (overall) and depression were directly associated with cognitive function in later life, indicating that fewer adverse experiences were linked to better cognitive function ($r= -0.138$, $P <0.001$). Furthermore, depression was found to mediate the relationship between experience of childhood hunger, the lack of childhood medical experience and cognitive function in later life ($p <. 001$), accounting for 7.6% and 43.6%, of the variance, respectively.

Conclusions: This study highlights that the improvement of ACEs is directly and indirectly related to a reduced likelihood of cognitive function through depression in older adults. As a result, future interventions should focus on alleviating depressive symptoms in older adults to prevent cognitive decline or impairment to a certain extent.

Keywords:
Cognitive function, adverse childhood experience, depression, structural equation model, cross-sectional, China

11-1 Subjective socioeconomic status and health inequality among the elderly in socioeconomically deprived rural areas of China: An investigation from multidimensional perspective on health vulnerability

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The authors declare that there are no conflict of interests.

Abstract

Objective: This study aims to explore the multidimensional health vulnerability of the elderly in economically deprived rural areas of China, with a particular focus on examining the relationship between subjective economic status and multidimensional health vulnerability.

Methods: This survey utilized a multi-stage stratified sampling method to investigate a total of 1,747 individuals included in the analysis. Initially, the Alkire-Foster methodology was employed to identify the elderly with multidimensional health vulnerability, followed by binary logistic regression analysis to determine the correlation between subjective economic status and multidimensional health vulnerability.

Results: Our study revealed that 41.39% of old adults in economically deprived rural areas exhibited multidimensional health vulnerability. Compared with elderly with low subjective economic status, those with medium or high subjective economic status had a 63.6.% and 75.7% reduction in the occurrence of multidimensional health vulnerability at a significance level of 0.001, respectively. Gender, clean fuels, internet use, smoking, drinking, and sleep quality were risk factors for multidimensional health vulnerability.

Conclusion: There exists correlation between subjective economic status and multidimensional health vulnerability among the elderly in economically deprived rural areas of China. The government should prioritize enhancing social security efforts and transfer income to achieve health equality considering subjective economic status.

Keywords: Elderly, Health inequity, Economically deprived rural areas, Subjective economic status, Multidimensional health vulnerability

11-2 Spatial Evaluation of Multi-Indicator Healthcare Resources in Small Areas: A Case Study of Hospitals, Hospital Beds, and Physicians across Chinese Cities

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Objective: Ensuring the equal right of residents to receive healthcare services is a crucial step towards achieving the global sustainable development goal of universal health coverage. Efficiently monitoring the equal distribution of healthcare resources and identifying shortcomings in allocation are foundational steps towards universal health coverage. This study aims to evaluate the inequality in the spatial distribution of city-level healthcare resources in China in 2021, and to identify influencing factors.
Methods: We obtained three key indicators of healthcare resources for 366 cities, including hospitals, hospital beds, and physicians. Firstly, we calculated comprehensive score using a Geographical Weighted Principal Component Analysis (GWPCA), followed by evaluating its spatial inequality using the spatial Gini coefficient. We then utilized a bivariate Moran's I to quantify spatial association between each pair of healthcare resource indicators. Lastly, we used a multiscale geographical weighted regression (MGWR) to analyse the impact of influencing factors on the distribution of healthcare resources.
Results: The spatial Gini coefficient coefficient suggests that there still remains inequality in the distribution of healthcare resources among cities in China, particularly in the eastern regions. The bivariate Moran's I reveals a harmonious type distribution of healthcare resources in eastern China, presenting a high agglomeration area, while the central part of northern China and provinces such as Yunnan and Guangxi present low clustering areas. The MGWR reveals that the present spatial distribution of healthcare resources results from the combined effects of socioeconomic and natural environmental factors.
Conclusion: This study reveals the spatial inequality and its related influencing factors in the distribution of healthcare resources in China in 2021 , offering scientific guidance and evidence for policy makers in various cities to make decisions based on local conditions.
Keywords: Healthcare resources; Small area; Spatial equality

Conflicts of Interest
We declare no competing interests

11-3 Optimizing Sexual Health for All – A Qualitative Study to Identify Barriers and Facilitators to HIV/STI testing among International Migrants in Japan

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Background: International migrants in Japan are disproportionately affected by the HIV epidemic, facing multilevel barriers including language challenges, stigma and information gaps. Driven by the rapidly aging society, migrant communities in Japan are expected to continue growing, underscoring the importance of engaging migrants in public health dialogues. This study aimed to explore international migrants' experience in accessing HIV/STI testing in Japan.

Methods: From June 2023 to March 2024, international migrants with long-term visas (i.e. > 3 months) were recruited via HIV testing events, online advertisement, and direct referral by community partners and peers. All participants received a one-hour semi-structured one-to-one interview. Interview questions included perceived barriers and facilitators to HIV/STI testing and desired characteristics of digital interventions. Interviews were conducted in English, Chinese and Nepali and were audio recorded and transcribed. Thematic analysis was conducted to identify cross-cutting themes.

Results: We interviewed a diverse sample of HIV-negative, adult international migrants in Tokyo (N=18), including migrants from China (n=9), Nepal (n=4), US (n=3), Brazil (n=1), Vietnam (n=1). Participants were mostly under 30 years old (n=13). Sixteen were men, and 14 were gay men. Three cross-cutting themes emerged. Firstly, participants commonly had a favorable opinion of Japanese healthcare providers' professionalism and privacy protection, and perceived little sexuality- or nationality-related discrimination in clinical settings. Secondly, while cheering the visibility of HIV-related campaigns in Japan, participants highlighted the challenges in accessing testing due to information gaps. Many relied on infrequent, free testing events or utilized clinic-based testing (20-25 USD/test) in urgent situations. Lastly, participants expressed interest in a streamlined, trustworthy, and multilingual website for disseminating sexual health education and testing information to facilitate healthcare seeking process.

Conclusions: Supportive and targeted interventions are needed to bolster Japan's HIV/STI testing among international migrants, and more broadly, to make HIV/STI testing more accessible to all populations.

Keywords: HIV, sexually transmitted infections, migrant health, health disparities, men who have sex with men

Declaration: The authors have no interest of conflict to declare

11-4 The effect of air pollution on socioeconomic inequality in hypertension among Chinese middle-aged and older adults

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[Objective]

Socioeconomic inequality in hypertension is well established. Air pollution is a determinant of hypertension, which is also conceptualized as a possible factor affecting this inequality. Based on the Diderichsen model, both differentials in susceptibility and exposure to air pollution explain how air pollution influences health inequalities. Previous studies focused on assessing whether socioeconomic-status (SES) modifies the effect of air pollution on hypertension only from the differential susceptibility perspective, but not from the differential exposure perspective. Thus, the mechanisms between air pollution and health inequality remain unclear. We aim to examine the effect of $PM_{2.5}$ on socioeconomic inequality in hypertension and quantify the dual mechanisms among Chinese middle-aged and older adults.

[Methods]

We used the 2015 wave of the China Health and Retirement Longitudinal Study data, which consisted of 15,260 respondents aged 35 and older. Socioeconomic inequality in hypertension is measured by concentration indies. Re-centered Influence Function (RIF) regression decomposition (decomposing the covariance of health and socioeconomic rank) was employed to examine the effect of $PM_{2.5}$ on concentration indices. Mechanism analysis was based on Oaxaca-Blinder decomposition, which provides a framework to quantify the effect of differential exposure and susceptibility to $PM_{2.5}$.

[Results]

The results show pro-rich inequality in hypertension. The relationship between $PM_{2.5}$ and socioeconomic inequality in hypertension is significantly positive. Mechanism analysis demonstrated that, compared with the high SES groups, the low SES groups are more likely exposed to $PM_{2.5}$ (differential exposure) and also more likely to develop hypertension symptoms due to $PM_{2.5}$ hazard (differential susceptibility). Moreover, the effect of differential susceptibility to $PM_{2.5}$ is greater than the effect of differential exposure.

[Conclusion]

We found that $PM_{2.5}$ exacerbates socioeconomic inequality in hypertension. Importantly, compared to differential exposure to $PM_{2.5}$, differential susceptibility plays a more significant role in explaining the effect of $PM_{2.5}$ on health inequality.

Keywords: health inequality; air pollution; RIF regression decomposition

11-5 Small-area spatiotemporal disparities in maternal mortality: insights from a 20-year observational study across Chinese counties

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Abstract
Objectives: China has made significant strides towards Sustainable Development Goal 3 (SDG3), particularly in reducing the national maternal mortality ratio (MMR). Despite these advances, small area-level disparities in MMR remain a challenge for achieving health equity and effective targeted strategies. This study aims to identify the spatiotemporal patterns of inequalities and clusters of MMR at the county level in China from 1996 to 2015, and to explore the extent to which scale effects of administrative division explain these spatiotemporal disparities.
Methods: Analyzing MMR panel data from 2,894 counties, we first employed three geospatial analytical methods, including the spatial Gini coefficient to assess geo-inequalities, the Anselin Local Moran's I for spatial clusters and outliers, and the Getis-Ord Gi* for spatiotemporal hot and cold spot detection. We then utilized Bayesian spatiotemporal modeling and the spatiotemporal variance partitioning index (STVPI) to explore effect-factors (province, city, and county) contributing to MMR variability.
Results: While the proportion of counties achieving SDG 3 increased significantly from 27.05% (783) to 93.4% (2,703), spatial disparities persisted. The spatial Gini coefficient revealed dynamic shifts in regional inequality, indicating a "spatial inequality lock-in (SILI)" effect. Spatial agglomeration analysis exposed entrenched east-west disparities, elucidating persistent clusters. Our spatiotemporal hotspot map identified six categories of hot and cold spots, emphasizing the need for tailored regional policies. Cold spots (2,694, 93.1%) vastly outnumbered hotspots (93, 3.2%), underscoring the necessity for targeted health promotion strategies. Lastly, the STVPI evaluation reveals the spatiotemporal contributions of different administrative scales to the above identified spatiotemporal inequalities and clusters.
Conclusions: This study highlights ongoing spatiotemporal disparities in MMR, emphasizing the importance of region-specific policies to achieve health equity and SDG 3. The identification of the SILI effect underscores the need for coordinated efforts to address entrenched disparities. The STVPI evaluation provides a policy rationale for the optimal scale of subsequent policy attention.

Keywords
MMR; Small area; Spatiotemporal heterogeneity; Scale effect; Spatial inequality lock-in effect; STVPI; SDG3; China.

Conflicts of Interest
We declare no competing interests.

11-6 Delineating multi-dimensional healthy aging trajectories in the United Kingdom, the United States, and China

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Abstract

Objectives: Aging, characterized as a complicated and multi-dimensional process, manifests heterogeneities across different organs/systems, individuals, and countries. We aimed to delineate multi-dimensional healthy aging trajectories for persons under different sociodemographic contexts by performing a cross-national study.

Methods: Three national datasets, the UKB (the UK), the NHANES (the US), and the CHARLS (China) were utilized for the analyses. We selected 14 aging metrics (e.g., diastolic blood pressure (DBP), bone mineral content (BMC), peak expiratory flow (PEF), and cognitive function) that represent the functioning of different organs/systems, pictured their sex-, educational-, and income-specific percentile curves, namely the "trajectories", with the advancing age. We also estimated the age-specific normative reference values for each of the 14 aging metrics.

Results: Generally, except for cognitive function, the other 13 metrics manifested a progressive deterioration or maintained stability after adulthood, especially after middle age. The deterioration of cognitive function was more pronounced after the age of 70 in Chinese and British populations, while not in the American populations. In the stratified analyses, males and females manifested disparities in the trajectories of aging metrics involving the cardiovascular (i.e., DBP) and muscle-skeletal systems (i.e., BMC). Notably, we observed substantial disparities in the aging trajectories of participants according to economic and educational levels within and between the three countries. Specifically, the low-income or low-education subgroups in China manifested a more pronounced deterioration in the functioning of the brain (i.e., cognitive function), muscle-skeletal (i.e., grip strength), physical function (i.e., frailty index_Lab), and pulmonary (i.e., PEF) system, compared to their high-income or high-education counterparts. However, these income or educational disparities in aging trajectories were nonexistent in the UK and the US participants.

Conclusions: This investigation demonstrates the heterogeneities in multi-dimensional healthy aging trajectories across different socioeconomic contexts. This work may serve as a proof-of-concept to comprehend the multi-dimensional signature of healthy aging and call for policies to promote health equity across nations when facing dramatic global aging.

Keywords: Heterogeneity; multi-dimensional; aging trajectory; sociodemographic context; cross-national.

Competing interests

The authors declare that no competing interests exist.

11-7 The global, regional, and national burden and inequalities of liver complications related to non-alcoholic fatty liver disease in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019

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Conflict of interest The authors have not disclosed any competing interests.

Abstract

Objectives: We aimed to assess the global disease burden attributed to liver complications related to non-alcoholic fatty liver disease (LC-NAFLD), and evaluate temporal trends from 1990-2019. Additionally, we sought to elucidate the relationship factors and health inequalities across countries.

Methods: Global Burden of Disease Study 2019 data were analysed to assess the LC-NAFLD incidence, prevalence, mortality, and disability-adjusted life years (DALYs) from 1990-2019. Temporal trends of disease burden were indicated by 'estimated annual percentage change' (EAPC). Global inequalities in LC-NAFLD were measured by the slope index of inequality (SII) and the relative concentration index (RCI).

Results: Globally, LC-NAFLD incidence increased from 1.94/100,000 to 2.08/100,000 (EAPC=0.10 [-0.03-0.23]) and prevalence increased from 12,065.63/100,000 to 15,023.47/100,000 (EAPC=0.77 [0.69-0.85]) during 1990-2019. Conversely, LC-NAFLD mortality decreased from 2.39/100,000 to 2.09/100,000 (EAPC=-0.67 [-0.76-0.58]), as did DALYs from 63.28/100,000 to 53.33/100,000 (EAPC=-0.82 [-0.92-0.71]). In 2019, Central Latin America, North Africa and the Middle East emerged as regions with the highest incidence and prevalence of LC-NAFLD, while Central Latin America and Andean Latin America had the highest mortality and DALY rates. High-risk areas for increasing LC-NAFLD incidence and prevalence were concentrated in Central Asia and High-income North America. Health inequalities by countries' socioeconomic development index (SDI) increased significantly from1.15(-0.35-2.66)/100,000 to 2.03(0.75-3.32)/100,000 for mortality, and increased from 36.63 (28.61-44.66)/100,000 to 43.21 (36.93-49.50)/100,000 for DALYs. Consistent findings were supported by the relative gradient of inequality measured by RCI.

Conclusions: Globally, age standardization resulted in a significant increase in prevalence of LC-NAFLD and a decline in mortality and DALYs, but no obvious rise in incidence. LC-NAFLD disease burden may be linked to economic status and healthcare quality. Cross-national health inequality in LC-NAFLD increased over time, and lower SDI countries bear a disproportionate mortality and DALYs burden.

Keywords: Non-alcoholic Fatty Liver Disease; Global Burden of Disease Study 2019; Incidence; Prevalence; Mortality; Disability-adjusted life-years; Temporal trend; Health inequalities analysis

11-8 Health inequalities in intrinsic capacity loss among individuals aged 80 and above in Chinese nursing homes: a latent class analysis

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Abstracts

Objective: The World Health Organization (WHO) highlights that intrinsic capacity (IC) is crucial to elderly health. Yet, studies on IC loss and its protective factors in Chinese nursing homes for those aged 80 and above are limited. This study aims to identify potential IC categories in this demographic and explore how health inequalities factors like gender, economic status, and education influence these classes, focusing on their role in IC loss and highlighting health inequalities.

Methods: The study included 432 residents aged 80 and above from nursing homes in Ningbo, Zhejiang Province, China. We assessed six aspects of IC (locomotion, cognitive, psychological, vitality, vision, and hearing) using the WHO-recommended ICOPE approach. Latent class analysis (LCA) revealed various IC impairment patterns, and ordinal logistic regression analyzed the relationships between health inequalities factors and these patterns.

Results: 86.9% of participants experienced loss in at least one IC domain; detailed loss rates in locomotion, vision, vitality, hearing, psychological, and cognitive capacities were 83.2%, 52.8%, 50.9%, 46.5%, 44.9%, and 44.0%, respectively. Significant gender differences and five distinct IC subgroups were identified. Ordinal logistic regression analysis showed that being male, younger within the cohort, and higher education were significant protective factors (all $p<0.05$). Economic status emerged as the most critical protective factor against health inequalities among the elderly (OR=0.009, 95%CI [0.001,0.122], $p<0.001$). Gender analysis revealed that octogenarian women generally face greater disadvantages in health, social, and economic dimensions, as well as in maintaining IC, compared to men.

Conclusion: IC loss is prevalent and complex among those aged 80 and above, demonstrating notable socioeconomic and gender inequalities. Understanding these inequalities is crucial for developing effective protective and intervention strategies to reduce health disparities and enhance the overall well-being of the elderly population.

Keywords: intrinsic capacity; health inequalities; persons aged 80 years and older; nursing homes; latent class analysis

Conflict of interests: The author have no conflicts of interest with this study.

11-9 Socioeconomic inequalities in cancer mortality and access to universal health coverage in 204 countries and territories, 1990−2019

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Abstract

Objective Cancer-related deaths are a significant global issue and are influenced by socioeconomic status. However, the impact of universal health coverage (UHC) on reducing disparities in cancer outcomes has not been quantified. This study aims to comprehensively compare current patterns and temporal trends of cancer mortality and UHC effective coverage across different sociodemographic index (SDI) settings, and quantify the association between cancer mortality and access to UHC effective coverage.

Method Data on mortality for all-cancer and 29 cancer subtypes, UHC effective coverage performance, and socioeconomic status were extracted from the Global Burden of Disease Study and Our World in Data for 204 countries and territories. The Gini coefficient was used to measure the regional inequality of UHC effective coverage across SDI quintiles. The estimated annual percentage change (EAPC) was calculated to quantify the temporal trend of age-standardized mortality rate (ASMR) for cancer from 1990 to 2019. A generalized linear model was applied to estimate the odds ratio (OR) with a 95% confidence interval (CI) between ASMR for specific cancers and accessibility of UHC effective coverage.

Results Globally, the ASMR (per 100,000) for total cancers decreased by 15.3% from 147.2 in 1990 to 124.7 in 2019, with an estimated EAPC of -0.7% (95% CI: -0.7%, -0.6%). The high SDI quintile had the fastest decline (-0.9% [-1.0%, -0.9%]), followed by the middle (-0.5% [-0.5%, -0.4%]) and high-middle (-0.9% [-1.0%, -0.8%]) SDI levels. The overall UHC effective coverage index showed a significantly positive relation with SDI levels, with an increase ranging from 27.9% in the high SDI quintile to 62.2% in the low SDI quintile during the study period. The Gini coefficient of UHC effective coverage performance was highest in the low SDI quintile (0.106) and lowest in the high SDI quintile (0.059). Decreased Gini coefficients were observed in most individual effective coverage indicators across the SDI spectrum over the past 30 years. A negative association was observed between ASMR for all-cancer (adjusted OR: 0.87 [95% CI: 0.76, 0.99]), stomach (0.73 [0.56, 0.95]), breast (0.64 [0.52, 0.79]), cervical (0.42 [0.30, 0.60]), lip and oral cavity (0.55 [0.40, 0.75]), and nasopharynx cancers (0.42 [0.26, 0.68]) and UHC effective coverage performance. Performance on antiretroviral therapy, treatments for breast cancer, chronic kidney disease, chronic obstructive pulmonary disease, diabetes, paralytic ileus and intestinal obstruction, and tuberculosis was associated with decreased mortality for total cancers.

Conclusion Socioeconomic inequalities exist in cancer mortality and accessibility of UHC effective coverage across SDI quintiles. Although the inequality in UHC performance has been decreasing globally over the past 30 years, it persists, particularly in the low SDI quintile. These findings strengthen the evidence base for increasing equitable access to UHC effective coverage by incorporating risk factor reduction, early screening, and effective treatment to address disparities in cancer outcomes.

Keywords Cancer; Mortality; Universal health coverage; Health equality; Temporal trend

11-10 The impact of medical and health service supply on the income level of rural middle-aged and elderly households.

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This study aims to explore the impact of medical and health service supply at the prefecture-level on the income level of rural middle-aged and elderly families, and to examine its mechanisms from the perspectives of the health status of the middle-aged and elderly, local fiscal support, and economic development.
Multiple methods such as entropy weight method, principal component analysis, Logit model, OLS model, mediation effect model, and moderation effect model were employed for analysis. The results show that the improvement of medical and health service supply level has a positive promoting effect on the income level of rural middle-aged and elderly families.
Further analysis indicates that the improvement of medical and health service supply level can increase family income through early medical intervention, reducing hospitalization probability, and enhancing family human capital. Local fiscal support and economic development have a strengthening effect on this promoting effect, especially in the western region. In addition, the number of hospitals, beds, and doctors has a positive impact on family income level, while the increase in the number of health centers shows a negative impact.

Keywords: medical and health service supply, income of rural middle-aged and elderly families, local fiscal support, economic development.

11-11 Analysis of the accessibility and equilibrium of adult vaccination outpatient services in Guangdong Province

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Abstract
Objective: This study aims to investigate the allocation of resources in adult vaccination clinics across Guangdong Province, analyze the accessibility and equilibrium of these clinics, and provide recommendations for optimizing the utilization of adult vaccination service resources.
Methods: The research was conducted in 21 cities within Guangdong Province. Data on the number of adult vaccination clinics and population served in 2022 were obtained from the Guangdong Center for Disease Control and Prevention to describe their spatial distribution. The Gaussian two-step floating catchment area was used to calculate an accessibility index (Ai) and construct a service accessibility map. Additionally, we evaluated the equilibrium of resource allocation using the Gini index.
Results: There were a total of 204 adult vaccination clinics in Guangdong Province in 2022, with an average of 9.7 clinics per city. The number of adult vaccination clinics in the Pearl River Delta, North Guangdong, West Guangdong, and East Guangdong were 127 (61.35%), 25 (12.25%), 20 (9.80%), and 32 (15.69%), respectively. The ratio of adult vaccination service personnel to the population per ten thousand was 0.77 to 25.23. 49.49% of the areas had zero accessibility, and accessibility was divided into six grades using the natural breaks method: low (0-0.38), lower (0.39-1.24), moderately low (1.25-2.52), moderately high (2.53-4.76), higher (4.77-10.27), and very high (10.28-17.90), accounting for 74.59%, 15.28%, 5.81%, 3.18%, 0.96%, and 0.18% of the total, respectively. The average Gini coefficient of vaccination personnel at adult vaccination clinics across the province was 0.78, with a range of 0.84-0.90 in Guangdong North, 0.80-0.89 in Guangdong West and 0.69-0.88 in Guangdong East.
Conclusion: The accessibility of adult vaccination clinic services in different regions of Guangdong Province varies greatly, and the overall equilibrium is not high. It is suggested to further strengthen the construction of adult vaccination service and improve accessibility and equilibrium.

Key words Adult vaccination clinics in Guangdong province; Vaccines for adults; Accessibility; Equilibrium

No competing interests

12-1 CDKN1A promotes Cis-induced AKI by inducing cytoplasmic ROS production and ferroptosis

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This work had no competing financial interests.

Abstract

Objectives:
Cisplatin was widely used as a chemotherapeutic drug for the treatment of various solid tumors and approximately 20-30% of patients experienced acute kidney injury (AKI) during cisplatin therapy. This work aimed to identify differentially expressed genes (DEGs) associated with cisplatin-induced AKI through analysis of gene expression data in control group and cisplatin-treated group, in order to reveal its pathogenesis and provide a reliable basis for early diagnosis and treatment.

Method:
We utilized the public dataset GSE85957 to identify differentially expressed genes. By comparing the gene expression profiles of the cisplatin group and the control group, we identified 13 common differentially expressed genes (DEGs) associated with ferroptosis. Further analysis showed that these common DEGs were enriched in the p53-p21 signaling pathway. To verify this hypothesis, we knocked down the CDKN1A (encoded protein p21) in human renal tubular epithelial cells HK-2 by transfecting CDKN1A siRNA. Verified the gene and protein expression of CDKN1A by Q-PCR and Western Blot. DHE and ferroOrange was used in the cytoplasmic ROS and Fe^{2+} production.

Result:
By knocking down CDKN1A, we found that the decrease in cell viability induced by cisplatin was restored, and the production of cytosolic ROS also decreased. Importantly, knocking down CDKN1A also upregulated the expression of Glutathione Peroxidase 4 (GPX4), a known protein that was negatively correlated with ferroptosis. These results suggested that CDKN1A played a key role in cisplatin-induced AKI and may affect the occurrence of renal injury by regulating the process of ferroptosis.

Conclusion:
We found CDKN1A played an important role in the pathogenesis of AKI by regulating the expression of GPX4 and Nuclear Receptor Coactivator 4 (NCOA4). These findings provided a solid foundation for the early diagnosis and treatment of cisplatin-induced AKI and were expected to provide guidance for the development of new treatment strategies.

Keywords: Cis-induced acute kidney injury; CDKN1A; Ferroptosis; Machine learning; Bioinformatics analysis

12-2 Depression, anxiety and post-traumatic stress disorder among adolescents in regional China: A network analysis

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Abstract

Objective: The research on the comorbidities among depression, anxiety, and post-traumatic stress disorder (PTSD) is insufficient. The aim of this study was to explore the internal relationship by establishing and analyzing the comorbidity networks, and to provide suggestions for the interventions targeting adolescent mental health after traumatic events.

Methods: Using data from the second and third wave (N = 3,189, 47.79% female) in the Chengdu Positive Child Development (CPCD) cohort, network models of depression, anxiety and PTSD are estimated. The network structure, the centrality of nodes, stability, and changes in network structure are analyzed. Symptoms that drive comorbidity are determined by bridge node analysis. The network invariance test was used to examine the difference in global connectivity between the two networks.

Results: The two network models obtained had adequate stability and accuracy. K27 (Somatic 10), K37 (Generalized Anxiety 9), K15 (Somatic 5), K33 (Generalized Anxiety 7), K24 (Somatic 9) were the most central nodes in both networks, P13 (Sleep problem) has the highest Bridge Expected Influence value. The structural difference between the two networks was statistically significant ($M = 0.229$, $P = 0.010$), and the global strength of the network at wave 2 was higher than the network at wave 3 (35.1 vs. 33.9, $S = 1.20$, $P = 0.010$).

Conclusions: Anxiety disorders should be prioritized when addressing comorbidities associated with depression, anxiety, and PTSD, while sleep disorders should be targeted to mitigate their co-occurrence. In addition, post-traumatic intervention strategies need to consider stage-specific approaches as well as encompassing both comprehensive and targeted measures. In the future, studies could emphasize on long-term monitoring of post-traumatic stress symptoms to provide further evidence.

Keywords: Intervention; Network analysis; Post-traumatic Stress Disorder; Depression; Anxiety; Adolescents

Declaration of competing interest

None.

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12-3 The Transcription Factor Zfp335 Promotes Differentiation and Survival of Effector Th1 Cells by directly Regulating Lmna Expression

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Objective: Antigen-specific effector $CD4^+$ T cells play a crucial role in defending against exogenous pathogens. However, the mechanisms governing the differentiation and function of interferon-γ (IFN-γ)-producing effector $CD4^+$ T helper-1 (Th1) cells in immune responses remain largely unknown. In this study, we elucidated the pivotal role of zinc finger protein 335 (Zfp335) in regulating effector Th1 cell differentiation and survival during acute bacterial infection.

Methods: The effects of Zfp335 deletion on the differentiation, function and survival of effector Th1 cells were investigated using *Listeria* infection model in vivo and TCR signaling stimulation in vitro by flow cytometry. Additionally, we analyzed the intrinsic mechanisms regulating Th1 cell differentiation and survival by RNAseq combined with Cuttag. Finally, we performed in vivo and in vitro overexpression experiments to verify the regulatory effect of the target gene on the Zfp335 deletion phenotype.

Results: Mice wi*th Zfp335* knockout in OT-II cells exhibited impaired antigen-specific $CD4^+$ T cell expansion accompanied by a significant reduction in resistance to *Listeria* infection. Furthermore*, Zfp335 defici*ency restricted the effector $CD4^+$ Th1 cell population and compromised their survival upon *Listeria* challenge. The expression of T-bet and IFN-γ was accordingly decreased in *Zfp335*-deficient Th1 cells. Mechanistically, Zfp335 directly bound to the promoter region of *Lmna* gene and regulated its expression. Overexpression of *Lmna* was able to rescue the survival and function of *Zfp335-d*eficient effector Th1 cells.

Conclusion: In this study, we revealed an essential role of Zfp335 in effector $CD4^+$ Th1 cell differentiation and survival via directly targeting Lmna during acute infection.

Key Words: Th1 cells, Effector differentiation, Zfp335, Survival, Lmna

12-4 县域医共体内急性上消化道出血性疾病防治融合体系建设的实践探索[3*]

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Practice exploration of AUGIB prevention and treatment integration system construction in county medical community/Jingfen Shi ,et al.

Abstract To construct a **c**ounty-level fusion system which consist of a three Grade A general hospital as centre and the county medical community for the prevention and treatment of Acute Upper Gastrointestinal Bleeding(AUGIB) with high incidence and serious threat to the life safety of patients in the region,Based on county level medical alliance and integrated medical information system. To construct a set of pre-hospital and intra-hospital integrated prevention and treatment system with critically ill AUGIB patients as the main research object . To establish a new hierarchical linkage precision prevention and treatment system of "grass-roots intelligent screening and identification - rapid hierarchical referral of high-risk patients before hospital - green channel for rapid treatment with multidisciplinary linkage in hospital - intelligent management during the recovery period".

Key words County medical community; Acute upper gastrointestinal bleeding; Pre-hospital and intra-hospital integration; prevention and treatment converge

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12-5 ADAM17 inhibition enhances CD8$^+$ T cell effector differentiation and anti-tumor immunity through modulating CD122 signaling

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Abstract

Objective: CD8$^+$ T cells play crucial roles in protecting against pathogenic infections and eliminating malignant cells. The differentiation and function of CD8$^+$ T cells are precisely and exquisitely regulated by multi-layer networks including transcription factors (TFs), cytokines, and epigenetic modification. However, the post-translational regulation of CD8$^+$ T cell immune responses remains largely unknown. In this study, we aim to investigate the post-translational process mediated by sheddase A Disintegrin and Metalloprotease (ADAM)-mediated ectodomain shedding of membrane protein in CD8$^+$ T cells.

Methods: Comprehensive transcriptomic and proteomic analysis were applied to compare gene expression at RNA and protein levels. T cell-specific knockout ADAM17 mice were generated to study CD8$^+$ T cell immune responses. Mouse tumor model and CAR-T cells were used to assess the anti-tumor function of targeting ADAM17 in CD8$^+$ T cells.

Results: By comparing the transcriptomic and proteomic data, we found a high involvement of post-translational regulation in CD8$^+$ T cells. T cell-specific deletion of ADAM17 led to a dramatic increase in effector CD8$^+$ T cell differentiation and functionality, evidenced by enhanced elimination of pathogenic infection and tumors. Mechanistically, ADAM17 mediated cleavage of membrane CD122 in CD8$^+$ T cells. Thus, ADAM17 deletion led to elevated CD122 expression and enhanced cell survival responding to cytokines IL-2 and IL-15 in CD8$^+$ T cells. The regulatory mechanism of CD122 signaling by ADAM17 was verified in human CD8$^+$ T cells. More importantly, inhibition of ADAM17 in CD8$^+$ T cells using shRNA improved the anti-tumor efficacy of chimeric antigen receptor (CAR) T cells in solid tumors.

Conclusion: Our findings reveal a critical post-translational regulation in CD8$^+$ T cells, providing a potential therapeutic strategy of targeting ADAM17 for effective anti-tumor immunity.

Keywords: CD8$^+$ T cells, ADAM17, CD122, Tumor, Ectodomain shedding

12-6 Associations of maternal hemoglobin levels with ultrasonographic fetal biometrics and adverse birth outcomes

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Abstract

Objective: Evidence on the associations of maternal hemoglobin trajectories with fetal biometrics and birth outcomes remains lacking. We aimed to examine the association of time-specific hemoglobin levels and hemoglobin trajectories with fetal biometrics and adverse birth outcomes.

Methods: This prospective study included 6,844 pregnant women (mean (SD) age, 26.6 (3.6) years) from the Tongji-Huaxi-Shuangliu Birth Cohort. Hemoglobin levels were measured across four different periods of pregnancy (early [6-12 weeks of gestation]; middle [13-27]; middle-late [28-32]; and late pregnancy [33-37]). The birth outcomes were obtained from medical records, including small for gestational age (SGA), low birth weight (LBW), and preterm birth. Fetal biometrics were measured by ultrasound from middle pregnancy.

Results: In early pregnancy, anemia (hemoglobin <110 g/L) and higher hemoglobin level (>130 g/L) were not associated with adverse birth outcomes compared with the reference group (110-130 g/L). In middle-late pregnancy, anemia was associated with lower risks of SGA (odds ratio, 0.64; 95% CI, 0.50, 0.81) and LBW (0.58; 0.39, 0.84), while higher hemoglobin level was significantly associated with higher risks of LBW (2.27; 1.08, 4.26) and preterm birth (2.03; 1.12, 3.44). A similar pattern was observed in late pregnancy. Three trajectories of hemoglobin (trajectory 1, consistent decline; trajectory 2, consistently low; trajectory 3, increase from the middle-late pregnancy) were identified throughout pregnancy. Compared with the trajectory 1 group, the trajectory 3 group was significantly associated with lower estimated fetal weight (β, -0.54; 95% CI, -0.99, -0.09) in late pregnancy, and higher umbilical artery resistance index throughout the whole pregnancy (0.65; 0.31, 1.00). In addition, the trajectory 3 group was associated with a higher risk of LBW (odds ratio, 1.57; 95% CI, 1.09, 2.26).

Conclusions: Increased maternal hemoglobin levels from the middle-late pregnancy may identify the risk of adverse birth outcome. Further studies are needed to validate our findings.

Keywords: hemoglobin, low birth weight, small for gestational age, trajectory, fetal growth

Author Disclosures: The authors report no conflicts of interest.

12-7 Per-and polyfluoroalkyl substances and human health outcomes: an umbrella review of systematic reviews with meta-analyses of observational studies

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Abstract

Background: Although evidence on the association between per-and polyfluoroalkyl substances (PFASs) and human health outcomes has grown exponentially, specific health outcomes and their potential associations with PFASs have not been conclusively evaluated. Therefore, we present the first umbrella review (UR) to assess the strength of evidence, and the validity of the claimed associations between various PFASs and multiple health outcomes.

Methods: We conducted a comprehensive search through the databases of PubMed, Embase, and Web of Science from inception to September 3, 2023, to identify systematic reviews with meta-analyses of observational studies examining the associations between PFASs and multiple health outcomes. The quality of included studies was evaluated using the A Measurement Tool to Assess Systematic Reviews (AMSTAR) tool, and credibility of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) criteria. The protocol of this UR had been registered in PROSPERO (CRD 42023480817).

Results: The UR identified 124 meta-analyses from 20 articles. Using the AMSTAR measurement tool, 19 articles (95%) with 117 meta-analyses were categorized as of moderate-to-high quality. Based on the GRADE assessment, significant associations between specific types of PFASs and decreased risk of birth weight, tetanus vaccine, and triglycerides (TG) levels showed high certainty of evidence. Moreover, moderate certainty of evidence with statistical significance was observed between PFASs and 5 health outcomes including body mass index, childhood obesity, preeclampsia, sperm progressive motility, and small for gestational age. Forty-one (33%) and sixty-two (50%) associations presented low and very low certainty evidence, respectively.

Conclusion: The UR presented high certainty of evidence supporting the associations between specific types of PFASs and decreased risk in several health outcomes including birth weight, tetanus vaccine, and TG levels. Additionally, further research is needed to identify the underlying biological mechanism and explore potential associations between PFASs and other health outcome.

12-8 Immunotherapy effects of a recombinant BCG with c-di-AMP as endogenous adjuvant on melanoma in mice model

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Abstract: Objective To investigate immunotherapy effects and mechanism of a recombinant Bacillus Calmette-Guérin (rBCG) with bacterial signaling molecule cyclic dimeric adenosine monophosphate (c-di-AMP) as endogenous adjuvant on the mice model of melanoma. **Methods** A mouse melanoma model was established and injected with BCG and rBCG by subcutaneous route. The survival of melanotic mice, tumor growth and metastasis were observed. The levels of cytokines secreted by splenocytes were measured by ELISA. Subsets of immune cells in tumor were determined by flow cytometry. The transcriptional levels of tumor microenvironment-related genes were detected by qRT-PCR. **Results** Both BCG and rBCG immunotherapy could inhibit the growth and metastasis of melanoma, which prolonged the survival of tumor-bearing mice. BCG tended to inhibit the growth of tumor, and rBCG delayed tumorigenesis and metastasis in mice. BCG and rBCG immunizations promoted the secretion of IFN-γ and IL-2 by splenocytes, and proportions of $CD4^+$ and $CD8^+$ T cells as well as NK cells in tumor. rBCG administration led to the increased proportion of B cells in tumor. Moreover, immunotherapy by two strains reduced the numbers of M2 tumor-associated macrophages and myeloid-derived suppressor cells (MDSC) in tumor. BCG immunization upregulated transcriptions of anti-tumor CXCL9 and TNF-α, and metabolism-related genes that promoting tumor such as ACAA1a, ACAA1b, PDH, but rBCG had little effects on these genes expression. **Conclusion** Both BCG and rBCG showed therapeutic effects on melanotic mice, and rBCG immunization inhibited tumor formation and metastasis significantly than that of BCG, which involved in the regulation of immune cell subsets, cytokines as well as tumor related genes expression in the tumor microenvironment.

Keywords: Immunotherapy, BCG, melanoma, c-di-AMP

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12-9 Truncated PD1 engineered gas-producing extracellular vesicles for ultrasound imaging and subsequent degradation of PDL1 in tumor cells

Aim: PD-L1 immune checkpoint inhibitors hold promise for cancer therapy. However, PD-L1 is widely expressed in tumor and stromal cells and with extensive heterogeneity. To evaluate PD-L1 expression in vivo to guide immunotherapy scientifically, extracellular vesicles targeting PD-L1 and loading calcium bicarbonate [Ca $(HCO_3)_2$] were used to image the PD-L1-positive cells; Which also can mediate the endocytosis and degradation of PD-L1, block its immunosuppressive signals, and exert the theranostic effect.

Materials and Methods: PD-L1-targeted truncated protein tPD-1 was merged with membrane protein PTGFRN, and displayed on the membrane of extracellular vesicles. Ca $(HCO_3)_2$ was loaded by electroporation. Tumor-bearing mice were injected with gas-producing through the tail vein. Ultrasound examination was performed before and after injection for 0, 2, 4, and 6 hours.

Results: The injection of the gas-producing extracellular vesicle contrast agent enhanced the ultrasound response in the tumor, and the contrast signal reached the maximum after 4 hours. Moreover, after the treatment of the engineered extracellular vesicle, the expression of PD-L1 in the tumor was decreased, with the proportion of CD8+T cells increased. The tumor volume was significantly reduced compared with the control

Conclusion: The gas-producing extracellular vesicles can systematically evaluate the identification of PD-L1 comparing the consistency between ultrasound imaging evaluation and cellular and molecular characteristics in combination with the 4T1 mouse tumor-bearing mode. It also can mediate the endocytosis and degradation of PD-L1, block its immunosuppressive signals, and exert the theranostic effect, which provides new ideas for tumor immunotherapy by ultrasound theranostics of tumor immunity and activation of tumor immunity.

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12-10 Production of narrative macrostructures in Mandarin-Speaking children with Autism Spectrum Disorder: Age, linguistic and cognitive factors

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Objective: This study investigates how age, the linguistic factor measured by expressive and receptive vocabulary skills and cognitive factors indexed by working memory predict narrative macrostructure abilities in Mandarin-speaking children with Autism Spectrum Disorder (ASD).

Methods: Sixty-three Mandarin-speaking children aged 5-7 years old (26 with ASD (mean age=6;1, sd=0.7, age range: 4;6-7;5), and 37 typically developing (TD) peers (mean age=6;1, sd=0.2, age range:5;7-6;10)) were recruited. A story retelling task (Multilingual Assessment Instrument for Narratives, LIMTUS MAIN, Gagarina et al., 2015) was used. Macrostructures were coded as story structure (SS), story complexity (SC) and internal state terms (IS). Three measures are taken as predictors: age, expressive vocabulary skills (Multilingual Naming Test, MINT, Gollan et al., 2012), receptive vocabulary skills (Peabody Picture Vocabulary Test, PPVT, Dunn & Dunn, 2007) and working memory tested by a digit span task.

Results: Results showed that TD group performed significantly better than ASD group across all three measures. Working memory was a significant predictor for all aspects of narrative macrostructures. However, chronological age and expressive vocabulary skills did not significantly predict the narrative outcome measures. Receptive vocabulary skills significantly predict the use of IS.

Discussion & Conclusion: Mandarin-speaking children with ASD aged 5-7 years old show deficits in all measures of narrative macrostructure abilities compared to their age-matched peers. Working memory is found to be crucial for narrative production, particularly in children with ASD. No significant effects of expressive vocabulary skills suggested that macrostructures may be less language dependent, whereas IS is more language dependent (Gagarina, 2016). This study provides new empirical data to support the diagnosis and intervention of Mandarin-speaking ASD children, and may have important implication for educational and clinical practices for this group of children.

Keywords: narrative macrostructures; story retelling; Mandarin-speaking children; autism

Conflict of Interest Statement: The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

12-11 The use of referential expressions in oral narratives of 5-7 years old Mandarin-speaking children with Autism Spectrum Disorder

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Aim: This study aimed to examine the referential expressions (REs) forms and discourse functions in narratives of Mandarin-speaking preschool children with Autism Spectrum Disorder (ASD).

Methods: A total of 55 5-7 years old children participated in the study with 26 ASD children (mean age=6;1, SD=0;9) and 29 age-matched typically developing (TD) children (mean age=6;0, SD=0;4). Pictured-based stories (Multilingual Assessment Instrument for Narratives, LITMUS-MAIN, Gagarina et al., 2015) were used to examine the use of REs. REs of story characters were coded in two forms: nominal and pronominal, and three discourse functions: introduction, maintenance, and reintroduction.

Results: Results showed that overall, the ASD and TD groups produced significantly more nominal referents than pronominal REs. The ASD group produced fewer pronouns than TD age-matched peers. In introduction, nominal referents were significantly more than pronominals ($p<.001$), whereas in maintenance, an opposite pattern was found in the frequency of nominal and pronominal REs in both groups ($p<.001$). In reintroduction, no significant difference in nominal and pronominal referents was found in ASD children. In contrast, pronouns were used more than nouns in the TD group ($p<.001$).

Discussion: These findings suggested that Mandarin-speaking ASD children's use of REs lagged behind their age-matched peers. The low frequency of pronominal REs indicated that children aged 5-7 still have difficulty in adopting local co-reference strategies, particularly for the ASD group. This study contributes to the understanding of the use of REs by extending the database to the less-studied Mandarin-speaking preschoolers with ASD and provides new empirical data to support language intervention and to improve ASD children's well-being further.

Keywords：Referential expressions；Oral narratives；Mandarin-speaking children with(out) ASD

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