

Office of Research

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High Impact Journal Feature

BIOSTATISTICS & INFORMATICS

Modified PCR protocol to increase sensitivity for determination of bacterial community composition

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Microbiome

The objective of this project was to increase the sensitivity of sequence-based bacterial community determination without impacting community composition or interfering with cluster formation during sequencing. Two PCR protocols (standard and modified) were examined in airway samples where we observed a large range in bacterial load (3.1-6.2 log₁₀ 16S rRNA gene copies/reaction). Tracheal aspirate (TA) samples (n = 99) were collected from sixteen children requiring mechanical ventilation at a single center. DNA was extracted, and total bacterial load (TBL) was assessed using qPCR. Amplification of 16S rRNA was attempted with both protocols in all samples. PCR product was observed using both protocols in 52 samples and in 24 additional samples only with the modified protocol. TBL, diversity metrics, and prominent taxa were compared for samples in three groups based on success of the two protocols (successful with both, success with modified only, unsuccessful for both). TBL differed significantly across the three groups (p<0.001). Specifically, the modified protocol allowed amplification from samples with intermediate TBL. Shannon diversity was similar between the two protocols, and Morisita-Horn beta diversity index showed high agreement between the two protocols within samples (median value 0.9997, range 0.9947 to 1). We show that both protocols identify similar communities, and the technical variability of both protocols was very low. The use of limited PCR cycles was a key feature to limit impact of background by exclusion of 24% of samples with no evidence of bacterial DNA present in the sample. The modified amplification protocol represents a viable approach that increased sensitivity of bacterial community analysis, which is important for study of the human airway microbiome where bacterial load is highly variable.

HEALTH SYSTEMS, MANAGEMENT & POLICY

Persistent Racial/Ethnic Disparities in Supine Sleep Positioning among US Preterm Infants, 2000-2015

Hwang, SS; Tong, SH; Smith, RA; Barfield, WD; Pyle, L; Battaglia, C; McManus, B; Niermeyer, S; Sauaia, A
Journal of Pediatrics

The objective of this study was to assess trends in racial disparity in supine sleep positioning (SSP) across racial/ethnic groups of infants born early preterm (Early preterm; <34 weeks) and late preterm (Late preterm; 34-36 weeks) from 2000 to 2015. We analyzed Pregnancy Risk Assessment Monitoring System data (a population-based perinatal surveillance system) from 16 US states from 2000 to 2015 (Weighted N = 1 020 986). Marginal prevalence of SSP by year was estimated for infants who were early preterm and late preterm, adjusting for maternal and infant characteristics. After stratifying infants who were early preterm and late preterm, we compared the aOR of SSP trends across racial/ethnic groups by testing the time-race interaction. From 2000 to 2015, Non-Hispanic Black infants had lower odds of SSP compared with Non-Hispanic White infants for early preterm (aOR 0.61; 95% CI 0.47-0.78) and late preterm (aOR 0.44; 95% CI 0.34-0.56) groups. For Hispanic infants, there was no statistically significant difference for either preterm group when compared with Non-Hispanic White infants. aOR of SSP increased (on average) annually by 10.0%, 7.3%, and 7.7%, respectively, in Non-Hispanic White, Non-Hispanic Black, and Hispanic early preterm infants and by 5.8%, 5.9%, and 4.8% among Non-Hispanic White, Non-Hispanic Black, and Hispanic late preterm infants. However, there were no significant between-group differences in annual changes (Early preterm: P = .11; Late preterm: P = .25). SSP increased for all racial/ethnic preterm groups from 2000 to 2015. However, the racial/ethnic disparity in SSP among early preterm and late preterm groups persists.

CENTERS FOR AMERICAN INDIAN & ALASKA NATIVE HEALTH

Dissemination and uptake of HIV/STD preventive interventions in American Indian and Alaska Native communities: a case study

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Ethnicity & Health

HIV and sexually transmitted diseases (STDs) are serious health conditions among American Indian and Alaska Native (AIAN) populations, especially youth. However, few sexual risk reduction evidence-based interventions (EBIs) have been implemented by AIAN-serving organizations. This project sought to identify and assess the parameters facilitating the uptake and use of EBIs in order to strengthen opportunities for sustainability and improved sexual health among AIANs. Guided by Rogers' theory of diffusion of innovation, we conducted a survey with a national sample of stakeholders involved with sexual health and well-being of AIAN youth (N = 142). We collected surveys for nine months beginning September 2010 and analyzed data in 2014 and 2015. We assessed respondents' perceptions of factors that might facilitate or hinder the use of a sexual risk reduction EBI, called RESPECT, in their communities. We regressed the scale of likely program uptake ($\alpha = 0.88$) on each of five measures of perception of diffusion and uptake: trialability (extent new program can be altered), relative advantage (more advantageous than current program), observability (impact of program), complexity (difficulty of implementation), and compatibility (consistent with community values and practices). Trialability ($p = .009$), observability ($p = .003$), and compatibility ($p = .005$) were found to be significantly related to program uptake in the adjusted model. Standardized betas showed that compatibility ranked highest of the three, followed by trialability and observability. For AIAN-serving organizations and AIAN communities, demonstrating trialability, compatibility, and observability of a sexual risk reduction EBI in specific cultural settings may increase likelihood of implementation and sustainability.

EPIDEMIOLOGY

Association of Lipid Mediators With Development of Future Incident Inflammatory Arthritis in an Anti-Citrullinated Protein Antibody-Positive Population

Polinski, KJ; Bemis, EA; Yang, F; Crume, T; Demoruelle, MK; Feser, M; Seifert, J; O'Dell, JR; Mikuls, TR; Weisman, MH; Gregersen, PK; Keating, RM; Buckner, J; Reisdorph, N; Deane, KD; Clare-Salzler, M; Holers, VM; Norris, JM
Arthritis & Rheumatology

The objective of this study was to determine the association of polyunsaturated fatty acid (PUFA)-derived lipid mediators with progression from rheumatoid arthritis (RA)-related autoimmunity to inflammatory arthritis (IA). We conducted a prospective cohort study using data from the Studies of the Etiology of Rheumatoid Arthritis (SERA). SERA enrolled first-degree relatives (FDRs) of individuals with RA (FDR cohort) and individuals who screened positive for RA-related autoantibodies at health fairs (screened cohort). We followed up 133 anti-cyclic citrullinated peptide 3.1 (anti-CCP3.1)-positive participants, 29 of whom developed IA. Lipid mediators selected a priori were quantified from stored plasma samples using liquid chromatography tandem mass spectrometry. We fit multivariable Cox proportional hazards models for each lipid mediator as a time-varying variable. For lipid mediators found to be significantly associated with IA, we then examined interleukin-1 beta (IL-1 beta), IL-6, IL-8, and tumor necrosis factor (TNF) as potential statistical mediators. For every 1 natural log pg/ml increase in the circulating plasma levels of proinflammatory 5-HETE, the risk of developing IA increased by 241% (hazard ratio 2.41 [95% confidence interval 1.43-4.07]) after adjusting for age at baseline, cohort (FDR or screened), and shared epitope status. The models examining 15-HETE and 17-HDHA had the same trend but did not reach significance. We did not find evidence that the association between 5-HETE and IA risk was influenced by the proinflammatory cytokines tested. In a prospective cohort of anti-CCP-positive individuals, higher levels of 5-HETE, an important precursor to proinflammatory leukotrienes, is associated with subsequent IA. Our findings highlight the potential significance of these PUFA metabolites in pre-RA populations.

COMMUNITY & BEHAVIORAL HEALTH

Perceptions of Syringe Service Programs and Supervised Use Sites Among a Sample of Registered Voters in a US State

Brooks-Russell, A; Brandspigel, S; Franco, CY; Alishahi, ML; Lee-Winn, AE
Journal of Public Health Management and Practice

The decision to initiate a syringe service program or expand to a supervised use site is often influenced by local public support or opposition. The purpose of this study was to better understand public attitudes to local syringe service programs to inform the possibility of expanding services. We surveyed a sample of registered voters (n = 690) in the 8 counties in the state of Colorado with existing syringe service programs. Respondents were asked about their awareness of and attitudes toward syringe service programs and supervised use sites. More than three-fourths of respondents reported they were familiar with syringe service programs, but only a quarter knew they were legal, despite all survey respondents living near an operating program. Nearly one in 3 respondents thought a syringe service program or a supervised use site makes a community better, and a majority (57%) thought supervised use sites should be legal in their state. There were significant differences in attitudes toward the benefits and risks of syringe service programs by political party affiliation. Understanding the level of community knowledge and support for syringe service programs, as well as the reasons for opposition, can be helpful in addressing community concerns when seeking to initiate or expand services.

UNIVERSITY OF NORTHERN COLORADO

We Deserve Care and We Deserve Competent Care: Qualitative Perspectives on Health Care from Transgender Youth in the Southeast United States

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Journal of Pediatric Nursing*

Transgender populations experience health inequities that underscore the importance of ensuring access to high quality care. We thematically summarize the health care experiences of transgender youth living in the southeast United States to identify potential barriers and facilitators to health care. Transgender youth recruited from community settings in an urban area of the southeast United States participated in individual interviews (n = 33) and focus groups (n = 9) about protective factors. We conducted a thematic analysis of data from 42 participants who described their experiences seeking and receiving health care. Participants reported a wide range of gender identities. The individual interview sample was majority Black (54.5%) and the mean age was 21.7 years and focus group participants were all white and the mean age was 16.8 years. Participants described numerous barriers to health care, including limited availability of gender affirming care, logistical challenges, such as gatekeeping and cost, concerns about confidentiality in relation to sexual behavior and gender identity, and inadequate cultural competency among providers regarding gender affirming care. Facilitators included intake procedures collecting chosen pronouns and names and consistent use of them by providers, and open communication, including active listening. Findings underscore the need for a multi-component approach to ensure both transgender and youth-friendly care. Providers and office staff may benefit from transgender cultural competency trainings. In addition, clinic protocols relating to confidentiality and chosen name and pronoun use may help facilitate access to and receipt of quality care.

UNIVERSITY OF COLORADO CANCER CENTER

Predictors of attendance during an exercise program for cancer survivors

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Supportive Care in Cancer*

Exercise programs delivered in community- or clinic-based settings improve physical and psychosocial outcomes among cancer survivors; however, adherence is essential to achieve such benefits. This study examined predictors of attendance to an exercise program in a large, diverse sample of cancer survivors. Participants (n = 302) were enrolled in BfitBwell, an exercise program for adults diagnosed with cancer, and currently receiving or within 6 months of completing chemotherapy or radiation therapy. Participants were offered two supervised aerobic and resistance exercise sessions per week for 3 months. Predictors of attendance included demographics, cancer-related information, quality of life (QOL), fatigue, physical fitness, activity level, and importance of making various changes (e.g., improving fitness). Univariate linear regression first explored associations between predictor variables and adherence, and any important variables ($p < .10$) were included in a multivariate linear regression model. Participants were $M = 54.9 \pm 13.9$ years old, mostly female (67.3%), white (83.6%), and most commonly diagnosed with breast cancer (34.8%). Average attendance was 16.2 ± 6.6 exercise sessions. Six-minute walk test distance, QOL, and fatigue were associated with exercise session attendance ($p < .05$). The multivariable model revealed that higher QOL predicted higher attendance (beta = .351, $p = .005$), and working full- or part-time significantly predicted lower attendance (beta = -.221, $p = .021$). Higher pre-program QOL and not working full- or part-time predicted higher exercise program attendance. Existing and future exercise programs for cancer survivors should consider ways to adapt program delivery to provide support to survivors who start with low QOL, and accommodate those who may face barriers to attending due to work schedule/conflict.

CENTER FOR HEALTH, WORK & ENVIRONMENT

Profiles of total worker health® in United States small businesses

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BMC Public Health

The Total Worker Health® (TWH) approach is a best practice method to protect and promote worker safety, health, and well-being. Central to this approach is leadership support and health and safety climates that support day-to-day use of health and safety policies and programs. There is some research that supports these relationships, but there is limited research amongst small businesses. Furthermore, it remains to be shown what role TWH business strategies, as reflected by organizational policies and programs, play in this process. The purpose of this study is to characterize small businesses by their organizations' TWH approach and assess the relationship of these approaches to employee health and safety behaviors. We utilized cross-sectional data from 97 businesses participating in the Small+Safe+Well study. We collected data using a business assessment tool, Healthy Workplace Assessment (TM), and an employee assessment tool, Employee Health and Safety Culture Survey. We used latent profile analysis at the business level to identify subgroups of businesses based on a set of characteristics from these assessments. Linear regression analysis at the employee level was used to determine profile association with employee safety and health behaviors. There were two profiles characterized by the lowest (33% of all businesses) and highest (9%) levels of the indicators. There were also two profiles with higher scores on two of the different foci on either TWH business strategies (27%) or leadership and climate (31%). Employees working for a business with a profile that focused on leadership and climate, in addition to having a business strategy, reported the best safety and health behaviors. Our study demonstrates that employee engagement in TWH will be highest when businesses have a strategy for how they implement a TWH approach and when they demonstrate leadership commitment to these strategies and foster positive safety and health climates. Our results offer suggestions on how to use TWH assessments to develop interventions for small businesses. More research is needed to understand whether small businesses can improve upon their profile overtime, whether these changes depend on contextual factors, and whether TWH interventions can help them improve their profile.

COLORADO STATE UNIVERSITY

Age-related change in self-perceptions of aging: Longitudinal trajectories and predictors of change

Diehl, M; Wettstein, M; Spuling, SM; Wurm, S

Psychology and Aging

Using data from the German Ageing Survey (Deutscher Alterssurvey, DEAS; N = 4,712), this study examined age-related change in three dimensions of self-perceptions of aging (SPA): perceptions of physical losses, social losses, and ongoing development. Participants ranged in age from 40 to 85 years at study entry (1996, 2002, or 2008) and were followed for up to 21 years. Time-invariant, context-specific and time-varying, person-specific predictors of the observed age-related changes were examined. Findings from longitudinal multilevel regression analyses showed significant nonlinear age-related change for all three dimensions. Specifically, starting at about age 65, participants showed age-related increases in perceptions of physical and social losses, with increases getting steeper in old age. Starting at about age 55, participants reported increasingly fewer perceptions related to ongoing development. The decline in perceptions of ongoing development also became increasingly steeper after age 70. Region of residence was a significant context-specific predictor of the intercepts of the three SPA dimensions. Health-related variables (i.e., number of chronic diseases, self-rated health), affective well-being (i.e., positive and negative affect), and measures of social integration (i.e., loneliness) were significant person-specific predictors. Health-related variables had their strongest association with perceptions of physical losses, whereas negative affect and loneliness had their strongest association with perceptions of social losses. Positive affect had its strongest association with perceptions of ongoing development. This study is the first one to describe age-related change trajectories in multiple dimensions of SPA and significant predictors of these change trajectories.

ENVIRONMENTAL & OCCUPATIONAL HEALTH

Structural Racism and the COVID-19 Experience in the United States

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Health Security*

The long, fallacious history of attributing racial disparities in public health outcomes to biological inferiority or poor decision making persists in contemporary conversations about the COVID-19 pandemic. Given the disproportionate impacts of this pandemic on communities of color, it is essential for scholars, practitioners, and policymakers to focus on how structural racism drives these disparate outcomes. In May and June 2020, we conducted a 6-state online survey to examine racial/ethnic differences in exposure to COVID-19, risk mitigation behaviors, risk perceptions, and COVID-19 impacts. Results show that Black and Hispanic individuals were more likely than White respondents to experience factors associated with structural racism (eg, living in larger households, going to work in person, using public transportation) that, by their very nature, increase the likelihood of exposure to COVID-19. Controlling for other demographic and socioeconomic characteristics, non-White respondents were equally or more likely than White respondents to take protective actions against COVID-19, including keeping distance from others and wearing masks. Black and Hispanic respondents also perceived higher risks of dying of the disease and of running out of money due to the pandemic, and 40% of Black respondents reported knowing someone who had died of COVID-19 at a time when the US death toll had just surpassed 100,000 people. To manage the current pandemic and prepare to combat future health crises in an effective, equitable, and antiracist manner, it is imperative to understand the structural factors perpetuating racial inequalities in the COVID-19 experience.

LIFECOURSE EPIDEMIOLOGY OF ADIPOSITY & DIABETES CENTER

Exposure to obesogenic endocrine disrupting chemicals and obesity among youth of Latino or Hispanic origin in the United States and Latin America: A lifecourse perspective

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Obesity Reviews*

Following a 2019 workshop led by the Center for Global Health Studies at the Fogarty International Center on the topic of childhood obesity prevention and research synergies transpiring from cross-border collaborations, we convened a group of experts in the United States and Latin America to conduct a narrative review of the epidemiological literature on the role of obesogenic endocrine disrupting chemicals (EDCs) in the etiology of childhood obesity among Latino youth in the United States and Latin America. In addition to summarizing and synthesizing results from research on this topic published within the last decade, we place the findings within a lifecourse biobehavioral framework to aid in identification of unique exposure-outcome relationships driven by both biological and behavioral research, identify inconsistencies and deficiencies in current literature, and discuss the role of policy regulations, all with the goal of identifying viable avenues for prevention of early life obesity in Latino/Hispanic populations.