RESULTS: Total PA showed an upward linear trend in female (p_{trend} = .04) and young adult (p_{trend} = .009) immigrants. Work-related PA showed an upward linear trend in young adult immigrants (p_{trend} = .01). Recreational PA indicated an upward linear trend in young adult (p_{trend} = .03) and Mexican American (p_{trend} < .001) immigrants and in immigrants living in the U.S. for 15-29 years (p_{trend} = .02). In contrast, we observed downward linear trends in transit-related PA for immigrants across male (p_{trend} = .04), middle-aged adult (p_{trend} = .01) and non-Hispanic Black groups (p_{trend} = .004) and in immigrants living in the U.S. for 15- 29 years (p_{trend} = .03).
CONCLUSION: Although there was no significant linear trend in four domains of PA in the overall U.S. immigrant sample, the trends of domain-specific PA differed across various subgroups. Future work is needed to explore the underlying mechanisms driving the observed patterns. In addition, continuous monitoring of PA trends is required to better understand the behavioral changes of U.S. immigrants and predict their health outcomes.

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Impact Of Covid-19 Pandemic On Body Composition And Daily Energy Expenditure-intake After 6-month Confinement

Marco A. Hernández-Lepe, Ricardo Á. Briones-Villalba, Pável Rendón-Cortés, María G. Cabrera-Ojeda, Luis M. Gómez-Miranda. *Autonomous University of Baja California, Tijuana, Mexico.*

The COVID-19 pandemic represents far-reaching health threats, consequently, some governments took extraordinary measures where the main guidelines included social confinement and suspension of school presential activities, resulting in changes in habitual practices of university students such daily energy expenditure and food intake.
PURPOSE: To determine the changes on daily energy expenditure and food intake in 10 health sciences university students after 6-month isolation by COVID-19 pandemic.
METHODS: Anthropometric parameters, a daily physical activity questionnaire, and a nutritional survey were obtained one week before the isolation by COVID-19 pandemic and after 6-months of confinement. Changes of body mass index, daily energy expenditure, and daily energy intake (daily total calories, total protein, total lipids, and total carbohydrates) were compared before and after the study period.
RESULTS: The main outcomes are described in Table 1.
CONCLUSIONS: Confinement by COVID-19 in university students showed a decrease in health status due to increased consumption of calories, specifically lipids, which results in an increase in body mass index, impacting in a greater risk of being affected by the coronavirus, in addition to being one of the main risk factors for suffering from cardiovascular diseases. Finally, even though there didn't exist statistical difference, there can be appreciated a tendency to decrease daily energy expenditure.

Changes in body composition and daily energy expenditure-intake after 6-month confinement

Variable	Before confinement	After confinement	Change	Significance
Body mass index (kg/m^2)	23.22±2.74	24.15±2.75	0.93±0.32	0.001*
Daily energy expenditure (kcal/kg)	40.27±5.74	39.50±6.33	-0.77±0.27	0.755
Daily energy intake (kcal)	1339.41±422.01	1611.04±489.22	271.62±96.03	0.031*
Daily protein intake (g)	63.59±20.60	74.77±34.86	11.18±3.95	0.220
Daily lipids intake (g)	43.05±26.01	60.68±26.22	17.63±6.23	0.004*
Daily carbohydrates intake (g)	168.73±49.80	186.25±54.30	17.52±6.19	0.469

Data is expressed as mean±SEM. * means statistical difference with p<0.05.

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Cardiovascular Benefits Of Resistance, Aerobic, And Combined Exercise (cardiorace)

Duck-chul Lee, FACSM[1], Angelique G. Brellenthin[1], Lorraine M. Lanningham-Foster[1], Marian L. Kohut[1], Yehua Li[2]. *[1]Iowa State University, Ames, IA. [2]University of California-Riverside, Riverside, CA.*

PURPOSE: Physical activity guidelines recommend both aerobic and resistance exercise, yet few studies have directly tested this combined exercise on overall cardiovascular benefits.
METHODS: Participants were 406 inactive adults (53% women, 35-70 years) with overweight/obesity and hypertension at high risk of cardiovascular disease (CVD) who were randomly assigned to 1 of 4 groups: aerobic exercise (AE) only (n=101), resistance exercise (RE) only (n=102), combined AE and RE (CE) (n=101), and no-exercise control (n=102). All exercise participants performed 1-year supervised time-matched exercise for 3 times/week, 60 min/session (CE with 30 min of each AE and RE) at 50-80% of their maximum intensity for AE using % heart rate reserve and RE using % 1-repetition maximum (1-RM). The primary outcome was the change in the overall CVD risk score from baseline to 1-year, defined as the mean of the sex-specific z-scores of 4 established CVD risk factors: resting systolic blood pressure (SBP), low-density lipoprotein cholesterol (LDL-C), fasting glucose, and % body fat. Each CVD risk factor, peak oxygen consumption (VO_{2peak}), and 1-RM chest and leg press were also assessed.
RESULTS: A total of 381 participants (94%) completed the study with 83% average exercise attendance rate. After adjusting for age, sex, and baseline value using the intention-to-treat analysis, the overall CVD risk score decreased in CE (-0.16) and AE (-0.15), but not in RE (-0.05), compared to the control (p<0.05 for between group differences). Percent body fat decreased in CE (-1.2%), AE (-1.0%), and RE (-1.0%) compared to the control (p<0.001). Although there were no group differences at 1-year, SBP and LDL-C decreased in CE (-2.3 mmHg, -7.2 mg/dl) (p<0.05 for within group differences), but not significantly in AE (-1.5 mmHg, -4.9 mg/dl) and RE (-1.2 mmHg, -0.8 mg/dl). Fasting glucose increased at 1-year in RE (p=0.01), but no between and within group differences were found in other groups. VO_{2peak} increased in AE (8%), CE (6%), and RE (1%) compared to the control (p<0.05). Both 1-RM chest and leg press increased in RE (18%, 19%) and CE (11%, 10%), but not in AE (-2%, 3%), compared to the control (p<0.05).
CONCLUSIONS: One-year CE and AE, but not RE, improved overall CVD risk score compared to the control in adults at high risk of CVD.
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Does Physical Activity Moderate The Influence Of Sedentary Behavior On Health In Young People?

Emanuel Schembri, Andreas Heinz, Robin Samuel. *Université du Luxembourg, Esch-sur-Alzette, Luxembourg.*

PURPOSE: High level of sedentary behavior (SB) may cause a number of health complaints (nHC) and lead to reduced self-rated health (SRH) in young people. The purpose of this study was to determine the relationship between SB, the magnitude of nHC, SRH, body mass index (BMI), and whether the amount of physical activity (PA) moderates this relationship.
METHODS: The data was obtained from Youth Survey Luxembourg 2019 (N=2802). The population characteristics include sociodemographic data such as age, gender, and socio-economics status (SES) (0=low to 18=high). The severity of nHC was the sum score of headaches, stomach aches, back aches, depression, irritableness, nervousness, dizziness, and difficulty falling asleep (0=low to 32=high). BMI was calculated by dividing body weight to the square of body height (kg/m²). SRH was measured on a 5-point scale (1=very good to 5=very bad). PA and SB were generated from factor analyses of the questionnaire items. SB is separated between leisure and gaming. Multiple regression analysis, adjusted for age, gender, and SES, was used to determine the relationships between SB, nHC, BMI, and SRH, and the moderating effect of PA.

RESULTS: Out of the participants, 54% were female and 46% were male with the mean age of 22±4 years (16-29 years). The mean SES was 9.3±2.2 (1-13), BMI was 23±4 kg/m² (14-47 kg/m²), severity of the nHC was 9±6 (0-32), and SRH was 1.8±0.6 (1-5). The multiple regression analysis shows that high SB through leisure is associated with more severe nHC (unstandardized coefficient b=.49, p<.01). However, PA can decrease nHC (b=.39, p<.01) for participants with high leisure SB. No association has been found between SRH, BMI, and leisure SB. Furthermore, an increase in SB through gaming is associated with higher BMI (b=.35, p<.01) and worse SRH (b=.09, p<.00). A relationship between the severity of nHC and gaming is not found. In all cases, a higher PA shows a significantly better nHC, SRH, and BMI.
CONCLUSIONS: The results show that PA has a positive moderating effect of the relationship on leisure SB and nHC in young people in Luxembourg. Increased SB causes higher nHC, worse SRH, and higher BMI and young people who do more PA have lower severity in nHC, and better BMI and SRH. Therefore, it is important for young people to reduce SB and implement a sufficient amount of PA to improve overall health.

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Cardiorespiratory Fitness And Risk Of Lung Cancer Among Smokers And Non-smokers

Xuemei Sui, FACSM[1], Immanuel Samuel[2], Rayelynn Murphy[2], Labros Sidossis[3], Charles Faselis[2], Jonathan Myers, FACSM[4], Peter Kokkinos, FACSM[2]. *[1]University of South Carolina, Columbia, SC. [2]Veterans Affairs Medical Center, Washington, DC. [3]Rutgers University, New Brunswick, NJ. [4]Veterans Affairs Palo Alto Health Care System, Palo Alto, CA.*

PURPOSE: Moderate evidence indicates a beneficial effect of self-reported physical activity on risk of lung cancer. However, few studies have evaluated lung cancer risk in relation to cardiorespiratory fitness (CRF), expressed as peak metabolic equivalents (METs), an objective marker of recent physical activity habits and less prone to misclassification. We aimed to assess the association between CRF and risk of lung cancer and to determine whether this association varies by smoking status.
METHODS: Male (N=552,560) and female (N=39,556) US Veterans (age 61.3±9.5) completed a symptom-limited exercise treadmill test (ETT) between 1999-2020 using the Bruce protocol. All had no history of cancer prior to ETT. After 8,735 subjects with missing data were excluded, we established five CRF categories based on age-specific quintiles of peak METs achieved: Least-Fit (n=98,473); Low-Fit (n=142,134); Moderate-Fit (n=109,368); Fit (n=136,726) and High-Fit (n=96,680). Multivariable Cox models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for lung cancer events across CRF categories.
RESULTS: During the follow-up period (median=8.8 years), 7,391 individuals (age 64.3±7.9) developed lung cancer (14 events/10,000 person-years of observation). After adjustment for age, gender, race, and body mass index, the risk of lung cancer declined progressively with higher CRF status and followed a similar pattern in smokers and non-smokers. For smokers, when compared to the Least-Fit, Low-Fit individuals had a 27% lower risk of lung cancer incidence (HR 0.73; 95% CI: 0.67-0.79). For Moderate-fit, Fit and High-fit individuals the risk was lower by 45% (HR 0.55; 95% CI: 0.50-0.61); 66% (HR 0.44; 95% CI: 0.42-0.52) and 70% (HR 0.30; 95% CI: 0.26-0.34), respectively. Similarly, for non-smokers lung cancer risk was lower by 29% (HR 0.71; 95% CI: 0.66-0.78), 45% (HR 0.55; 95% CI: 0.50-0.60); 58% (HR 0.42; 95% CI: 0.38-0.47) and 71% (HR 0.29; 95% CI: 0.26-0.33), respectively.
CONCLUSIONS: The CRF-lung cancer incidence association was inverse and followed a dose-response pattern for both smokers and non-smokers. These findings underscore the importance of promoting higher CRF, presumably through greater physical activity, in the prevention of lung cancer.

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Segmented School Physical Activity And Weight Status In Children: Application Of Compositional Data Analysis

Ryan D. Burns[1], Timothy A. Brusseau[1], You Fu[2], Yang Bai[1], Wonwoo Byun[1]. *[1]University of Utah, Salt Lake City, UT. [2]University of Nevada, Reno, NV.*

PURPOSE: Compositional data analysis has been applied to behavioral time-use data. However, no study has applied compositional data analysis to examine how the proportion of school day pedometer steps accrued during specific school segments relates to a health outcome. The purpose of this study was to apply compositional data analysis to examine the association between segmented school step count compositions and body mass index (BMI) z-scores in a sample of children.
METHODS: Participants were 855 (51.8% female) children recruited from the fourth and fifth grades from four public elementary schools following a 7-h school schedule. Using piezoelectric pedometers, step count data were collected during physical education, recess, lunch, and during the academic class time. Using the framework of compositional data analysis, a multi-level general linear mixed effects model associated the step count composition with BMI z-scores, adjusting for grade level, sex, race/ethnicity, the clustering of students within classrooms and the clustering of classrooms within schools. Compositional isotemporal substitution was then used to determine changes in BMI z-scores per reallocation of steps between pairs of school segments.
RESULTS: A higher percentage of steps accrued during physical education (β = -0.34, 95%CI: -0.65 - -0.03, p = 0.036) and recess (β = -0.47, 95%CI: -0.83 - -0.11, p = 0.012), relative to other segments, associated with lower BMI z-scores. Specifically, a 5% to 15% reallocation of steps accrued during lunch time to either physical education or recess associated with lower BMI z-scores ranging from -0.07 to -0.41 standard deviation units.
CONCLUSIONS: Using compositional data analysis, it was found that a higher percentage of steps accrued during physical education and recess associated with lower BMI z-scores in children. Reallocation of steps between school segments may yield meaningful reductions in BMI z-scores. The results highlight the potential health-related importance of accumulating steps during physical education and recess relative to other school segments.

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Physical Activity And Sedentary Behavior In College Students During The Covid-19 Pandemic

Jaclyn Dziewior, Lucas Carr, Gary Pierce, Kara Whitaker. *University of Iowa, Iowa City, IA.*

BACKGROUND: Emergence of the coronavirus disease pandemic (COVID-19) impacted the population's health behaviors. The influence of local shut downs and interpersonal regulations on physical activity and sedentary behaviors in college-aged students is not well understood.
PURPOSE: To investigate changes in physical activity and sedentary time as well as identify major barriers to leisure-time physical activity among college age students during the COVID-19 pandemic.
METHODS: We recruited undergraduate and graduate students attending a large University in the Midwest during the COVID-19 pandemic in May 2020. Physical activity and sedentary time were estimated a week before lockdown and a week during May 2020 using the Activity Questionnaire for Adults and Adolescents (AQuAA). Barriers to physical activity during the pandemic were assessed in May using 8 statements that participants ranked. Wilcoxon Signed Rank Tests were used to examine changes in the AQuAA before and during the pandemic. Frequencies were used to examine the number of respondents citing the same top barrier to physical activity.
RESULTS: Student respondents (n=230) were mostly female (82%) with a median age of 21 years ± 5. Median weekly MVPA minutes significantly decreased (7891±7340 vs. 5550±6410) and sedentary time significantly increased (1330±1570 vs. 2415±1770) during the initial COVID-19 shutdown. Specific activities with notable changes included a significant decrease in commuting walk time and a significant increase in computer time among others (see **Table**). The most commonly cited barriers to physical activity during the pandemic included lack of access to places to exercise and schoolwork.
CONCLUSIONs: COVID-19 related regulations are associated with reduced physical activity and increased sedentary behaviors of college age students. Local regulation may have introduced new barriers to physical activity.