Degree: MPH-45

Field of Study: Quantitative Methods

Practicum Project Abstracts 2023

Project Title	Project Summary or Abstract
Evaluating health behaviors in early on-set cancer patients	Currently in the United States, there are over 18 million cancer survivors which comprises over 5% of the total population. In ten years, this number is expected to grow to 26 million people. Relative to those with no cancer history, cancer survivors are at higher risk for not only recurrence and second malignancies, but also for various chronic diseases. Accordingly, it is important to ensure that this population maintains a healthy lifestyle. In 2018, the World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) published the third edition of evidence-based guidelines that address diet and physical activity for cancer prevention and cancer survivors. A scoring system has been developed to allow for quantitative assessment of these recommendations. Previous research has shown that better adherence to these guidelines was associated with reduced mortality. Recently, there has been a significant increase in cancer incidence in younger populations (< 50 years old). Since cancer generally occurs in older populations, there is less research focusing on the health behaviors of individuals diagnosed with young-onset cancer. To this end, we will analyze data from the National Health and Nutrition Examination Survey (NHANES) collected between 2005 and 2018. In addition to measuring adherence to WCRF/AICR diet and physical activity recommendations, we will assess dietary supplement use, sleep quality, and mental health. Results from this analysis will help elucidate potential areas of behavioral intervention that can improve the lives of cancer survivors.
The effect of a history of depression on survival for patients with bladder cancer	Does a depression diagnosis decrease length of life for patients with bladder cancer? This project is a survival analysis using the Harvard health professional follow up study (HPFS) data, looking at depression and its affect on survival for patients with bladder cancer. Depression has a prevalence of approximately 25% amongst patients with a concomitant cancer diagnosis. This is most likely and underestimate as depression may be overlooked or go undiagnosed

	during a patient's intensive cancer treatment. Bladder cancer is defined based on its depth of muscle invasion, however, regardless of level of involvement, treatment is demanding. For non-muscle invasive bladder cancer (NMIBC) transurethral tumour resection and intravesical chemotherapy are mainstay treatments. For muscle invasive bladder cancer (MIBC), radical cystectomy along with neoadjuvant chemotherapy with possible lymphadenectomy and radiation are the gold standard of treatment. These onerous interventions and the associated lifelong surveillance can be burdensome economically, socially, and mentally. Li and Wang showed that amongst their study population of patients with bladder cancer, over 70% had depression. Emerging data has shown that mental health pre- and post-treatment plays an important role in surgical outcomes and mortality. Lin et al. showed that patients with a history of major depressive disorder, exhibiting depressive symptoms after BC diagnosis, have an almost 5-fold increased risk of mortality compared with those without any depressive episodes or symptoms. Although this relationship has been preliminarily established, the vast majority of literature on bladder cancer focuses on the non-psychological influences on patient outcomes. If depression is both prevalent and decreases mortality in BC patients, psychological care should be incorporated into standard care for BC patients. Practitioners should be aware of this connection prior to patients developing depressive symptoms.
Impact of Pain condition on Balance Ability and Risk of Fall Management: A Nationwide Longitudinal study on Medicare Beneficiaries	Falls are the second leading cause of unintentional injury deaths worldwide and are responsible for over 38 million DALYs (disability-adjusted life years) lost each year. Common pain conditions including rheumatoid or osteo-arthritis, fibromyalgia, and inflammatory bowel diseases (IBD), can be highly associated with fall risk. Intuitively, refractory pain in joints can reduce muscle strength, flexibility, and range of motion, indirectly affecting an individual's ability of balance, gait coordination, eventually increase the risk of. In addition, studies have shown the association between IBD and fall risk due to a rising diagnosis rate among population over 60 years old, which jointly increase the rate of frailty, and thus the risk of fall in this population. This study will be based on a national wide database, which surveys health outcomes related to quality of care provided by Medicare Advantage Organizations (MAOs). With up to 200 thousands of Medicare beneficiaries, this project aims to explore the association between pain problems and risk of fall, as well as exploring potential related predictors and risk factors. In addition, we will apply a propensity

	score matching method to evaluate the effect of receiving fall management provided by MAOs on reducing the incidence of fall among the in the pain-suffering population in the following year.
Global Trend Analysis of Obesity and the Incidence of Early-Onset Colorectal Cancer	Background: Since the 1990s, while the incidence of later-onset CRC has decreased, the incidence of early-onset CRC (diagnosed in adults under age 50 years) has increased in multiple countries. Methods: We conducted an ecological study. Data sources: Sex-stratified country-specific age-standardized incidence rates (ASR) of early-onset CRC diagnosed at 20-49 years of age from 1990 were retrieved from Global Cancer Observatory database. Sex-stratified country-specific mean BMI for young adults aged 20 to 49 from 1990 were retrieved from NCD Risk Factor Collaboration database. Age-standardization was applied using direct age standardization referencing the World Standard Population (1966). Linear regression was used to compare the following models. Model1 (unadjusted): a baseline model including year as the only estimator of the age-standardized incidence rates (ASR, log scale) of early-onset CRC. Model2: further adjusted for age-standardized mean BMI. Adjusted R2 was used to compare variability explained by models. Results: Both early-onset CRC incidence and mean BMI continuously increased from 1990 among countries we analyzed in this study (i.e., USA, Sweden, and South Korea). After adjusting for mean BMI, the APCs became attenuated, but were still positive. Adjusted R2 were not significantly changed after adjusting for mean BMI. Conclusions: This study shows that the both obesity prevalence and early-onset CRC incidence has increased since 1990 in the US, Sweden, and South Korea. This study also indicates that not only obesity, but also other factors may contribute to the recent increasing incidence trend in CRC among young adults in multiple countries. Further analyses are needed to compare trends in other factors and early-onset CRC.
Outcomes and determinants of receipt of psychosocial and spiritual care services at the end-of-	This study was a multi-site retrospective cohort study of adolescent and young adult patients who died of advanced cancer and received care at one of three cancer centers over a 17-year period. This project sought to answer three research questions. The first was to determine factors associated with receipt of psychosocial and spiritual care at the end-of-life, with attention to whether or not there are

life for adolescents and young adults with advanced cancer	racial and ethnic disparities in the receipt of care. The second was to determine whether receipt of psychosocial and spiritual care services affects patient preferences around end-of-life care. The third was to determine whether receipt of psychosocial and spiritual care services affects other care utilization at the end-of-life.
The determinants and outcome of chronic kidney disease (stage 4 and 5) after heart transplantation in patients with normal baseline renal function pre-heart transplant.	Title: The determinants and outcomes of chronic kidney disease (stage 4 and 5) after heart transplantation in patients with normal baseline renal function pre-heart transplant. Chronic kidney disease (CKD) is a commonly recognized complication of heart transplantation and is associated with increased morbidity and mortality. Previous studies indicate that CKD and ESRD are an independent risk factors for mortality in heart transplant recipients. This study seeks to investigate the determinants and outcome of chronic kidney disease after heart transplantation in patients with normal baseline renal function pre-heart transplant among patients in the SRTR database. The study will also investigate racial disparities in the developing CKD (stage 4 and 5) and composite outcome of RRT and mortality. The primary outcome was CKD (stage 4 and 5). The secondary outcomes were mortality and renal replacement therapy (RRT), including dialysis or kidney transplantation. Findings from this research can provide insight to tailor surveillance of transplant patients with these predictors to prevent or delay the development of chronic kidney disease. Renal dysfunction can negatively impact the survival of heart transplant patients hence efforts should be made to prevent CKD by tackling predictors of CKD in heart transplant patients.
Planetary Health Diet and CVD	Exploring the planetary health diet effects on CVD in three large prospective cohort studies.
Identification of digital phenotypes among schizophrenia outpatients using latent profile analysis	BACKGROUND: Early measurement and identification of relapse in schizophrenia is complicated by substantial variability in symptom subdomains, severity, and duration. Real-time capture of aberrant behavior and subtle symptomatic changes by smartphone might indicate early stages of relapse and warrant early clinical intervention. METHODS: Outpatients living with schizophrenia (N = 68) in Boston, Bhopal, and Bangalore were enrolled into the SHARP Study at varying time points and followed between July 2021 and March

	2023 (n = 33,753). Passive digital sensing data were recorded daily on the mindLAMP smartphone application, and active symptom data were captured by ecological momentary assessment. After rescaling the data, BIC values and bootstrapped likelihood ratio tests were computed to determine a parsimonious, best-fitting Gaussian mixture model and identify latent profiles, for which a classify-analyze strategy was employed to examine assignment with clinical covariates. RESULTS: The selected EVI model identified two distinct latent profiles: (1) high entropy-low screen duration-low home time, and (2) low entropy-high screen duration-high home time (reference). After adjusting for mean GAD-7, a one-point increase in mean PANSS score was associated with a 12% decrease in odds of being classified in the first latent profile ($p < 0.05$). Among mean SFS sub-scales, social engagement (OR = 1.25; $p < 0.05$) and employment (OR = 1.21; $p < 0.05$) scores were each associated with the first latent profile. The best-fitting model for latent profile classification per stepwise AIC algorithm included mean SFS, mean PHQ-9, and mean PSQI scores as covariates. CONCLUSION: Our findings demonstrate the utility of digital phenotyping in characterizing heterogeneous symptom presentations and as an ecologically valid proxy for subjective measures of social functioning in schizophrenia.
longitudinal analysis for suicide re-attempt incidence in suicide high risk cohort adjusting for loss to follow-up	Background: Suicide is a major public health concern, particularly among high-risk patients who enter the healthcare system as involuntary cases. These individuals are susceptible to loss to follow-up, making it necessary to consider this phenomenon when conducting longitudinal cohort analyses. Methods: A multicenter prospective cohort study was conducted in eight tertiary hospitals in South Korea. The study included patients aged ≥15 years with suicidal ideation (Columbia-Suicide Severity Rating Scale score≥1) and suicidal attempts within one month. Patients were classified as suicide attempters, lost to follow-up, or end of study. Inverse probability of loss to follow-up weights were used to adjust for the dependent loss to follow-up. Results: Out of 518 patients, 55 (10.4%) attempted suicide, while 342 (64.4%) were lost to follow-up during the study period. The cumulative probabilities of suicide attempts using the Kaplan–Meier method at 3-year follow-ups were 20.4% (95% CI 15.6-26.4). The estimated cumulative probabilities considering loss to follow-up at 3 years were 20.2%. A history of previous suicide attempts was found

	to predict suicide, with a 29.2% (95% CI 22.2-37.9) risk of subsequent suicide attempts among individuals with a history of previous suicide attempts. The risk decreased to 7.5% (95% CI 3.50-15.5) among those without a previous suicide attempt. The risk of subsequent suicide attempts did not change significantly when repeated with the analysis considering the propensity score for loss to follow-up. Phone call surveys conducted after the follow-up period revealed that out of 76 contacted patients, only 18 had current suicidal ideation, and 7 had subsequent suicide attempts. Conclusions and Relevance: Loss to follow-up may have a lower risk level for suicide attempts, however, standard survival analysis and model adjusting for propensity of loss to follow up didn't show much difference. However, it is important to note that loss to follow-up is not an independent phenomenon from suicide attempts, and thus the latter approach will ensure that the potential impact of loss to follow-up on research outcomes is fully understood.
Predictors of Splenic Artery Embolization Failure for Blunt Traumatic Splenic Hemorrhage: A Retrospective Nation-wide TQIP Cohort Study	It is well-established that splenic artery embolization (SAE) is a safe alternative to splenectomy for hemodynamically stable traumatic blunt splenic injury (BSI). Studies have explored predictors of selecting SAE versus operative management as the index intervention for BSI, as well as predictors of predictors of selecting SAE over observation. Similarly, studies have also been conducted examining predictors of non-operative management failure, where "non-operative" was defined as observation and SAE pooled. However, there exists current gap in knowledge regarding predictors of in-hospital failure exclusively for traumatic BSI patients who underwent SAE, with failure defined as requiring operative splenectomy for failed hemorrhage control with SAE. Additionally, most relevant studies have explored AIS score for BSI as a predictor of SAE failure, but have not identified other potential predictors. Prior studies have also not investigated said trends with a national American trauma dataset offering a robust study size. We thus aim to define the predictors of SAE in-hospital failure for traumatic BSI patients, and secondarily define the proportion of SAE failures resulting in operative hemorrhage control within 24 hours vs beyond 24 hours of hospital arrival.
Substance Use Trends in American Indian/Alaska Native & Veteran Populations Following Declaration of the Opioid	Context and Purpose: To inform future substance use policy and programs, it is necessary to investigate historical and current trends in substance use and treatment. This study examines substance use and substance use disorder (SUD) treatment gap trends–focusing on opioids, alcohol, marijuana, and methamphetamine–in the American Indian/Alaska Native (AIAN) and veteran populations. Specifically, this research is designed to describe differences in substance use and

Crisis as a Public Health Emergency	treatment among these populations before and after the 2017 declaration of the Opioid Epidemic as a public health crisis. Methods: Data from the 2015-2019 National Surveys on Drug Use and Health (NSDUH) are used to examine outcomes in these populations with additional subgroup analysis examining geographic differences in population outcomes. Descriptive findings and multiple linear regression models of substance use and treatment are provided by population of interest. Findings: While the AIAN population tends to have higher misuse rates for illicit substances, alcohol, and pain relievers, heroin use rates among AIANs are comparable to the rates seen in the Veteran and non-Native populations. Additionally, compared to other groups, AIAN communities have higher rates of prior year alcohol abstinence. Controlling for potential social confounders, predicted probabilities of opioid misuse prior to 2017 among all three populations studied ranged from 3.7% to 5.2% with substantial overlap between populations. In 2018, the non-Native and Veteran populations saw a decrease in these trends, while the odds of AIAN opioid use remained relatively constant. With the exception of methamphetamine, compared to urban communities and controlling for race, individuals from rural areas have a lower odds of substance use across all substances studied. Analysis of the treatment gap for each of these populations from 2015-2019 showed little change in the SUD treatment gap, with AIANs consistently having the highest odds of needing but not receiving treatment. Conclusions: While unable to make causal inferences from these data, this descriptive analysis reinforces what various studies have shown: disparities in SUD and SUD treatment exist for the AIAN population. Further, this study highlights the need for additional substance use data collection and improved data accessibility for the AIAN population. While restrictions to these data remain in place, IHS has the responsibility of conducting and reporting actionable data for Tribes and organizations who support the AIAN population.
Loneliness and Social Support Associations with Mental Health in the All of Us Cohort	Background: Loneliness has been associated with various health issues, including mental and physical problems. The objective of this study was to determine the prevalence of loneliness in the US general population and its correlation with social support, stress, anxiety, and depression. Methods: This study analyzed cross-sectional baseline survey data from the All of Us study, a US-nationwide cohort study. Loneliness was assessed using the UCLA Loneliness Scale, while social support was measured by the RAND MOS Social Support Survey Instrument. Sociodemographic

	variables, including age, sex at birth, race/ethnicity, sexual orientation, education, income, birthplace, home ownership, marital status, and health insurance status, were also examined. The outcomes were the stress level, assessed using Cohen's Perceived Stress Scale, and clinically diagnosed anxiety disorder and depression disorder. The Chi-square test and t-test were used to compare absolute numbers, percentages, and means with standard deviations of the level of loneliness among various groups. Linear and logistic regression models were used to explore associations between loneliness and stress, anxiety, and depression, adjusting for social support and other covariates. Results: Preliminary results indicated that being female, Black, Asian, non-heterosexual, having an education less than college, income less than $35k, no home ownership, no health insurance, and having low social support were associated with a higher proportion of high loneliness compared to other groups. The high loneliness group was younger than the low loneliness group (53.8 ± 16.5 vs. 58.3 ± 15.8, $p < 0.0001$). In further analyses, we anticipate that higher levels of loneliness will be linked to a greater risk of stress, anxiety, and depression. The degree of risk may vary between low and high social support groups.
GPT-4 Automated Clinical Data Curation of Exceptional Cancer Survivors for Genomic Hypothesis Testing	Background: NEER (Network of Exceptional Cancer Responders) is a study aimed at investigating the germline genomics of cancer patients who have defied the odds and achieved exceptional survival despite being diagnosed with advanced-stage cancer. Through studying fortunate outliers, we can further understand cancer and improve treatment outcomes for all patients. However, the retrospective retrieval and curation of clinical data from NEER patients can be challenging due to their varied geographic locations, medical charting systems, and periods of cancer diagnosis. This is a common problem with many cancer genomic projects, including large-scale studies such as the Pan-Cancer Analysis of Whole Genomes (PCAWG), which also lack insightful information on cancer treatment for many patients. Objective: The objective of this study is to automate the chronological curation of oncological data from medical charts in order to create and test hypotheses about the exceptionality of NEER patients.

	Methods: Clinical information of NEER patients is retrieved from PICNIC Health with their consent. The medical encounters are de-identified and transformed into a string that is grouped by patient ID and encounter year. Regular expressions are then used to extract relevant oncological and medical information chronologically from the strings. A summary of the extracted medical information is created and passed through a HIPAA-compliant GPT4 API key to create oncological timelines for each patient. All timelines extracted through this process are compared for accuracy to the manually extracted timelines by a medical doctor. Once an accuracy of at least 90% is achieved, the oncological timelines are presented to our research group to create genomic hypotheses that explain the exceptionality of these patients based on their clinical data. Each hypothesis is then tested by comparing the genomic data of NEER patients with that of non-exceptional survivors from the PCAWG dataset. Preliminary Results: The research is still ongoing, but some preliminary findings indicate a higher-than-expected incidence of autoimmune diseases and hereditary cancer syndromes in the NEER group when compared to non-exceptional survivors. Additionally, we are addressing some of the challenges posed by GPT4, such as its tendency to "hallucinate" by creating content that does not exist. To tackle this issue, our prompts explicitly prohibit GPT4 from adding information that was not present in the clinical data. We aim to complete the automated and manual oncological timelines for each patient by July of this year.
Validation of the Stopping Opioids after Surgery (SOS) Score for Sustained Postoperative Opioid Use following Orthopaedic Surgery Procedures	Introduction: The Stopping Opioids after Surgery (SOS) score was developed to identify patients at risk for sustained opioid use following surgery. The SOS score has not been specifically validated for patients undergoing orthopaedic procedures. Our primary objective was to validate the SOS score within this context. Methods: In this retrospective cohort study, we considered a broad array of representative orthopaedic procedures performed between January 1, 2018, and March 31, 2022. These included rotator cuff repair, lumbar discectomy, lumbar fusion, total knee and total hip arthroplasty,

	ankle/distal radius fracture internal fixation, and ACL reconstruction. The SOS score's performance was evaluated by calculating the c-statistic, receiver-operating curve, and observed rates of sustained prescription opioid use (defined as uninterrupted prescriptions of opioids for 90 days or greater) following surgery. For our sensitivity analysis, these metrics were compared throughout various time epochs related to the occurrence of the COVID-19 pandemic. Results: 26,114 patients were included. The observed prevalence of sustained opioid use was 1.3% (95% CI 1.2-1.5) in the low-risk group (SOS scores < 30), 7.4% (95% CI 6.9-8.0) in the medium-risk group (SOS scores 30-60), and 20.8% (95% CI 17.7-24.2%) in the high-risk group (SOS scores > 60). The performance of the SOS score on the overall group was strong with a c-statistic of 0.82. The SOS score's performance showed no evidence of worsening over time. The pre-pandemic c-statistic was 0.79 and ranged from 0.77-0.80 throughout various waves of the pandemic. Conclusion: We validated the use of the SOS score for sustained prescription opioid use after a diverse array of orthopaedic procedures across subspecialties. This tool is easy to implement to prospectively identify patients, in musculoskeletal service lines, at higher risk of sustained opioid use, allowing future upstream interventions and modifications to avert opioid abuse and combat the opioid epidemic.
Breast Cancer Immune Cell Infiltration in Predisposition Variant Carriers	Despite improvements in overall survival, breast cancer (BC) is still a major source of cancer mortality, and BC incidence is increasing in the United States. An estimated 5% of BC patients have a germline genetic variant that is associated with increased risk of BC. Many of these variants occur in DNA double-strand break (DSB) repair-related genes which play important roles in both carcinogenesis and treatment response. DBS repair-related signaling mechanisms are also known to contribute to cell-intrinsic immune signaling in the tumor microenvironment. This cross-sectional study investigated the relationship between DSB repair-related germline pathogenic variant carrier status and immune cell infiltration in 362 Nurses' Health Study and Nurses' Health Study II participants who experienced incident BC. The gene expression deconvolution algorithm CIBERSORT was applied to tumor microarray data to infer the abundance of 22 immune cell types present in the tumors. We used both univariate methods and multivariable linear regression models to investigate the associations between inferred immune cell abundance and carrier status and observed an association between inferred M1 macrophage infiltration and carrier status. The association was maintained after

	adjustment for potential confounding factors. The inferred M1 macrophage population correlated with immunohistochemical staining of macrophage marker CD163 in the corresponding tumor samples, suggesting that the M1 macrophage population detected by the deconvolution algorithm may represent a particular type of tumor associated macrophages. The enrichment suggests that treatment and prevention strategies that target macrophages might be relevant for this population and confirmatory analyses should be conducted.
Trends and causes of mortality in Birhan Health and Demographic Surveillance System (Birhan HDSS), North Shewa Zone, Ethiopia: Evidence from a Verbal Autopsy Study	The project focuses on the causes of mortality of a mainly rural population in the Birhan Health and Demographic Surveillance System (HDSS) in North Shewa, Ethiopia. The project was able to describe the leading causes of death among all age categories in Birhan HDSS between July 2018 and March 2023, as well as, trends of leading causes of death in Birhan HDSS over time points of the study period. The results from this study can be used to implement interventions and programs that mitigate preventable deaths in the population. The study may further be transferable to other similar areas in Ethiopia as well as other LMICs to promote evidence based programs and policy decisions.
Prevalence of Gastrointestinal (GI), Hepatic, and Infectious Manifestations in Patients with Common Variable Immunodeficiency (CVID)	Rationale: Common variable immunodeficiency (CVID) is the most common, symptomatic, primary immunodeficiency in adults. Gastrointestinal (GI) and hepatic manifestations in CVID remain poorly delineated. We assessed the prevalence of GI, hepatic, and infectious manifestations among patients with CVID and correlated the findings with immunophenotypes. Methods: We conducted a retrospective cohort study of CVID patients at our large, academic center. We evaluated baseline patient characteristics, GI, hepatic, and infectious manifestations of 319 CVID patients. Laboratory studies and immunologic profiles of the patients were evaluated. Results: 291/319 CVID patients (91%) had documented GI or hepatic manifestations. The most common GI symptoms were diarrhea (n=153), vomiting/dysphagia (n=146), abdominal pain (n=117), and weight loss/malabsorption/protein wasting (n=43). Autoimmune/inflammatory GI disease was reported in 72/319 (23%) of patients. 135/238 (57%) of patients had abnormal liver biochemistries at some point [ALT: 63/135 (47%), AST: 78/135 (58%), Alkaline phosphatase: 76/135 (56%)]. Chronic inflammatory hepatitis was identified in 43/319 (13%); including autoimmune hepatitis (n=32), transaminitis hepatitis (n=6), infectious hepatitis (n=6). Other hepatic conditions were portal

	hypertension (n=30), liver cirrhosis (n=18), and nonalcoholic fatty liver disease (n=15). 23/319 (7%) had undergone transient elastography, 42/319 (13%) had undergone liver biopsy, and 22/42 (52%) had a diagnosis of nodular regenerative hyperplasia. The most common GI infections were H. pylori (n=22), C. difficile (n=18), Giardia (n=8). Low absolute CD3+ cells were associated with autoimmune hepatitis [OR 2.91; 95%CI (1.07–7.87); P=0.03], portal hypertension [OR 5.14; 95%CI (1.86–14.17); P=0.002], autoimmune/inflammatory GI disease [OR 2.69; 95%CI (1.13–6.41); P=0.02], and IBD [OR 5.09; 95%CI (1.07–24.20); P=0.04]. Low absolute CD4+ cells were associated with portal hypertension [OR 5.11; 95%CI (1.87 – 13.93); P=0.001], autoimmune/inflammatory GI disease [OR 3.47; 95%CI (1.49 – 8.12); P=0.004], and autoimmune gastroenteropathy [OR 3.78; 95%CI (1.44 – 9.92); P=0.007]. Low absolute CD19+ cells were associated with autoimmune gastroenteropathy [OR 3.66; 95%CI (1.16 – 11.6); P=0.02]. Low switched memory B-cells (IgM-IgD-CD27+CD19+) were associated with autoimmune gastroenteropathy [OR 5.07; 95%CI (1.35 – 19.04); P=0.01], and portal hypertension [OR 5.89; 95%CI (1.13–28.16); P=0.02]. Conclusions: CVID patients had a high prevalence of GI, hepatic, and infectious manifestations, which were associated with more severe immunophenotypes.
Associations of pregnancy intention with child and adolescent well-being	Unintended pregnancies consist of those pregnancies that are either mistimed or unwanted, both of which can contribute to prenatal stress. Prenatal stress has been linked to an increased risk for a wide range of adverse child and adolescent health consequences (including worse perinatal, neurodevelopmental, emotional, behavioral, cognitive, psychiatric, and physical health outcomes). Effects may occur directly via the impact of prenatal stress-induced physiologic changes on fetal development or indirectly via the effects of prenatal stress on maternal health, pregnancy outcomes, and parenting behaviors which then influence infant health. Possible mechanisms for these effects include HPA-axis and immune system dysregulation, epigenetic changes, and altered placental function. Consequently, prior research has shown that unintended pregnancies have numerous health consequences for mothers and children, particularly with regard to birth and early childhood outcomes. However, less is known about longer-term child health outcomes. Thus, my project utilized Project Viva data (a Harvard-based longitudinal research study on women's and children's health) in order to assess whether unintended pregnancies are associated with an increased risk of poor

	adolescent physical and mental health outcomes or a higher risk of having adverse childhood experiences.
Comparison of Injury and Mortality Characteristics in India and US with ACS Level Stratification	Trauma registries are integral in improving trauma systems. As more low-and middle-income countries establish trauma registries, international trauma systems can be compared to identify ways to reduce trauma-related morbidity and mortality. I conducted a multi-center, multinational cohort study that compared injury and mortality characteristics in trauma level hospitals in the U.S. and 4 academic hospitals in India from the 2016 U.S. National Trauma Data Bank (NTDB) and 2013-2016 India's Towards Improving Trauma Care Outcomes (TITCO). We further stratified the U.S. hospitals by American College of Surgeons (ACS) Trauma Center Levels to compare injury and mortality characteristics. Univariate analyses were conducted to characterize injury and mortality. Multivariable logistic regression was conducted to predict mortality odds using hospital location as the primary predictor while controlling for age, sex, physiological variables, injury severity score (ISS), and ACS levels. Patients from India and the U.S. were matched by their propensity scores. Injuries differed greatly between the U.S. and India, with more Indian patients presenting with neurologic and blood pressure abnormalities. Mortality was greater in India, with almost half of all mortality categorized as mild ISS, suggesting limitations in pre-hospital or hospital care. Despite minor differences in mortality between each ACS trauma level, all had significantly lower mortality compared to the TITCO hospitals. Propensity score matching resulted in 2599 matched pairs and demonstrated that patients who suffered trauma in the US had decreased mortality by an average of 9.8%
Post-Diagnosis Exercise Exposure and Risk of Cardiovascular Events in Men with Prostate Cancer: The Health Professionals Follow-up Study	Prostate cancer is the most common cancer diagnosis among men in the United States and represents 29% of all incident cancer cases. While early detection and treatment continue to improve, they have also led to the increased prevalence of numerous treatment-related symptoms. Specifically, the intersection of aging and cancer treatment has generated a unique population of older adult survivors that may be more susceptible to consequences of cancer treatment. Cardiovascular disease is the leading cause of mortality among prostate cancer patients, which may be the result of shared risk factors, older age, or the effect of the cancer treatments. Although there is substantial evidence to support the benefits of physical activity on cardiovascular disease risk factors, the extent to which physical activity may mitigate the cardiovascular events associated with

	prostate cancer is unclear. Therefore, the purpose of this study was to examine the effect of post-diagnosis physical activity on cardiovascular events in men with prostate cancer. To evaluate this question, data were obtained from men with diagnosed prostate cancer in the longitudinal Health Professionals Follow-up Study. The primary outcome was defined as incident cardiovascular disease events including coronary artery disease, nonfatal myocardial infarction, stroke, or cardiovascular disease death. Physical activity exposure was assessed as vigorous versus non-vigorous activity and MET-hours/week and evaluated in quartiles. Cox proportional hazards regression models were used to estimate the hazard ratios for the association between exercise exposure categories and incident cardiovascular disease endpoints following prostate cancer diagnosis. Data analysis for this project is currently ongoing.
Gabapentinoid Prescriptions in a State Prison Population	Objective: To understand gabapentinoid prescription prevalence and association with concomitant opiate prescriptions in a state prison population. Background: Gabapentinoids which include gabapentin and pregabalin are known to be misused and abused in the community setting and increase the risk of opiate related mortality. The incarcerated population has a high prevalence of substance use disorder and a high risk of opiate related mortality. Methods: This is a cross sectional study with secondary analysis of prescription data from the Massachusetts state prison population. Gabapentin and/or pregabalin prescription orders determine which study participants will be included. Each participant's comprehensive medication list will be in the data analysis. Medication for Opiate Use Disorder Treatments (MOUD) prescriptions will be identified as once daily morning methadone or buprenorphine. Non MOUD opiate prescriptions will be the remainder of the opiate prescription orders. T statistics, Chai squared and logistic regression statistical analysis will be done using SAS 9.4 software. The prevalence of gabapentin prescriptions will be based on the patient census in the Massachusetts Department of Correction state prisons on the day of data collection. Conclusions: A significant association of gabapentinoid and concomitant opiate prescriptions is expected in the prison population. More research in this area is needed to improve quality of care and reduce opiate related mortality risks in the incarcerated population.

English Proficiency as a Sociodemographic Predictor of Undergoing Routine Skin Checks	Significant sociodemographic disparities exist with regard to cancer prevention practices and outcomes. Health disparities affecting linguistic minorities are often overlooked and may not be captured by racial or ethnic identifiers. These disparities extend to dermatology where minority groups experience poorer skin cancer outcomes than racial, ethnic, and linguistic majority groups. Skin checks remain the primary method of skin cancer detection, and early intervention is critical to optimizing outcomes. In this observational study of the Health Information National Trends Survey (HINTS), a nationally-representative cross-sectional survey of individuals living in the United States, a multivariable logistic regression model adjusted for age, insurance status, gender, education, race/ethnicity, Hispanic identity, US region of residence, and income was created to estimate the odds ratio of undergoing routine skin checks among non-proficient English speakers compared to proficient speakers. A secondary logistic regression analysis utilizing a 1:1 propensity-score matched cohort was also performed. This study suggests that proficient English speakers have 3.24 times higher odds of undergoing routine skin check compared to non-proficient English speakers, holding age, insurance status, gender, education, race/ethnicity, Hispanic identity, US region of residence, and income constant. This finding is statistically significant with a 95% confidence interval of 1.14 to 9.25. A causal inference framework utilizing a logistic regression performed on a 1:1 propensity score matched cohort suggests that proficient English speakers have a 1.73 times higher odds of undergoing routine skin check compared to non-proficient English speakers, however this estimate is not statistically significant with a confidence interval of 0.55 to 5.40.
Yogurt consumption and chronic liver disease mortality and liver cancer incidence: A prospective	Background: Higher yogurt consumption is associated with lower risk of various chronic diseases. However, few epidemiological studies have examined the relationship between yogurt consumption with liver outcomes. We investigated the association between yogurt consumption with chronic liver disease (CLD) mortality and liver cancer incidence .

cohort study and meta-analysis of cohort studies	Methods: We analyzed data from the Women's Health Initiative-Observational Study (n=74,400), a prospective cohort study initiated between 1993-1998. Yogurt consumption was recorded by a validated food frequency questionnaire. Multivariable-adjusted Cox proportional hazards models were adopted to estimate hazard ratios (HR) of CLD mortality and liver cancer incidence associated with yogurt consumption. We performed random-effects meta-analysis and subgroup analysis to synthesize current evidence. Results: With a median follow-up of 22 years, 171 women were diagnosed with incident liver cancers, and 119 women died of CLD. After adjusting for most known risk factors, higher yogurt consumption was associated with lower risk of CLD mortality (HR ≥1 cup/week vs. Never = 0.58, 95% confidence interval [CI] = 0.35-0.97; P-trend = 0.03). A non-significant inverse association between yogurt consumption and liver cancer incidence (HR = 0.78, 95% CI = 0.52-1.17; P-trend = 0.10) was observed. Meta-analysis showed that yogurt consumption was not associated with overall liver cancer incidence (RR = 0.82, 95% CI = 0.66-1.02); however, higher yogurt intake was associated with a lower long-term (≥ 20 years) risk of liver cancer (RR = 0.75, 95% CI = 0.57-0.99). Conclusions: In conclusion, higher yogurt consumption was associated with lower risk of CLD mortality and lower long-term risk of liver cancer, suggesting that yogurt consumption may prevent CLD and liver cancer. The potential synergistic effect between yogurt and fiber on liver pathology warrants further investigation.
Investigating the Pathophysiology of Limbic-predominant Age-related TDP-43 Encephalopathy (LATE) and Its Relationship with Alzheimer's Disease Pathology	Background: Limbic-predominant age-related TDP-43 encephalopathy neuropathological change (LATE-NC) is found in over half of pathologically confirmed Alzheimer's disease (AD) dementia cases. However, the region-specific relationship between AD neuropathologic change (ADNC) and LATE-NC remains unclear. Methods: We analyzed data from n=1264 deceased participants of multi-regional postmortem neuropathology data from the Religious Orders Study and the Rush Memory and Aging Project (ROSMAP). We assessed the association between regional LATE-NC and global Aβ burden, adjusting for APOE ε4, age at death, and sex. Then, we tested the intra- and inter-regional associations

	between LATE-NC and tau, adjusting for Aβ, APOE ε4, age at death, and sex. We performed a post-hoc subgroup analysis in participants without Hippocampal sclerosis (HS). Results: Global Aβ was positively associated with LATE-NC in most regions. Tau and LATE-NC were positively associated within the entorhinal (t=7.29, p=5.4×10-13) and midfrontal cortex (t=4.33, p=1.6×10-5) but not within the hippocampus. Tau and LATE-NC were positively correlated across most interregional pairs except for negative associations between hippocampal tau (CA1/subiculum) and frontal LATE-NC. There was no association between hippocampal tau and frontal LATE-NC in the HS(-) subgroup, suggesting that extensive hippocampal neuronal loss in HS(+) cases could have artifactually driven the negative association between hippocampal tau and frontal LATE-NC. Conclusion: Aβ was positively associated with LATE-NC in most regions. Even after adjusting for Aβ and APOE ε4, tau was positively associated with LATE-NC across most regions, except for hippocampal tau and frontal LATE-NC. Further studies are required to determine the underlying mechanisms linking ADNC and LATE-NC.
Assessing Oncological Outcomes Among Pediatric Heart Transplant Recipients	Given limited information available about racial disparities in post-transplant outcomes for de novo malignancy, further research is needed. This practicum entailed a literature review as well as a quantitative analysis to assess oncological outcomes of pediatric heart transplant patients. We studied heart transplant recipients included in the SRTR database who received their first heart transplant at an age younger than 18. A better understanding of de novo malignancies and potential health disparities may reveal opportunities for clinical management and intervention to improve the health of this patient population.
Breaking down the Asian Monolith: A comprehensive overview of cardiovascular risk factors and outcomes among Asian American adults	Asian Americans are the fastest growing racial group in the United States, projected to reach a population of 46 million by 20601. Although Asian Americans represent a highly heterogenous group comprised of diverse subpopulations, each with its own cultural, demographic, linguistic, and socioeconomic characteristics, they are often categorized as a single “Asian” category in national health surveys and public health surveillance efforts2. Emerging evidence suggests that aggregation of Asian adults masks important differences in the health status of subgroups that comprise this population. Despite growing recognition of heterogeneity in the health status of Asian Americans, little is known

	about whether the burden of cardiovascular disease varies across Asian subpopulations4. Prior work has focused on single high-visibility risk factors, or on specific US regions where comprehensive disaggregated data is present. Understanding these patterns could uncover health inequities within the Asian America population that ultimately inform public health and policy strategies to address the high and rising burden of cardiovascular disease in the United States. Therefore, in this study, we used the National Health Interview Survey (NHIS), which began reporting disaggregated data for Asian adults in 2011, to answer 3 questions. First, how does the age and sex-standardized burden of cardiovascular risk factors (hypertension, diabetes, hyperlipidemia, obesity, and smoking) vary among Asian subgroups? Second, does the burden of cardiovascular disease (heart attack, stroke, coronary heart disease, and angina) disease vary across these Asian subgroups? And third, do observed associations change after accounting for social determinants of health (education, poverty, and insurance status)?
Predictors of Plasma Soluble cd14, a biomarker of gut barrier dysfunction	This is a cross-sectional analysis of the relationship between alcohol consumption and plasma soluble cd14, a biomarker of gut barrier dysfunction. Many previous studies discussed how alcohol can disrupt the intestinal barrier and increase the permeability of the gut, and we've used the plasma soluble cd14 biomarker to further assess the trend in the dose-response relationship of this association, and compare the results according to the type of alcohol.
Prevalence and trends of metabolically healthy and unhealthy obesity in the US, from 1999 to 2018	Obesity is a well-known risk factor for cardiovascular disease, and both imposes a huge disease burden globally. There has been a special interest on the population who are obese but metabolically healthy, also called as metabolically healthy obese (MHO) people. In this study, adult, non-pregnant participants in 10 cycles of NHANES data from 1999-2000 to 2017-2018 were categorized into four phenotypes, according to the presence of obesity and other metabolic component, ie hypertension, hyperglycemia, and dyslipidemia: metabolically healthy normal weight (MHNW); MHO; metabolically unhealthy normal weight (MUNW); and metabolically unhealthy obese (MUO). From 1999-2000 cycle to 2017-2018, the prevalence of obesity (26.92% to 38.41% in male, 31.31% to 43.49% in female), hyperglycemia (16.07% to 36.95% in male, 11.87% to 29.58% in female), and MUO (16.07% to 36.95% in male, 11.87% to 29.58% in female) increased. Also, among 20 to 40 years old, the prevalence of MHO increased in female (5.67% in 1999-2000, 12.80% in 2017-2018) and the prevalence of MUNW

	decreased drastically, both in male (44.99% in 1999-2000, 35.40% in 2017-2018) and in female (36.29% in 1999-2000, 18.62% in 2017-2018). These findings reflect the overall increase of metabolic components over time and implies a need for special attention to the younger population who may face even greater risk at the future. In addition, since the MHO as understood as a transient state which eventually progresses to a metabolically unhealthy state, healthy lifestyle and monitoring should also be encouraged to the young female population where the prevalence of MHO is increasing.
Develop a prediction tool for an elective and oncologic oocyte banking	Objective: To develop a predictive model that anticipates the probability of patients returning to utilizer their cryopreserved oocytes and to identify the factors affecting their utilization. Methods: The study included 77,631 cycles of oocyte cryopreservation (OC) from the Society for Assisted Reproductive Technology Clinic Outcome Reporting System (SART CORS) from 2014-2020. We developed a supervised machine learning model to estimate the probability of patients coming back to utilize their stored oocytes. Patient demographics and location, medical/fertility diagnosis, and partner information were analyzed, and several learner algorithms, including Panelized regressions, Random Forests, gradient boosting machine, Linear Discriminant Analysis, and Bootstrap Aggregating decision trees, were tested as candidates. Results: The performance of an ensemble model combining three different machine learning models (Bagged CART, Linear Discriminant Analysis, and Stochastic Gradient Boosting) achieved a balanced accuracy of 0.83, sensitivity of 0.76, and specificity of 0.91 of prediction if patient will come back. The ensemble model performed the best in terms of both ROC (0.90) and PRC-AUC (0.57). The models identified several factors that affect the probability of returning to utilize cryopreserved oocytes, such as age, presence of partner at the time of OC, race/ethnicity, geographic region of clinic, and the indication for oocyte cryopreservation. Conclusions: The identified factors affecting the probability of returning to utilize cryopreserved oocytes can help healthcare providers, patients, and insurers make better informed decisions regarding oocyte cryopreservation utilization and patient selection.
Agonal Duration in Donation After Circulatory	Donation after Circulatory Death (DCD) donor hearts recovered using the direct procurement and perfusion (DPP) method experience variable durations of warm ischemia at the time of procurement

Death Cardiac Transplantation	(WIP). We used the OPTN database to assess the effect of WIP on 30-day mortality after DCD heart transplantation. The analysis evaluated outcomes in 237 recipients of DCD heart transplantation demonstrating an optimal WIP cutpoint of 36 minutes. Multivariable logistic regression modelling identified donor left ventricular ejection fraction (LVEF) less than 60% as an independent predictor of 30-day mortality. The area under the receiver operator characteristic curve (AUC) for predicting 30-day mortality based on WIP less than 36 mins and donor LVEF less than 60% was 0.90, which is considered excellent classification ability. Based on these findings, we do not recommend proceeding with DCD heart transplantation for patients with WIP greater than 36 minutes, particularly in donors with LVEF less than 60%.
Mental Health and Social Outcomes for Children Experiencing Homelessness in the United States	I have included the abstract conclusions for our literature review, I am currently finalizing my practicum presentation and will submit the abstract to you for tomorrow (as my presentation is tomorrow). My apologies for this short delay. Homelessness and housing insecurity is increasing. Furthermore, homelessness poses unique risks to youth and children with the latter being examined minimally thus far. The forthcoming research study will examine the mental health outcome of suicide attempts, several substances use outcomes including first or lifetime misuse of cigarettes, cannabis, alcohol, cocaine, methamphetamine, ecstasy, injection drug use and prescription opioids and psychosocial outcomes including exposure to physical or sexual violence and bullying. It is likely that middle school aged children experiencing homelessness will have worse outcomes especially for the racialized in comparison to their housed and non-racialized counterparts as seen in high school youth.
The Outcomes and Racial Disparities of Traumatic Injury in Pregnancy	A comparison of the mortality risk following traumatic injury among pregnant versus non-pregnant trauma victims in the National Trauma Data Bank. This project sought to improve upon previous literature methodologically and by using a larger, more recent sample of data from trauma centers across the country.
Incidence and Risk Factors for Food Insecurity After Surgical Trauma	Introduction Over 1.3 billion people are suffering from food insecurity, defined as a lack of access to adequate nutrition. Despite clear evidence regarding the benefit of proper nutrition on clinical outcomes, the epidemiological burden of food insecurity on surgical patients is unclear. The goal of the study was to

	quantify the incidence and risk factors for food insecurity after surgical management of trauma. Methods A multicenter, prospective, longitudinal study was conducted amongst adult surgical trauma patients. The primary outcome of interest was new or worsening food insecurity from initial admission to 6 months post-operatively. Multivariate time-to-event analysis controlling for clinical and sociodemographic variables was performed. Results Of 801 patients enrolled, 19% were food insecure at baseline. Baseline food insecurity was associated with younger age, having children, and receiving welfare ($p < 0.005$). During the follow-up period, 17% of patients who did not report food insecurity at baseline experienced worsening food insecurity. Clinically, hospitalization-related financial toxicity (HR 4.96; $p < 0.001$) and increased length of stay (HR 5.99; $p < 0.001$) were associated with incident and worsening food insecurity. Patient demographic factors including greater total household income (HR 0.23; $p < 0.001$), and secure housing status (HR 0.32; $p=0.006$) were associated with maintaining food secure status. Conclusions Food insecurity is a significant problem for surgical patients. Risk factors for post-operative food insecurity include hospitalization-associated financial toxicity, lower household incomes, longer length of stays, and unstable housing. Using this data, high risk patients can be identified prior to discharge to implement context-specific solutions, including food prescriptions and connection to nutritional support programs.