The aim of the Hawai‘i Journal of Health & Social Welfare is to advance knowledge about health and social welfare, with a focus on the diverse peoples and unique environments of Hawai‘i and the Pacific region.

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In 2018, the number of partners providing financial backing for the journal expanded, and to reflect this expansion the name of the journal was changed in 2019 to the Hawai‘i Journal of Health & Social Welfare. The lead academic partners are now the six units of the UH College of Health Sciences and Social Welfare, including the John A. Burns School of Medicine, UH Public Health, the Thompson School of Social Work & Public Health, the Nancy Atmospera–Walch School of Nursing, the UH Cancer Center, and the Daniel K. Inouye College of Pharmacy. Other partners are the Hawai‘i State Department of Health and the UH Office of the Vice Chancellor for Research. The journal is fiscally managed by University Health Partners of Hawai‘i.

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A Rare Presentation of Central Nervous System Tuberculomas in an Immunocompetent Patient

Bryce K. Chang MD; Jacqueline Adlawan MD; Samuel Fesenmeier DO; David Kaminskas MD; Enrique Carrazana MD; Kore K. Liow MD, FACP, FAAN

Abstract

The uncommon presentation of simultaneous brain and lung lesions in an immunocompetent adult patient with frequent travel to a mycobacterium tuberculosis (MTB) endemic area requires high clinical suspicion for central nervous system (CNS) MTB, as this disease often results in severe neurologic morbidity and mortality. Non-specific and subacute symptoms make the diagnosis of CNS MTB clinically challenging, and a workup with imaging and microbiological studies such as acid-fast bacilli staining, nucleic acid amplification testing, and tissue culture must not delay prompt treatment with anti-tuberculosis therapy. This case illustrates the complex challenges of medical diagnosis and multi-disciplinary decision-making involved in the workup of CNS MTB.

Keywords

central nervous system, mycobacterium tuberculosis, simultaneous brain and lung lesions

Abbreviations and Acronyms

AFB = acid-fast bacilli
CNS = central nervous system
CSF = cerebrospinal fluid
CT = computed tomography
FLAIR = fluid attenuation inversion recovery
IGRA = interferon gamma release assay
IV = intravenous
MRI = magnetic resonance imaging
MTB = mycobacterium tuberculosis
NAAT = nucleic acid amplification testing
PCR = polymerase chain reaction
PPD = purified protein derivative

Introduction

Hawai‘i has one of the highest mycobacterium tuberculosis (MTB) annual case rates in the country, almost 3 times higher than the national case rate. MTB is an obligate aerobic intracellular bacterium that preferentially infects macrophages in the lungs and is highly transmissible via inhalation of aerosol droplets. In the health care setting, transmission is controlled with contact investigation and airborne isolation via negative pressure rooms for patients with MTB and N95 masks or powered air-purifying respirators for those in contact. Moreover, socioeconomic development, access to clean water, adequate sanitation, and access to health services is equally important in preventing MTB transmission. Additionally, there is currently no TB vaccine that is approved for use in the United States. Hawai‘i’s MTB burden is primarily among immigrants and travelers. In 2015, immigrants made up 86% of Hawai‘i’s 127 MTB cases, of which the majority (63%) were from the Philippines. However, only 21 of these cases involved both pulmonary and extrapulmonary sites. Central nervous system (CNS) MTB only accounts for 1% of all MTB cases but results in significant morbidity and mortality for over half of patients. Young children and immunocompromised persons are at greatest risk for CNS MTB. Diagnosis of CNS MTB is clinically challenging given non-specific symptoms and radiologic findings such as basilar cistern meningeal enhancement (abnormally bright spots in membranes covering pools of cerebrospinal fluid [CSF]), ring enhancing lesions (abnormally bright rings), obstructive hydrocephalus (CSF build-up), edema (swelling), and infarcts (dead tissue). Moreover, standard practice acid-fast bacilli (AFB) smear and MTB nucleic acid amplification testing (NAAT) have a lower diagnostic yield than tissue biopsy with MTB culture which has the highest sensitivity for MTB. Management requires a high suspicion for CNS MTB and empiric anti-tuberculosis therapy should be started without delay. Here is a case of CNS MTB in an immunocompetent patient who was treated promptly with rifampin, isoniazid, pyrazinamide, and ethambutol, and then clinically improved with regression of brain abscesses.

Case Report

The patient is a 66-year-old Filipino female who presented to the emergency department with confusion for two days and intermittent headaches and neck pain for three weeks. She reported a 20-pound weight loss over the course of years; but denied fever, chills, cough, hemoptysis (bloody cough), shortness of breath, or night sweats. She reported no history of tuberculosis, human immunodeficiency virus, or use of immunosuppressant medications. She was an active smoker but denied alcohol or illicit drug use. She traveled to the Philippines yearly. Her vital signs and pulmonary exam were unremarkable. A neurologic exam showed disorientation, visual agnosia with mild anomic aphasia (unable to identify gloves by name) but no other lateralizing signs. Non-contrast head computed tomography (CT) was significant for multiple areas of hypodensity (brightness) with evidence of mass effect with right to left midline shift by 5.1 mm without acute infarct or hemorrhage. Brain magnetic resonance imaging (MRI) showed multiple areas of increased T2 signal on the
T2 fluid attenuation inversion recovery (FLAIR) sequences throughout both hemispheres with right to left midline shift of approximately 3 mm (Figure 1). MRI also showed innumerable ring enhancing masses with extensive vasogenic edema (swelling) with the largest mass measuring 2.0 x 1.4 x 1.2 cm in the right temporoparietal region (Figure 2). Chest x-ray and non-contrast chest CT were significant for bi-apical consolidations with air bronchograms suspicious for tuberculosis (Figure 3). Blood count and chemistries were not significant.

The CNS and lung radiological findings, with her history of frequent travel to the Philippines, raised suspicion for disseminated tuberculosis. The patient was promptly started on MTB quadruple therapy with the maximum doses of rifampin 600 mg and isoniazid 300 mg, and weight-based doses of pyrazinamide 1000 mg and ethambutol 800 mg; vancomycin with trough goal 20-25 mg/L and ceftriaxone 2g every 12 hours for the possibility of brain abscesses; dexamethasone for cerebral edema associated with CNS MTB lesions (0.3 mg/kg/day intravenously

Figure 1. Multiple areas of increased T2 signal on the T2 FLAIR sequences throughout both hemispheres with right to left midline shift of approximately 3 mm.

Figure 2. MRI showing innumerable ring enhancing masses throughout the brain parenchyma with extensive vasogenic edema with largest mass measuring 2.0 x 1.4 x 1.2 cm in the right temporoparietal region.

Figure 3. Non-contrast chest CT significant for bi-apical consolidations with air bronchograms suspicious for tuberculosis.
Ventricles inflammation, or spinal involvement, whereas CT
rial tuberculomas, basal meningeal enhancement, ventriculitis
shows more multifocal bilateral acute infarcts, infratento
MRI provides superior sensitivity and specificity than CT and
the bilateral basal ganglia and anterior thalamus.

Vessel inflammation) can cause infarction most commonly of
cause obstructive hydrocephalus.

Obstruction of the cerebral aqueduct or lateral apertures can
obstructive hydrocephalus is more common, but exudative
and 1 cm in diameter, are seen in two-thirds of patients.
infarcts.

Radiologic findings in CNS MTB are most commonly tuber
culomas (mass of dead tissue from MTB), hydrocephalus, and
infarcts. Multiple tuberculomas, averaging 4-5 in number
and 1 cm in diameter, are seen in two-thirds of patients. Non-
 obstructive hydrocephalus is more common, but exudative
obstruction of the cerebral aqueduct or lateral apertures can
cause obstructive hydrocephalus. Cerebral vasculitis (blood
evessel inflammation) can cause infarction most commonly of
the bilateral basal ganglia and anterior thalamus. Generally,
MRI provides superior sensitivity and specificity than CT and
shows more multifocal bilateral acute infarcts, infratentori-
ral tuberculomas, basal meningeal enhancement, ventriculitis
(ventricle inflammation), or spinal involvement, whereas CT

Discussion

The indicators of CNS MTB were bi-apical lesions on chest CT
with concomitant ring enhancing brain masses in the setting of
recurrent travel to the Philippines, an MTB endemic area. Other
pathogens endemic to the Philippines such as Schistosomiasis
and hepatitis were less likely. Given simultaneous lung and
brain lesions in a long-term smoker, metastatic lung cancer
was also considered. However, the size of edema relative to
brain lesions suggested abscesses rather than metastasis. In
retrospect, bacterial cerebral abscesses were less likely given
lung imaging pathognomonic for MTB with positive cultures.
While CNS MTB is rare in an immunocompetent adult, this
diagnosis should be considered due to its severe neurological
morbidity and mortality. CNS MTB often presents with non-
specific symptoms such as headache, confusion, and memory
loss. Though the neurologic exam can indicate focal deficits
suggestive of mass lesions, such as this patient’s visual agnosia
correlating with the large right temporoparietal mass, there were
no reliable findings for a specific diagnosis.

Radiologic findings in CNS MTB are most commonly tuber
culomas (mass of dead tissue from MTB), hydrocephalus, and
infarcts. About 10% of CNS tuberculomas may exhibit the characteristic target sign
of central calcification with surrounding ring enhancement;
however, this sign is non-specific and seen in toxoplasmosis,
primary lymphoma, and bacterial abscesses.

CSF studies commonly show elevated protein and pleocytosis
(increased cell count). However, this patient’s altered mental
status from innumerable masses and extensive brain swell-
ing contraindicated performing a lumbar puncture. As in this
patient’s course, diagnosis of CNS MTB is made with exam
findings correlated with imaging and confirmed by microbiol-
ogy. AFB smear and culture are better tests for active MTB than
PPD or IGRA which test for latent MTB, however, these active
MTB detection methods’ modest sensitivity and required time
frames often leave clinicians little choice but to promptly initiate
empiric therapy or risk missing a case that could result in death.
Visualization of smears for AFB is rapid and inexpensive but
has only 25% sensitivity, and NAAT can confirm but cannot rule
out MTB as commercial assays are only 78% sensitive. Thus,
mycobacterial culture remains the gold standard for diagnosis
of drug-susceptible or drug-resistant MTB but can take at 2 to 6
weeks to provide results. With positive AFB stain and negative
MTB PCR in the setting of concomitant lung and brain mass
lesions, non-tuberculosis mycobacteria should be considered.

Tissue histopathology or MTB culture should be performed
but should not delay treatment. A brain biopsy for further
diagnostic clarity was considered but not performed due to
patient reluctance as well as clinical response to treatment. This
is consistent with prior literature, where diagnosis was made
primarily without brain biopsy after positive culture of more
readily accessible extra-neural sites of disease. The duration
of treatment of CNS MTB with anti-tuberculosis therapy guided by
culture sensitivity should be at least 10 months. Edema control
with dexamethasone appears beneficial for rapid neurological
improvement, though duration of steroid treatment is unclear.
It is possible that our patient’s rapid improvement was in
part due to the co-administration of dexamethasone along with
quadurale tuberculostatic treatment.

Conclusion

Hawai‘i faces almost triple the annual case rate burden of
MTB compared to the mainland, yet CNS MTB remains rare
and deadly. In immunocompetent adult patients with head-
ache, altered mental status, and simultaneous brain and lung
mass lesions, CNS MTB, though rare, requires high clinical
suspicion because treatment with anti-tuberculosis therapy
should be started promptly to prevent neurologic morbidity
and mortality. Workup for CNS MTB remains complex and
clinically challenging.
Conflict of Interest

None of the authors report any conflict of interest.

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References
Race and Depressive Symptoms are Associated with the Prevalence of Adolescent Suicide Attempts in Hawai‘i, Youth Risk Behavior Survey 2015-2017

Carlotta Ching Ting Fok PhD, MA; Matthew J. Shim PhD, MPH

Abstract

Suicide is death caused by injuring oneself with the intent to die. According to the 2017 National Vital Statistics report, suicide was the second leading cause of death for adolescents 10-24 years old, accounting for 19.2% of deaths in that age group. Aggregated 2015-2017 Hawai‘i Youth Risk Behavior Survey (YRBS) data from 12,120 respondents were analyzed. Multivariate logistic regression modeling for complex survey procedure was created using predicted marginals to estimate crude and adjusted prevalence ratios for suicide attempts. After adjusting for race, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm, youth who experienced bullying (adjusted prevalence ratio=1.75; 95% confidence interval: 1.44-2.12), used illicit drugs (1.89; 1.54-2.31), those with one-time self-harm (2.87; 2.04-4.04), or repeated self-harm (5.31; 4.28-6.60) were more likely to have suicide attempts. Race by depressive symptoms interaction was significant (P<.01), demonstrating the heterogeneity of the stratum-specific measures of association. When depressive symptoms were present, youth who are Native Hawaiian (2.64; 1.68-4.15), Japanese (2.39; 1.44-3.95), other Pacific Islander (2.04; 1.29-3.21), Filipino (1.77; 1.21-2.59), and those who do not describe as only one race/ethnicity (1.74; 1.16-2.62) were more likely to have suicide attempts compared to White. When depressive symptoms were not present, other Pacific Islanders (4.05; 1.69-9.67), Hispanics/Latinos (3.37; 1.10-10.30), Native Hawaiians (3.03; 1.23-7.45), and other race groups (2.03; 1.03-4.00) were more likely to have suicide attempts compared to White. These results demonstrated the importance of screening for depressive symptoms and other risk factors to prevent suicide attempts in adolescents.

Keywords

Suicide attempts, risk factors, depressive symptoms, race, self-harm

Abbreviations

APR = Adjusted prevalence ratio
CI = Confidence Interval
YRBS = Youth Risk Behavior Survey

Introduction

Suicide is death caused by injuring oneself with the intent to die. The effects of suicide extend beyond the person who takes his or her life. It has detrimental and lasting effects on family, friends, and communities. Although suicide occurs more frequently in older than in younger people, it is one of the leading causes of death for adolescents. According to the 2017 National Vital Statistics Report, suicide was the second leading cause of death for young people 10-24 years old, accounting for 19.2% of deaths in that age group.1 The suicide rate for this age group was stable from 2000 to 2007 but then demonstrated a significant increase from 2007 (6.8 per 100,000) to 2017 (10.6 per 100,000).2 In Hawai‘i, aggregated data from the 2015-2017 National Vital Statistics System reported that the rate of suicide deaths for adolescents aged 15-19 years was 13.2 (per 100,000), which was higher than the national estimate of 10.5 (per 100,000). Identifying the risk factors for suicide attempts for adolescents in Hawai‘i is crucial to help reduce the rate and improve adolescent health.

Past researchers have found that adolescent suicide attempt was associated with past suicide attempts, hopelessness and depressive symptoms, impulsivity, aggressive behavior, or exposure to violence.3-6 For example, a review conducted by Bilsen (2018) suggested that in addition to these risk factors, family structure and processes, such as the presence of depression and substance abuse in family members, were also linked to adolescent suicide behavior.5 In another study, Taliaferro and Muehlenkamp (2014) revealed that hopelessness and depressive symptoms were important risk factors that distinguished youth who reported suicidal ideation and those without, while self-injury differentiated those who attempted suicide from those who had sui-2 cial ideation but without the attempt.5

In addition, past researchers have also found an association between bullying and suicide-related behavior in youth.7-9 For example, Hertz, et al (2013), suggested that the association between bullying and suicide-related behaviors was mediated by depression and delinquency in youth.7 Vergara, et al (2019), examined the different consequences in peer victimization and bully perpetration in suicide behavior. They found that bully perpetration was associated with the number of past month suicide attempts, while peer victimization was associated more with suicidal ideation.9

Aside from these risk factors, past studies have found the association between race and suicide.10-13 According to the 2017 data from National Center of Health Statistics, the age-adjusted suicide rates were highest for American Indians/Alaska Natives and Whites, compared to Hispanics, Asians/Pacific Islanders, or Blacks.12 Hawai‘i consists of diverse populations of Native Hawaiians, other Pacific Islanders, and multiple Asian groups (eg, Japanese, Filipinos, and other Asians) that are not commonly reported in the scientific literature. According to the 2018 American Community Survey, there were approximately 1.4 million persons living in Hawai‘i with 37.6% classified as Asian, 24.3% as White, 10.2% as Native Hawaiian and other Pacific
Islanders, and 24.3% as 2 or more races. A study by Wong, et al (2012), using Hawai‘i data from the 1999-2009 Youth Risk Behavior Surveys (YRBS) revealed a higher prevalence of Native Hawaiian/Pacific Islander, multiracial, and American Indian/Alaska Native adolescents in suicide-related behaviors (ie, suicide ideation, planning, and attempts), compared to Asian, Black, Hispanic, and White youth.

Another study conducted by Hishinuma, et al (2018), examined longitudinal prediction of suicide attempts for Native Hawaiians, Peoples of the Pacific, and Asian Americans, and found that past suicide attempts being the strongest predictor for future suicide attempts for these race groups. This suggests that suicide-related behaviors occurred more frequently in some racial groups than others in Hawai‘i; that certain risk factors might be stronger for certain race groups; and that culturally-embedded approaches to suicide prevention might be necessary. Thus, the present study aims to determine the risk factors for adolescent suicide attempts in Hawai‘i using YRBS data from 2015-2017 and to examine the associations between adolescent suicide attempts with racial groups and other selected demographic characteristics.

**Methods**

Aggregate data from the 2015-2017 high school Hawai‘i YRBS were used for this study. The 2019 YRBS data were not available yet at the time of analyses. Developed in 1990, the YRBS is a national school-based survey conducted by the Centers for Disease Control and Prevention (CDC) to collect information on behaviors that put youth at risk for negative health outcomes, including substance use, unhealthy dietary behaviors, inadequate physical activity, sexual behaviors related to unintended pregnancy and sexually transmitted disease, and behaviors that contribute to unintentional injuries and violence. Data are collected every odd year from Grade 9th through 12th students in public, non-charter schools in the US.

In this study, a total of 12,120 public high school respondents were analyzed from the 2015-2017 YRBS data. Suicide attempts were defined by those who reported having attempted suicide at least once in the past 12 months. There were 1,822 youth (15.0%) who did not respond to this question and were excluded from the analyses, resulting in a total of 10,298 participants. Depressive symptoms were defined by those who reported feeling sad or hopeless almost every day for two weeks or more during the past 12 months. Self-harm was classified into none, one-time, or repeatedly (≥ 2 times) of purposely hurting oneself during the past 12 months.

Unlike the national survey that combines all Asians into one category and aggregates Native Hawaiian or other Pacific Islander as a single race group, the Hawai‘i YRBS disaggregates these groups with the following race classifications based on the question in the survey, “Which one of these groups best describes you?”: White, Native Hawaiian, Japanese, Filipino, other Pacific Islander, Hispanic/Latino, other race, or “I do not describe myself as only one race or ethnicity.” Other covariates included bullying, which was defined by those who reported having been bullied on school property during the past 12 months. Illicit drug use was defined by those who had used any of the following at least once during the past 30 days: marijuana, cocaine, heroin, methamphetamine, ecstasy, prescription drugs (without doctor’s prescription), or hallucinogen. Alcohol use was defined by those who had at least one drink of alcohol at least once during the past 30 days.

Prevalence estimates of selected sociodemographic data and other characteristics by suicide attempts were obtained. Multivariate logistic regression modeling for complex survey procedure was created, using predicted marginals to estimate crude and adjusted prevalence ratios for suicide attempts. The model controlled for race, depressive symptoms, self-harm, bullying, illicit drug use, and alcohol use. Testing for interaction between race and depressive symptoms was identified (P<.01) with subsequent calculation of prevalence ratios for main effects. The final model included a total of 9,248 participants after listwise deletion of missing values in the independent and outcome variables. All analyses were conducted using SAS 9.4 (SAS Institute, INC., Cary, NC) with a P-value of <.05 considered statistically significant.

**Results**

Table 1 reports that the largest racial group represented in the 2015-2017 Hawai‘i YRBS data was Filipino (29.8%), followed by White (15.1%), Native Hawaiian (12.6%), and Japanese (12.2%). There was 18.7% of youth who reported “do not describe as only one race/ethnicity.” Approximately 10.2% of youth reported having attempted suicide at least once in the past 12 months. Estimates of suicide attempts were highest among youth who are Native Hawaiian, Hispanic/Latino, other Pacific Islander, those who do not describe as only one race/ethnicity, those who had repeated self-harm, those who experienced bullying, and those who used illicit drugs or alcohol (Table 2).

After adjusting for race, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm, youth who experienced bullying were more likely to have suicide attempts compared to those who did not experience bullying (adjusted prevalence ratio [APR]=1.75, 95% confidence interval [CI]: 1.44-2.12; Table 3a). Those who used illicit drugs (APR=1.89, 95% CI: 1.54-2.31) were more likely to have suicide attempts compared to those who did not use illicit drugs. Adolescents with one-time self-harm (APR=2.87, 95% CI: 2.04-4.04) or repeated self-harm (APR=5.31, 95% CI: 4.28-6.60) were more likely to have suicide attempts compared to those without any self-harm.
Table 1. Selected Sociodemographic Characteristics of Youth Risk Behavior Survey (YRBS) Study Sample, Hawai‘i, 2015 to 2017 (N=12,120)

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<th>Sociodemographic Characteristics</th>
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<tr>
<td>Missing</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illicit Drug Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9639</td>
<td>82.7</td>
<td>81.2-84.2</td>
</tr>
<tr>
<td>Yes</td>
<td>2281</td>
<td>17.3</td>
<td>15.8-18.8</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>8167</td>
<td>75.2</td>
<td>73.6-76.7</td>
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<tr>
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<td>3086</td>
<td>24.8</td>
<td>23.3-26.4</td>
</tr>
<tr>
<td>Missing</td>
<td>867</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Harm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>9292</td>
<td>79.0</td>
<td>77.7-80.2</td>
</tr>
<tr>
<td>One-time</td>
<td>1082</td>
<td>9.1</td>
<td>8.2-10.1</td>
</tr>
<tr>
<td>Repeatedly (≥2 times)</td>
<td>1536</td>
<td>11.9</td>
<td>11.0-12.8</td>
</tr>
<tr>
<td>Missing</td>
<td>210</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Individual subgroup column totals may not sum to overall total due to missing/unknown data and row percentages may not sum to 100% due to rounding. Also note that the time period for alcohol use and illicit drug use (past 30 days) is different from the time period for suicide attempt, depressive symptoms, bullying, and self-harm (past 12 months).  
* CI = confidence interval.

The effects of race on suicide attempts associated with the presence of depressive symptoms were explored, and the stratum-specific adjusted prevalence ratios were obtained (Table 3b). In the adjusted model when depressive symptoms were present (Figure 1), youth who are Native Hawaiian (APR=2.64, 95% CI: 1.68-4.15), Japanese (APR=2.39, 95% CI: 1.44-3.95), other Pacific Islanders (APR=2.04, 95% CI: 1.29-3.21), Filipino (APR=1.77, 95% CI: 1.21-2.59), and those who do not describe as only one race/ethnicity (APR=1.74, 95% CI: 1.16-2.62) were more likely to have suicide attempts compared to White youth. On the other hand, when depressive symptoms were not present (Figure 2), other Pacific Islanders (APR=4.05, 95% CI: 1.69-9.67), Hispanics/Latinos (APR=3.37, 95% CI: 1.10-10.30), Native Hawaiians (APR=3.03, 95% CI: 1.23-7.45), and other races (APR=2.03, 95% CI: 1.03-4.00) were more likely to have suicide attempts compared to Whites.
Table 3a. Crude and Adjusted Prevalence Ratios (PR) of Bullying, Illicit Drug Use, Alcohol Use, and Self-harm, Youth Risk Behavior Survey (YRBS), Hawai‘i, 2015 to 2017  

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Crude PR</th>
<th>95% CI</th>
<th>Adjusted PR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Yes</td>
<td>3.37</td>
<td>2.83-4.01</td>
<td>1.75</td>
<td>1.44-2.12</td>
</tr>
<tr>
<td>Illicit Drug Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Yes</td>
<td>4.94</td>
<td>4.27-5.70</td>
<td>1.89</td>
<td>1.54-2.31</td>
</tr>
<tr>
<td>Alcohol Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Yes</td>
<td>3.43</td>
<td>2.70-4.36</td>
<td>1.31</td>
<td>1.00-1.71</td>
</tr>
<tr>
<td>Self-Harm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>One-time</td>
<td>5.46</td>
<td>4.17-7.14</td>
<td>2.87</td>
<td>2.04-4.04</td>
</tr>
<tr>
<td>Repeatedly (≥2 times)</td>
<td>10.11</td>
<td>8.69-11.77</td>
<td>5.31</td>
<td>4.28-6.60</td>
</tr>
</tbody>
</table>

Note: The time period for alcohol use and illicit drug use (past 30 days) is different from the time period for bullying and self-harm (past 12 months).

a Adjusted for race/ethnicity, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm.

Table 3b. Crude and Adjusted Prevalence Ratios (PR) of Race/Ethnicity, Stratified by Depressive Symptoms

<table>
<thead>
<tr>
<th>Race/Ethnicity and Depressive Symptoms</th>
<th>Crude PR</th>
<th>95% CI</th>
<th>Adjusted PR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Depressive Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Native Hawaiian</td>
<td>3.66</td>
<td>1.39-9.60</td>
<td>3.03</td>
<td>1.23-7.45</td>
</tr>
<tr>
<td>Filipino</td>
<td>1.51</td>
<td>0.74-3.07</td>
<td>1.76</td>
<td>0.64-3.67</td>
</tr>
<tr>
<td>Japanese</td>
<td>0.48</td>
<td>0.18-1.32</td>
<td>0.7</td>
<td>0.24-2.03</td>
</tr>
<tr>
<td>Other Pacific Islander</td>
<td>3.49</td>
<td>1.67-7.29</td>
<td>4.05</td>
<td>1.69-9.67</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>4.58</td>
<td>1.25-16.81</td>
<td>3.37</td>
<td>1.10-10.30</td>
</tr>
<tr>
<td>Other Race</td>
<td>1.6</td>
<td>0.77-3.33</td>
<td>2.03</td>
<td>1.03-4.00</td>
</tr>
<tr>
<td>Do not describe as only one race/ethnicity</td>
<td>1.92</td>
<td>0.86-4.29</td>
<td>2.06</td>
<td>0.86-4.90</td>
</tr>
<tr>
<td>Depressive Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Native Hawaiian</td>
<td>1.97</td>
<td>1.37-2.83</td>
<td>2.64</td>
<td>1.68-4.15</td>
</tr>
<tr>
<td>Filipino</td>
<td>1.18</td>
<td>0.80-1.75</td>
<td>1.77</td>
<td>1.21-2.59</td>
</tr>
<tr>
<td>Japanese</td>
<td>1.57</td>
<td>0.93-2.65</td>
<td>2.39</td>
<td>1.44-3.95</td>
</tr>
<tr>
<td>Other Pacific Islander</td>
<td>1.37</td>
<td>0.92-2.04</td>
<td>2.04</td>
<td>1.29-3.21</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>1.24</td>
<td>0.76-2.03</td>
<td>1.41</td>
<td>0.86-2.29</td>
</tr>
<tr>
<td>Other Race</td>
<td>1.2</td>
<td>0.73-1.95</td>
<td>1.59</td>
<td>0.94-2.67</td>
</tr>
<tr>
<td>Do not describe as only one race/ethnicity</td>
<td>1.41</td>
<td>0.94-2.12</td>
<td>1.74</td>
<td>1.16-2.62</td>
</tr>
</tbody>
</table>

Note: Interaction between race and depressive symptoms was significant, P < .01

a CI = confidence interval.

b Adjusted for race/ethnicity, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm.

Table: Effect of Race/Ethnicity (Reference: White) on Prevalence of Suicide Attempt

<table>
<thead>
<tr>
<th>Effect</th>
<th>Crude PR</th>
<th>Adjusted PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/Ethnicity (Reference: White)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native Hawaiian</td>
<td>1.97</td>
<td>2.64</td>
</tr>
<tr>
<td>Filipino</td>
<td>1.18</td>
<td>1.77</td>
</tr>
<tr>
<td>Japanese</td>
<td>1.57</td>
<td>2.39</td>
</tr>
<tr>
<td>Other Pacific Islander</td>
<td>1.37</td>
<td>2.04</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>1.24</td>
<td>1.41</td>
</tr>
<tr>
<td>Other Race</td>
<td>1.20</td>
<td>1.59</td>
</tr>
<tr>
<td>Do not describe as only one race/ethnicity</td>
<td>1.41</td>
<td>1.74</td>
</tr>
</tbody>
</table>

Figure 1. Forest plot of adjusted prevalence ratios (PR) for suicide attempt by race/ethnicity when depressive symptoms were present. Adjusted prevalence ratio adjusts for race/ethnicity, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm. The plot displays the adjusted prevalence ratio with 95% confidence intervals. The vertical line represents a prevalence ratio of 1.0, where there is no effect.
**Discussion**

The study examined the risk factors for suicide attempts for adolescents in Hawai‘i and revealed that approximately 10.2% of youth reported having attempted suicide at least once in the past 12 months. This study highlighted the heterogeneity in the suicide attempt outcomes among different racial groups by depression symptoms.

Hawai‘i consists of diverse populations of Native Hawaiians, other Pacific Islanders, and multiple Asian groups. This study revealed higher estimates of suicide attempts for certain race groups including Native Hawaiians, other Pacific Islanders, Filipinos, and Hispanics/Latinos, compared to Whites. Consistent with past literature where depression was a significant risk factor, this study demonstrated a higher estimate of suicide attempts for youth with depressive symptoms.

This study reported a significant interaction between race and depressive symptoms, demonstrating the heterogeneity of the stratum-specific measures of association. The final adjusted model showed that when stratified by the presence of depressive symptoms, the effect of race on suicide attempt outcomes differed by whether depressive symptoms were present or not. When depressive symptoms were present, youth who are Native Hawaiian, Filipino, Japanese, other Pacific Islander, and those who do not describe as only one race/ethnicity were significantly more likely to have had suicide attempts compared to White youth. However, when depressive symptoms were not present, Native Hawaiians, other Pacific Islanders, and Hispanics/Latinos had a higher prevalence in suicide attempts compared to Whites, whereas Filipinos, Japanese, and those who do not describe as only one race/ethnicity did not differ from Whites in the prevalence of suicide attempts. It seems that race had a higher impact on suicide attempt outcomes when depressive symptoms were present.

The differential impact of race on suicide attempt outcomes might be related to the higher estimates of suicide attempts for certain race groups, particularly with Native Hawaiians and other Pacific Islanders, who had higher prevalence for suicide attempts compared to Whites regardless of whether depressive symptoms were present or not. This is consistent with past research where Native Hawaiian/Pacific Islander, American Indian/Alaska Native and multiracial adolescents were found to have increased risk for substance use, depression, and suicide. For example, Subica, et al (2018), conducted analyses using data from 1991-2015 Combined National Youth Behavioral Risk Surveys and found that Native Hawaiian/Pacific Islander had a higher prevalence for depressed moods, suicide ideation, planning, and attempts compared to non-Hispanic White adolescents. Harder, et al (2012), reported that suicide was most prominent among indigenous youth as individuals suffered from acculturation and oppression, resulting in fragmentation and dislocation of culture that might negatively influence a person’s identity and self-esteem. The authors emphasized culture as an important protective factor against indigenous youth suicide. Thus, the present study showed variation in the prevalence of suicide attempts among several of the Asian and Pacific Islander racial groups that are typically aggregated together in national studies, suggesting the importance of evaluating specific subgroups when possible.

<table>
<thead>
<tr>
<th>Effect</th>
<th>Crude PR</th>
<th>Adjusted PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/Ethnicity (Reference=White)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native Hawaiian</td>
<td>3.66</td>
<td>3.03</td>
</tr>
<tr>
<td>Filipino</td>
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<td>1.76</td>
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<td>3.37</td>
</tr>
<tr>
<td>Other Race</td>
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<td>2.03</td>
</tr>
<tr>
<td>Do not describe as only one race/ethnicity</td>
<td>1.92</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Figure 2. Forest plot of adjusted prevalence ratios (PR) for suicide attempt by race/ethnicity when depressive symptoms were not present. Adjusted prevalence ratio adjusts for race/ethnicity, depressive symptoms, bullying, illicit drug use, alcohol use, and self-harm. The plot displays the adjusted prevalence ratio with 95% confidence intervals. The vertical line represents a prevalence ratio of 1.0, where there is no effect.
In this study, other Pacific Islanders reported the highest prevalence in adolescent suicide attempts compared to other race groups when depressive symptoms were not present. This is consistent with past research that adolescent suicide rates in the Pacific Islands were among the highest in the world.\textsuperscript{20,22} However, there is a lack of recent literature on adolescent suicide studying the Pacific Islander populations alone. When they were included in studies, these populations were often combined with other race groups into one aggregated group, making it difficult to draw conclusions based on this population alone.\textsuperscript{23}

This study demonstrated that when depressive symptoms were present, there was a higher prevalence of suicide attempts among those who do not describe as only one race/ethnicity compared to Whites. It is possible these youth with multiracial identities struggled with integrating their diverse racial identities, due to the person’s perception that the multiple racial identities were distinct and in conflict with one another,\textsuperscript{24} resulting in perceived racial discrimination and poor mental health outcomes.\textsuperscript{25,26} However, due to the limited information provided in the YRBS survey, it is not clear in this study how the prevalence of suicide attempts in this group differed from the group who were multiracial but identified as a single race.

Our study revealed that adolescents who experienced bullying, those who used illicit drugs, or those who had harmed themselves were more likely to have suicide attempts, compared to those who did not experience bullying, did not use illicit drugs, or did not harm themselves. The strongest predictor for suicide attempt was self-harm. An incremental, upward trend was found for self-harm, with youth who had hurt themselves repeatedly about 5 times more likely to have attempted suicide compared to those without self-harm. This is consistent with past research that indicated non-suicidal self-injury as a significant predictor for subsequent suicidal thoughts/behaviors.\textsuperscript{27} This study provides valuable information of the impact of self-harm on suicide attempts and highlights the need of screening adolescents for self-harm.

Suicide has a devastating impact on families, friends, and communities. Identifying groups at increased risk through available data may help inform public health programs in the development of targeted outreach with aims to reduce adolescent suicide attempts and improve the overall mental health of youth in Hawai‘i. Public health professionals who work with adolescents are encouraged to screen for depressive symptoms and self-harm and provide appropriate follow up that may help reduce the rate of adolescent suicide attempts in Hawai‘i. Increasing awareness of disparities in suicide attempts among the Native Hawaiian and other Pacific Islander race groups, those who experience depression symptoms, and those who had harmed themselves, would be crucial to help reduce the occurrence of suicide attempts in adolescents.
Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Hawai‘i State Department of Health.

Conflict of Interest

None of the authors identify a conflict of interest.

Acknowledgements

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Examination of Associations between Physical Activity and Eating Identities among College-aged Adults Living in Hawai‘i

Brook E. Harmon PhD; Cardella L. Leak PhD; Hongmei Zhang PhD; Nathan T. West MS; Claudio R. Nigg PhD

Abstract

While physical activity and diet behaviors are correlated, mechanisms underlying associations have rarely been examined. This study examined associations between physical activity identity and eating identity among college-aged adults in Hawai‘i to provide guidance for future multiple behavior change interventions. This study was a cross-sectional analysis of data collected between September 2013 and January 2014. Participants were 40 college students attending 4-year and 2-year institutions within the University of Hawai‘i system. Total physical activity identity score and dimensions were measured using the Athlete Identity Questionnaire. Eating identity subtypes were measured using the Eating Identity Type Inventory. Associations between physical activity identity total score, 4 physical activity identity dimensions (appearance, importance, competence, and encouragement), and 4 eating identity subtypes (healthy, emotional, meat, and picky) were examined using multiple linear regressions. A significant positive association was found between total physical activity identity score and the healthy eating subtype and a negative association with the picky eating subtype. The physical activity dimension importance had a significant positive association with the healthy eating subtype, appearance a negative association with the emotional eating subtype, and competence a positive association with the meat eating subtype but a negative association with the picky eating subtype. The findings suggest important overlap in identities for physical activity and diet. Measurement of physical activity identity and eating identity as well as tailored intervention strategies should be incorporated into more behavior change research.

Keywords

obesity; identity theory; multiple behavior change; young adults; emerging adulthood

Abbreviations and Acronyms

AIQ = Athlete Identity Questionnaire
EI = eating identity
EITI = Eating Identity Type Inventory
M = mean
PAI = physical activity identity
SD = standard deviation

Introduction

Despite known health benefits, many college-aged adults fail to adopt and maintain healthy physical activity and diet behaviors contributing to a rise in obesity during young adulthood.1-3 In Hawai‘i, 19% of college-aged adults (18-24 years)4 are obese and nearly 23% have at least 1 chronic disease. In addition, only half of college-aged adults in Hawai‘i meet physical activity recommendations5 and less than half consume fruits (45%) or vegetables (28%) once per day.4

While research has traditionally focused on changing physical activity and diet behaviors in isolation, multiple behavior change interventions have been increasing in number.6-7 This is partly due to research indicating health behaviors often cluster together6-8 as well as the potential for multiple behavior change interventions to increase health benefits and reduce healthcare costs.6-7,10 However, these interventions are an understudied area6,7,10,11 especially interventions with young adults and racial/ethnic minority groups.6

Studies examining physical activity and diet behavior change have been mixed regarding the proportion of individuals currently engaged in or ready to engage in both physical activity and healthy diet behaviors.7,12 These studies suggest being further along in the change process of 1 behavior may enable change in other behaviors although cognitive focused interventions may be needed to move forward the less advanced behavior.9,12 Unfortunately, a lack of research on psychosocial constructs that motivate changes across behaviors currently limits the field.3-11 Therefore, understanding psychosocial constructs that connect physical activity and diet behaviors is important when developing theory-based targets for multiple behavior change interventions aimed at reducing obesity.13,14

Identity theory is particularly relevant for multiple behavior change research as it suggests the self is multi-faceted and hierarchically organized based on an individual’s view of themselves within a particular role.15-16 Identities are meanings individuals attach to roles played in society17 that build upon past experiences and serve as a standard for behavior.18 Individuals enact multiple roles daily and each role taps into an identity.19 Identities are managed by individuals assigning importance to identities and enacting identity-congruent behaviors.20 However, occasions exist where multiple identity-congruent behaviors are enacted at once,21,22 suggesting overlap in identities (eg, physical activity and diet) as well as their congruent behaviors (eg, exercise and healthy eating patterns) and a potential mechanism by which multiple behavior change interventions may work.

Individuals with a high degree of physical activity-related identity (PAI) have increased participation in physical activity, and development of PAI at younger ages is associated with engagement in physical activity later in life.23,24 Historically, PAI has been labeled “athlete identity,” which was conceptualized as a single construct with multiple dimensions related to sport involvement.23 The field has evolved to measure PAI...
using more global concepts of physical activity. The Athlete Identity Questionnaire (AIQ) was developed using a definition inclusive of sport, exercise, and physical activity involvement.

The AIQ also assesses PAI as a multidimensional construct inclusive of 4 dimensions that connect PAI to psychosocial constructs that underlie the behavior change theories of Social Cognitive Theory, Transtheoretical Model, and Theory of Planned Behavior. Research on mediators highlight these theories and their psychosocial constructs as important to diet and physical activity behavior change. The PAI dimensions of appearance, importance, competence, and encouragement align with the psychosocial constructs of outcome expectations, identity salience, self-efficacy, and social support, respectively.

How an individual eats is another way to assign identity. Within eating identity (EI) research, healthy EI has been the primary focus and linked with healthier dietary practices. However, many people do not identify as a healthy eater. EI research now acknowledges the existence of multiple EIs leading to the development of the Eating Identity Type Inventory (EITI), which includes scales measuring the presence of healthy, meat, emotional, and picky EI subtypes.

It may be particularly important to understand if there are psychosocial constructs that underlie both PAI and EI among young adults, a time period when the process of exploring, establishing, monitoring, and revising identities is particularly active. Despite this malleability, few multiple behavior change interventions target college-aged adults, and those that have, found it difficult to achieve significant positive results. A lack of knowledge about the psychosocial constructs that should be targeted has impeded success, and a better understanding of between-behavior relationships and cross-behavior influences is needed.

The purpose of this study was to examine associations between PAI and EI among college-aged adults living in Hawai‘i to provide guidance for future multiple behavior change research. Associations between total PAI score, PAI dimensions (ie, appearance, importance, competence, and encouragement), and EI subtypes (ie, healthy, emotional, meat, and picky) were examined.

Methods

Participants

Participants were 40 students who attended 4-year and 2-year institutions in the University of Hawai‘i system and were at least 18 years of age at the time of recruitment. Participants were recruited using a mix of posted flyers and on-campus recruitment tables between September 2013 and January 2014. Recruitment for this study was part of a larger qualitative study seeking input on programming associated with the construction of a new on-campus recreation center. A $15 gift card was given to each participant. Approval was received from the University of Hawai‘i Institutional Review Board before recruitment or data collection began (CHS#21355).

Measures

Participants signed an informed consent form and returned it in person or via email. They then completed demographic questions, screeners of dietary intake developed and validated by the National Cancer Institute, and validated physical activity questions from Project EAT along with questions examining participant’s PAI and EI. Surveys were collected via email or in person before focus groups were conducted to reduce the discussion biasing responses.

Physical Activity Identity (PAI)

The AIQ includes 21 items that differentiate 4 dimensions of PAI: appearance, importance, competence, and encouragement (see Table 1). The questionnaire items have been validated in both adult and adolescent populations with coefficient reliabilities ranging from 0.68 to 0.89. Participants answered questions using a 5-point, Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Traditionally, the items from each dimension are added together and all dimension scores summed to compute a total score, but means for each dimension are presented. These steps were followed and means were used in all analyses to enable comparisons with EI subtypes.

Eating Identity (EI)

A previous validation study in adults examined the structure of the 11-item EITI, which included 4 EI dimension subscales: healthy, emotional, meat, and picky (see Table 1) and found acceptable internal consistencies with Cronbach alpha’s ranging from 0.61 to 0.82. Participants responded using a 5-point, Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) for each subscale. Mean scores were calculated for each EI dimension with higher scores indicating a greater affinity for that EI dimension.

Data Analysis

Data were analyzed using SPSS software, version 23 (IBM Corp., Armonk, NY) and SAS® software, version 9.4 (SAS Institute Inc., Cary, NC). No data were missing and, based on a review of Q-Q plots, were normally distributed. Internal consistency for the PAI dimensions and EI subtypes were assessed using Cronbach’s alpha (Table 1). Previous research suggests identities associated with more developed behaviors may predict development of other behavior-related identities. A previous analysis from this dataset found the majority of participants
(55%) were further along in physical activity-related behaviors, as measured by meeting recommendations. Therefore, PAI-related variables were entered as independent variables and EI-related variables as dependent variables in all analyses.

A multiple linear regression was used to examine associations between participant total PAI score and EI subtype (healthy, emotional, meat, or picky). A second set of multiple linear regressions were conducted to examine associations between each PAI dimension (appearance, importance, competence, and encouragement) and EI subtype to provide insight on potential psychosocial construct associations across behaviors (ie, outcome expectations/appearance, identity salience/importance, self-efficacy/competence, social support/encouragement).

**Results**

Participants had a mean age of 25 (SD = 7.85), were 65% female, and 58% originally from Hawai‘i. Most participants identified as Asian American (33%) or of mixed ethnicity (30%) and either lived with their parents (45%) or lived in other off-campus housing (30%). Participants ate on average 2.92 (SD = 2.63) cup equivalents of fruits and vegetables per day, had 31% (SD = 5.99) of their calories coming from fat, and participated in 3.59 (SD = 3.35) hours of moderate-to-vigorous physical activity per week. Additional information about the participant population can be found in previous publications.

Good internal consistency was found for items on the AIQ (α = 0.62 - 0.94) and EITI (α = 0.62 - 0.83) as shown in Table 1. On average, participants received a PAI total score of 3.10 (SD = 0.70). The average scores for each PAI dimension were 3.04 (SD = 1.13) for appearance, 3.49 (SD = 1.03) for competence, and 3.39 (SD = 0.94) for encouragement. For EI, the picky EI subtype had the lowest mean of 2.20 (SD = 1.02) while the meat EI subtype had the highest mean of 3.69 (SD = 1.07). The healthy EI subtype had a mean of 3.26 (SD = 0.71) and the emotional EI subtype a mean of 2.94 (SD = 0.95).

When the associations between total PAI score and EI subtypes were examined, statistically significant associations were seen with the healthy EI subtype (F(1,38) = 10.78, P = .002; R² = 0.22) and the picky EI subtype (F(1,38) = 5.29, P = .03; R² = 0.12). Total PAI score was positively associated with the healthy EI subtype and negatively associated with the picky EI subtype (Table 2).

When regression results for each PAI dimension and EI subtype were examined, different associations were seen between each dimension and subtype (Table 2). The PAI domain importance

---

**Table 1. Internal Consistencies for Subscales Used in Assessing Eating and Physical Activity Identity among College Students in Hawai‘i September 2013-January 2014 (n=40)**

<table>
<thead>
<tr>
<th>EITI</th>
<th>AIQ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthy Eater α = .83</strong></td>
<td>Appearance α = .94</td>
</tr>
<tr>
<td>1. I am a healthy eater</td>
<td>1. I think I look athletic, like a person who exercises</td>
</tr>
<tr>
<td>2. I am someone who eats in a nutritious manner</td>
<td>2. I look like I never work out</td>
</tr>
<tr>
<td>3. I am someone who is careful about what I eat</td>
<td>3. My body looks in shape</td>
</tr>
<tr>
<td></td>
<td>4. My body looks well-proportioned</td>
</tr>
<tr>
<td></td>
<td>5. I look like a person who is physically fit</td>
</tr>
<tr>
<td></td>
<td>6. It’s obvious to others that I’m flabby and out of shape</td>
</tr>
<tr>
<td><strong>Emotional Eater α = .77</strong></td>
<td>Importance α = .87</td>
</tr>
<tr>
<td>1. I am an overeater</td>
<td>1. I schedule time to exercise</td>
</tr>
<tr>
<td>2. I am someone who eats more when stressed or anxious</td>
<td>2. I don’t let other things get in the way of my exercise/sport activity</td>
</tr>
<tr>
<td>3. I am someone who eats more when sad or depressed</td>
<td>3. I use several specific strategies to help me maintain regular exercise</td>
</tr>
<tr>
<td></td>
<td>4. After illness or injury, I begin exercising again as soon as possible</td>
</tr>
<tr>
<td></td>
<td>5. I would be very irritated if something prevented me from participating in a session of exercise I had planned to do</td>
</tr>
<tr>
<td></td>
<td>6. I plan specific alternate times, places, and/or types of exercise to use if I miss an exercise session</td>
</tr>
<tr>
<td><strong>Picky Eater α = .80</strong></td>
<td>Competence α = .87</td>
</tr>
<tr>
<td>1. I am a picky eater</td>
<td>1. I could participate in several types of physical activity if I wanted to</td>
</tr>
<tr>
<td>2. I am someone who likes to eat a lot of different things (reversed scale)</td>
<td>2. I simply don’t have much athletic ability</td>
</tr>
<tr>
<td>3. I am someone who likes to try new foods (reverse scale)</td>
<td>3. In most physical activities, I feel I can become skilled with sufficient effort and practice</td>
</tr>
<tr>
<td></td>
<td>4. I’m not very good at athletic activities</td>
</tr>
<tr>
<td></td>
<td>5. I’m confident of my athletic skills</td>
</tr>
<tr>
<td><strong>Meat Eater α = .62</strong></td>
<td>Encouragement α = .90</td>
</tr>
<tr>
<td>1. I am a meat eater</td>
<td>1. I receive encouragement from others for exercising</td>
</tr>
<tr>
<td>2. I am someone who likes meat with every meal</td>
<td>2. My family/closest friends are enthusiastic about any effort/proGRESS I make concerning exercise/sport</td>
</tr>
<tr>
<td></td>
<td>3. My family/roommates/companions are very willing to accommodate my involvement in exercise/sport</td>
</tr>
<tr>
<td></td>
<td>4. I get a lot of reinforcement from others regarding my physical activity</td>
</tr>
</tbody>
</table>

Notes: Eating Identity Type Inventory = EITI; Athletic Identity Questionnaire = AIQ
Table 2. Associations between Physical Activity Identity (Total Score and Dimension Scores) and Eating Identity Subtypes among College Students in Hawai‘i September 2013-January 2014 (n=40)

<table>
<thead>
<tr>
<th>Eating Identity Subtype</th>
<th>Total PAI</th>
<th>Appearance</th>
<th>Importance</th>
<th>Competence</th>
<th>Encouragement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Eater</td>
<td>.22*</td>
<td>.36*</td>
<td>.22</td>
<td>.12</td>
<td>-.13</td>
</tr>
<tr>
<td>Emotional Eater</td>
<td>.07</td>
<td>.37</td>
<td>.19</td>
<td>.20</td>
<td>.20</td>
</tr>
<tr>
<td>Meat Eater</td>
<td>.01</td>
<td>.27</td>
<td>.18</td>
<td>.21</td>
<td>.20</td>
</tr>
<tr>
<td>Picky Eater</td>
<td>.12</td>
<td>.35*</td>
<td>.18</td>
<td>.37</td>
<td>.14</td>
</tr>
</tbody>
</table>

Notes: PAI = physical activity identity, *represents significant P-values of <.05

had a significantly positive association with the healthy EI subtype (β = 0.45, P = .006) while appearance had a significant negative association with the emotional EI subtype (β = -0.48, P = .01). The PAI domain competence had a statistically significant positive association with the meat EI subtype (β = 0.51, P = .007), but a negative association with the picky EI subtype (β = -0.37, P = .04). The PAI domain encouragement was not significantly associated with any of the EI subtypes.

Discussion

Incorporating identity theory into the design of multiple behavior change interventions for physical activity and diet may be effective in combating rising rates of obesity, especially among young adults. However, to-date few studies have examined psychosocial constructs that would allow PAI and EI to simultaneously be the focus of multiple behavior change strategies. This study found a significant positive association between total PAI score and the healthy EI subtype. In addition, significant associations between the PAI dimensions of appearance, importance, and competence and EI subtypes, emotional, healthy, meat, and picky (respectively), indicate psychosocial construct overlap between PAI and EI. These associations provide potential cross-behavior associations that can be examined in larger samples and through the testing of intervention strategies.

The current study had similar scoring patterns to the validation study of the EITI. The picky EI subtype had the lowest mean score in both studies; however, participants in the current study had the highest mean score for the meat EI subtype while participants in the validation study had the highest mean score for the healthy EI subtype. Participants in the validation study were on average older than participants in the current study and participants from the 2 studies came from different geographical regions. Therefore, variation in EI subtypes is expected as studies indicate adults increase their interest in healthy eating with age and variation exists in dietary patterns by geography and race/ethnicity.

A higher total PAI score and score on the PAI domain importance were associated with a higher mean score for the healthy EI subtype in the current study. Total PAI score and the domain importance have been associated with higher engagement in physical activity among adolescents and college students in previous studies. Previous research also has found physical activity and diet behaviors cluster with individuals who identify as healthy-eaters often engaging in regular physical activity and vice versa.

Total PAI score and the PAI domain competence were negatively associated with the picky EI subtype. Picky eating is often thought to be a transient behavior only found in childhood; however, research indicates a picky EI exists in adulthood and has significant impacts on eating and overall health. In a study of college students, higher scores on a picky eating scale were associated with lower intake of fruits and vegetables as well as reduced variation in fruit and vegetable selections. Past studies also found picky eaters often identify as "unhealthy eaters;" therefore, it is not unexpected for total PAI scores to be negatively associated with the picky EI subtype, given the positive association with the healthy EI subtype in this study.

Dietary interventions have found self-efficacy to be a determinant of whether someone develops healthier eating behaviors,
which aligns with this study’s finding of a negative association between the PAI domain of competence and the picky EI subtype.\textsuperscript{31,56,61} Given this negative association, more research is needed to determine whether assessing EI subtypes within multiple behavior change interventions is beneficial for identifying subtypes such as picky. While all intervention participants may benefit from increases in self-efficacy,\textsuperscript{31-33} those with a picky EI subtype may need particular focus on strategies that help build self-efficacy to improve both physical activity and diet behaviors.

When PAI domains were examined, lower scores on the PAI domain appearance were associated with higher emotional EI subtype scores. Previous studies have found associations between appearance and less healthy eating patterns, including emotional eating.\textsuperscript{62,66} Specifically, studies indicate emotional and other forms of disordered eating occur in response to seeking a thin or muscular ideal along with body dissatisfaction.\textsuperscript{63-65} Findings from this study along with previous literature\textsuperscript{66} suggest more research is needed on successful intervention strategies that incorporate body acceptance and outcome expectations not related to appearance, especially for behavior change interventions aimed at emotional eaters.

The PAI dimension competence was positively associated with the meat EI subtype. To better understand this association, variables were examined stratified by sex. Males compared to females exhibited higher means for both the meat EI subtype (M = 4.2 and 3.4, respectively) and the competence dimension (M = 3.7 and 3.3, respectively). The relationship between increased meat eating and masculinity has been noted in the literature,\textsuperscript{66} and a study with college students found males reported higher levels of self-efficacy related to physical activity than females.\textsuperscript{67} A study of adults in Hawai‘i found Native Hawaiian and White males had higher levels of physical activity-related self-efficacy compared to males and females of other race/ethnic groups; however, males across racial/ethnic groups may need targeted help to meet fruit and vegetable recommendations.\textsuperscript{68} One study found a high meat EI was reduced and a healthy EI increased using intervention messaging, and this modification may be enhanced if future studies incorporate psychosocial constructs from Theory of Planned Behavior as well as Social Cognitive Theory.\textsuperscript{69} Given these findings, intervention strategies that enable college-aged adults to transfer competence in physical activity to eating a healthy diet should be tested and gender differences across racial/ethnic groups examined.

Each PAI domain was significantly associated with at least 1 EI subtype except for encouragement. While encouragement may be needed in defining oneself as someone who is active,\textsuperscript{27} it may not be as transferrable to other behaviors. A previous study using the AIQ found only parental encouragement was associated with children’s engagement in physical activity. However, parent encouragement was not associated with children’s participation in team sports or with adolescent physical activity engagement.\textsuperscript{23} In addition, a review of physical activity, diet, and screen time interventions for adolescents found parental support was a mediator for diet change, but not other behaviors.\textsuperscript{31} Additional research is needed to better understand how social support-related constructs, source of support, and type of behavior intersect to influence physical activity and diet behavior change.

Limitations to this study include its small sample size, which likely restricted the ability to find additional significant associations. In addition, the data are cross-sectional, negating the ability to make causal statements. Further, the study population was comprised of a convenience sample recruited in 2013-2014, which limits generalizability of the findings. However, 2-year college students and a multi-ethnic population were recruited, tapping into college populations that are not commonly recruited.\textsuperscript{69,70} While the AIQ is successful at capturing physical activity involvement across multiple dimensions, it is not the most commonly used exercise identity measure. However, the more commonly used Exercise Identity Scale has been criticized as not fully representing “role-identity”\textsuperscript{71} nor is it divided into psychosocial subscales. Additionally, since the AIQ scale was related to physical activity and not dietary psychosocial constructs, interpretations may differ if diet specific psychosocial constructs (eg, self-efficacy for eating healthy) are measured and incorporated into analyses.

**Conclusion**

Despite these limitations, the present study was conducted with a population rarely included in multiple behavior change interventions.\textsuperscript{4} In addition, most research on PAI and EI has been siloed with little guidance on incorporating identity measurement into behavior change research. Given this study’s findings, physical activity and diet research should incorporate measures of PAI and EI as associations exist that could help researchers better influence both behaviors. This study adds to previous research indicating physical activity and diet behaviors are correlated and may be transferrable (ie, if 1 behavior is changed, the other is influenced)\textsuperscript{72} as well as research indicating identities may be central to why some but not all individuals with intentions to change behaviors do change.\textsuperscript{61,68,72} Study findings suggest the PAI dimensions of appearance and competence as well as tailored strategies for some EI subtypes (eg, picky, emotional, and meat) should be examined further to progress research aimed at changing both physical activity and diet behaviors.

**Conflict of Interest**

None of the authors identify any conflicts of interest.
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References


Pre-Surgical COVID-19 Incidence in Relation to Public Health Initiatives and Community Perceptions

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Introduction

The absolute impact of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or COVID-19 pandemic upon healthcare facilities across the United States may take years to quantify (if even possible), and organizational or regional comparisons, in terms of preventive and remedial efficiencies, would be inequitable. Given the increasing prevalence of COVID-19, and in compliance with governmental directives at that time, the Shriners Hospitals for Children (SHC; an organization dedicated to provide care for children regardless of the family’s ability to pay) ceased elective surgeries between March and May 2020. As surgical services resumed in mid-May, preadmission testing for COVID-19 was required of all patients scheduled for elective outpatient or inpatient surgery. Testing for COVID-19 served to ensure that the health of patients presenting for elective procedures was optimal and to prevent suffering from both the viral infection and added stress of a surgical procedure, which may have led to unforeseen negative outcomes. Furthermore, testing also safeguarded the wellbeing of the healthcare team providing care to these patients. Patients who tested positive had their surgeries rescheduled for a later date in accordance with mandated precautions put forth by the Centers for Disease Control and Prevention (CDC).

During this time, media reports were robust with accounts of regional disparities in the prevalence of COVID-19, as well as the public implementation of and personal adherence to COVID-19 restrictions in communities across the United States. To further understand regional variation in infection control measures, and best care practices and the health of the pediatric patients served within the SHC system, the incidence of COVID-19 was assessed with data from 10 Shriners hospitals.

Pre-Surgical COVID-19 Testing

The electronic medical records of patients who were tested for COVID-19 (with test results recorded) and scheduled for elective surgery between May 18 to July 22, 2020 (10 weeks) were reviewed. During this time frame, the alpha variant was the predominant, if not the only, variant circulating, and vaccination approval would not occur until August 2021, with vaccination for children to follow in October 2021. Data elements extracted included age; sex; race; ethnicity; COVID-19 test date, type, and result; type of surgery; and COVID-19-related symptoms (ie, if positive test result). Statistical analysis including chi-square, Fisher’s exact, and Wilcoxon rank sum test with statistical significance set at P<.05 (two-sided) was performed using SAS software version 9.4 (SAS Institute Inc, Cary, NC).

A total of 1281 patients were tested for COVID-19 and scheduled for elective surgery during the 10-week review period, with 1269 (99.1%) testing negative and 12 (0.9%) testing positive. Of these 12, 7 were from Shriners hospitals located in the western region (Honolulu, Pasadena, and Portland), 3 from the central region (Chicago, Salt Lake, Shreveport, and Texas), and 2 from the eastern region (Ohio, Philadelphia, and Springfield). There were no COVID-19-related symptoms observed or reported for any patients tested. All positive results were considered asymptomatic cases, which, in turn, were potential sources of infectivity. Table 1 presents demographic information and descriptive statistics for the patient sample and by region. There appeared to be an association between region and COVID-19 test result between the western and central regions (odds ratio 3.9, 95% confidence interval 1.001 to 15.1; relative risk 3.8, 95% confidence interval 0.99 to 14.8) but it did not reach the level of statistical significance. Other regional comparisons between the west and east, and central and east were not significant (see Table 2). Sex, race, or ethnicity was not associated with COVID-19 test result, and patients who tested positive versus negative were not significantly different in terms of age.
Table 1. Demographic Information and Descriptive Statistics of the Pediatric Patient Sample by Region

<table>
<thead>
<tr>
<th></th>
<th>Overall (N=1281)</th>
<th>Western Region (N=380)</th>
<th>Central Region (N=625)</th>
<th>Eastern Region (N=276)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years; mean, st. dev., range)</strong></td>
<td>10.3 5.5</td>
<td>9.8 5.5</td>
<td>10.6 5.5</td>
<td>10.5 5.5</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Female</td>
<td>653 51</td>
<td>197 51.8</td>
<td>319 51</td>
<td>137 49.6</td>
</tr>
<tr>
<td>Male</td>
<td>628 49</td>
<td>183 48.2</td>
<td>306 49</td>
<td>139 50.4</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>12 0.9</td>
<td>7 1.8</td>
<td>3 0.5</td>
<td>2 0.7</td>
</tr>
<tr>
<td>Asian</td>
<td>135 10.5</td>
<td>87 22.9</td>
<td>31 5</td>
<td>17 6.2</td>
</tr>
<tr>
<td>Black or African American</td>
<td>113 8.8</td>
<td>8 2.1</td>
<td>73 11.7</td>
<td>32 11.6</td>
</tr>
<tr>
<td>Native Hawaiian/Other Pacific Islander</td>
<td>56 4.4</td>
<td>53 14</td>
<td>2 0.3</td>
<td>1 0.4</td>
</tr>
<tr>
<td><strong>Ethnicity (missing=1)</strong></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Hispanic Latino</td>
<td>222 17.3</td>
<td>71 18.7</td>
<td>120 19.2</td>
<td>31 11.3</td>
</tr>
<tr>
<td>Non-Hispanic Latino</td>
<td>874 68.3</td>
<td>268 70.5</td>
<td>400 64</td>
<td>206 74.9</td>
</tr>
<tr>
<td>Declined</td>
<td>11 0.9</td>
<td>- -</td>
<td>- -</td>
<td>11 4</td>
</tr>
<tr>
<td>Multiple</td>
<td>1 0.1</td>
<td>- -</td>
<td>1 0.2</td>
<td>- -</td>
</tr>
<tr>
<td><strong>Surgery Type</strong></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Cleft lip/palate</td>
<td>107 8.4</td>
<td>9 2.4</td>
<td>88 14.1</td>
<td>10 3.6</td>
</tr>
<tr>
<td>Dental</td>
<td>89 7</td>
<td>75 19.7</td>
<td>12 1.9</td>
<td>2 0.7</td>
</tr>
<tr>
<td>Neurologic</td>
<td>2 0.2</td>
<td>- -</td>
<td>- -</td>
<td>2 0.7</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>950 74.2</td>
<td>274 72.1</td>
<td>488 78.1</td>
<td>188 68.1</td>
</tr>
<tr>
<td>Physical Medicine &amp; Rehabilitation (PM&amp;R)</td>
<td>6 0.5</td>
<td>- -</td>
<td>- -</td>
<td>6 2.2</td>
</tr>
<tr>
<td>Plastic</td>
<td>68 5.3</td>
<td>4 1.1</td>
<td>- -</td>
<td>64 23.2</td>
</tr>
<tr>
<td>Urologic</td>
<td>4 0.3</td>
<td>- -</td>
<td>- -</td>
<td>4 1.5</td>
</tr>
<tr>
<td>Other</td>
<td>55 4.3</td>
<td>18 4.7</td>
<td>37 5.9</td>
<td>- -</td>
</tr>
<tr>
<td><strong>COVID-19 Testing</strong></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Type</td>
<td></td>
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<td></td>
<td></td>
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<td>In-vitro diagnostic</td>
<td>1 0.1</td>
<td>- -</td>
<td>- -</td>
<td>1 0.4</td>
</tr>
<tr>
<td>Isothermal nucleic acid amplification</td>
<td>253 19.8</td>
<td>- -</td>
<td>177 26.3</td>
<td>76 27.5</td>
</tr>
<tr>
<td>Nasopharyngeal swab/washing</td>
<td>164 12.8</td>
<td>- -</td>
<td>- -</td>
<td>164 59.4</td>
</tr>
<tr>
<td>Polymerase chain reaction (PCR)</td>
<td>699 54.6</td>
<td>305 49</td>
<td>305 48.8</td>
<td>14 5.1</td>
</tr>
<tr>
<td>Rapid COVID amplified probe</td>
<td>18 1.4</td>
<td>- -</td>
<td>- -</td>
<td>18 6.5</td>
</tr>
<tr>
<td>Not listed</td>
<td>2 0.2</td>
<td>- -</td>
<td>- -</td>
<td>2 0.7</td>
</tr>
<tr>
<td>Other</td>
<td>143 11.2</td>
<td>- -</td>
<td>143 22.9</td>
<td>- -</td>
</tr>
<tr>
<td>Unspecified</td>
<td>1 0.1</td>
<td>- -</td>
<td>- -</td>
<td>1 0.4</td>
</tr>
</tbody>
</table>
Table 1. Demographic Information and Descriptive Statistics of the Pediatric Patient Sample by Region (continued)

<table>
<thead>
<tr>
<th>Result</th>
<th>Overall (N=1281)</th>
<th>Western Region (N=380)</th>
<th>Central Region (N=625)</th>
<th>Eastern Region (N=276)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Negative</strong></td>
<td>1269</td>
<td>99.1</td>
<td>373</td>
<td>98.2</td>
</tr>
<tr>
<td><strong>Positive</strong></td>
<td>12</td>
<td>0.9</td>
<td>7</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No</strong></td>
<td>1281</td>
<td>100</td>
<td>380</td>
<td>100</td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Data: electronic Medical Records from 10 Shriners Hospitals for Children hospitals.

Table 2. Regional Variation in Positive COVID-19 Test Results

<table>
<thead>
<tr>
<th>Region</th>
<th>Test Result</th>
<th>Total</th>
<th>Fisher’s exact test (two-sided) P = .048</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West (vs Central)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (70)</td>
<td>373 (37.5)</td>
<td>OR: 3.8910; 95% CI: 1.0001 to 15.1385</td>
</tr>
<tr>
<td>No</td>
<td>3 (30)</td>
<td>622 (62.5)</td>
<td>RR (C1): 3.8377; 95% CI: 0.9984 to 14.7517</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>995</td>
<td>RR (C2): 0.9863; 95% CI: 0.9718 to 1.0010</td>
</tr>
<tr>
<td><strong>West (vs East)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (77.8)</td>
<td>412 (63.7)</td>
<td>OR: 1.9964; 95% CI: 0.4114 to 9.6885</td>
</tr>
<tr>
<td>No</td>
<td>2 (22.2)</td>
<td>235 (36.3)</td>
<td>RR (C1): 1.9797; 95% CI: 0.4146 to 9.4529</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>647</td>
<td>RR (C2): 0.9917; 95% CI: 0.9748 to 1.0088</td>
</tr>
<tr>
<td><strong>Central (vs East)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3 (60)</td>
<td>623 (69.4)</td>
<td>OR: 0.6597; 95% CI: 0.1096 to 3.9704</td>
</tr>
<tr>
<td>No</td>
<td>2 (40)</td>
<td>274 (30.6)</td>
<td>RR (C1): 0.6613; 95% CI: 0.1111 to 3.9357</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>897</td>
<td>RR (C2): 1.0025; 95% CI: 0.9911 to 1.0140</td>
</tr>
</tbody>
</table>

Conclusion

Previous studies involving other children’s hospitals in the United States reported geographical variability in the prevalence of COVID-19 (i.e., east higher than west⁴), and a pooled prevalence of 0.65%, during comparable timeframes.⁵ The overall (0.9%), western (1.8%; 7/380) and eastern (0.7%; 2/276) regional incidence rates indicated that COVID-19 was slightly higher within this SHC pediatric population and regional variability was reversed compared to other studies (i.e., west higher than east [and central]). In addition, patients in the western (versus central) region were more than 3 times as likely to have tested positive. This particular finding could simply be reflective of the region(s) examined during that specific time, but not indicative of regional invariability concerning COVID-19 as reflected by differing results that were observed as compared to prior studies.

From a public health perspective, civic responses to COVID-19 ranged along a proactive-passive continuum (i.e., variable adherence to public policies such as sheltering in place, mask mandates, limited gathering sizes, and such⁶), which corresponded with varying rates of COVID-19 between United States communities. This development was unfortunate when considered within the control and prevention milieu needed to slow this pandemic (i.e., higher compliance with public health mandates had the potential to decrease COVID-19 spread). However, the overall 0.9% positivity rate found across 10 Shriners hospitals was comparable with that reported among other pediatric hospitals,⁴,⁵ and supported the relative efficacy of public health initiatives enacted in response to COVID-19 within the regions assessed. The effectiveness of public health measures in limiting the prevalence of COVID-19 depended upon a local community’s acceptance and compliance, which, in turn, seemingly differed as well. Moreover, the low regional incidence rates highlighted the similarity of infectivity among SHC's, and other pediatric, patients despite demographic differences (e.g., race or socioeconomic status, which was deemed significant by other studies).⁴-⁷ This study’s primary limitation concerns the retrospective collection of data from medical records, which was performed by different individuals at 10 Shriners hospitals. Although medical
records were maintained within the same electronic system, data integrity depended on the quality of documentation both into and from them. However, the data elements of interest were standardized entries and/or accessible via scanned documents within the medical records. The pediatric patients included in this review may not fully represent the general pediatric population, which limits the generalizability of findings, for example, to those who were scheduled for elective (vs. urgent) surgery and with comparable demographic characteristics. In addition, although COVID-19 testing methodology varied within and between regions (eg, data heterogeneity), the respective precision of the different testing methods supported data integrity.

Given that the prevalence of COVID-19 appears to be low in this SHC pediatric population, pre-surgical testing seems to be an effective tool in identifying (a)symptomatic incidence. This routine practice allows for the optimization of these patients’ health prior to surgery, and helps to protect their families, patient peers, and hospital staff against COVID-19 infection. Institutional efficacy and patient well-being are thereby advanced with having direct knowledge of hospital-specific COVID-19 incidence and regional prevalence rates (versus estimates), which can be weighed alongside publicly available databases (eg, state or county government, or John Hopkins University), and in conjunction with current public health initiatives in order to help determine effective policy with regards to hospital operations during the pandemic.

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- Shriners Hospitals for Children, Pasadena, CA (DZ)
- Shriners Hospitals for Children, Philadelphia, PA (BB)
- Shriners Hospitals for Children, Portland, OR (RB)
- Shriners Hospitals for Children, Salt Lake City, UT (KC)
- Shriners Hospitals for Children, Shreveport, LA (CM)
- Shriners Hospitals for Children, Springfield, MA (SG)

**References**

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1. Organizations, university divisions, and other research units considering publication of a sponsored supplement should consult with the HJH&SW editorial staff to make certain the educational objectives and value of the supplement are optimized during the planning process.

2. Supplements should treat broad topics in an impartial and unbiased manner. They must have educational value, be useful to HJH&SW readership, and contain data not previously published elsewhere.

3. Supplements must have a sponsor who will act as the guest editor of the supplement. The sponsor will be responsible for every step of the publication process including development of the theme/concept, peer review, editing, preliminary copy editing (ie, proof reading and first round of copy editing), and marketing of the publication. HJH&SW staff will only be involved in layout, final copy editing and reviewing final proofs. It is important that the sponsor is aware of all steps to publication. The sponsor will:
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   c. Establish and oversee a peer review process that ensures the accuracy and validity of the articles.
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   h. Communicate any issues or desired changes to the HJH&SW staff in a timely manner.

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   • Final date for submitting Word documents for copy editing
   • Final date for submitting Word documents for layout
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Sample Workflow and Timeline for a Supplement

1. The sponsor contacts the HJH&SW editors (hjhsw@hawaii.edu) to discuss the supplement topic, estimated timeline, length and cost. HJH&SW staff will review the journal requirements for articles and share our review process with the sponsor. **Time frame: 2 weeks**

2. The sponsor will complete the draft contract and pay a non-refundable deposit of $2500 or half the contract value. **Time frame: 3 days**

3. The sponsor will solicit articles for the supplement. **Time frame: 3-6 months**

   Articles must comply with:
   - Instructions for Manuscript Preparation and Submission of Research Articles
   - Instructions for Manuscript Preparation and Submission of Columns
   - HJH&SW Statistical Guidelines
   - HJH&SW Style Guide for Native Hawaiian Words and Phrases
   - AMA Manual of Style A free summary can be found here.

4. The sponsor will oversee the article selection, peer review, and editing process. We recommend that time be allowed for at least two rounds of reviews for each article. **Time frame: 3-6 months**

   • Ensure that each article includes Institutional Review Board (IRB) review and approval, and a statement disclosing any conflicts of interest.
   • Obtain a Copyright Transfer Agreement signed by all authors for each article.

5. Optional: During this time, the sponsor can solicit advertisements for the supplement to help defray costs for publication and/or printing. To initiate this process, the sponsor will work the HJH&SW advertising representative Michael Roth at 808-595-4124 or roth-comm@gmail.com.

6. The sponsor or their designee will conduct a final review of each article to ensure adherence to HJH&SW guidelines and AMA style. **Time frame: 2 weeks**

7. For each article, the sponsor will submit the final Word document and Copyright Transfer Agreement to the HJH&SW journal production editor. The journal production editor will send the articles to the copy editor for final journal style review. Copyediting will be 8 hours per edition plus 1 hour per article for additional articles purchased. Any additional hours will be billed at $100 per hour. **Time frame: 2 weeks**

8. The sponsor will submit the final articles to the layout editor for formatting. **Time frame: 1 month**

   Acting in the role of guest editor, the sponsor will include a column introducing the supplement. **IMPORTANT:** All articles submitted for layout should be in their finalized form. Page proofs will be returned to the sponsor for their review and approval, but changes will only be made to fix any errors that were introduced during the layout process. Any editing or changes to the text or figures after the initial copy layout will incur a fee of $50 per page.

9. The sponsor will review the electronic copy from the layout editor and submit any final corrections. **Time frame: 5 working days**

10. The layout editor will make the final corrections and provide a finished electronic copy of the supplement to the sponsoring editors to allow time for printing.

11. The managing editor will work with the sponsor to draft a press release. Sponsors should contact the managing editor at least 30 days prior to the date of publication to plan and script the press release. Sponsors are encouraged to submit 1-2 photos to accompany the press release. Note that obtaining signed photo releases is the responsibility of the sponsor.

12. The supplement will be published online along with the press release. An electronic copy will be sent to our subscribers and circulation lists, and the edition will be forwarded to the National Library of Medicine for indexing and made available for no cost access to the public.

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