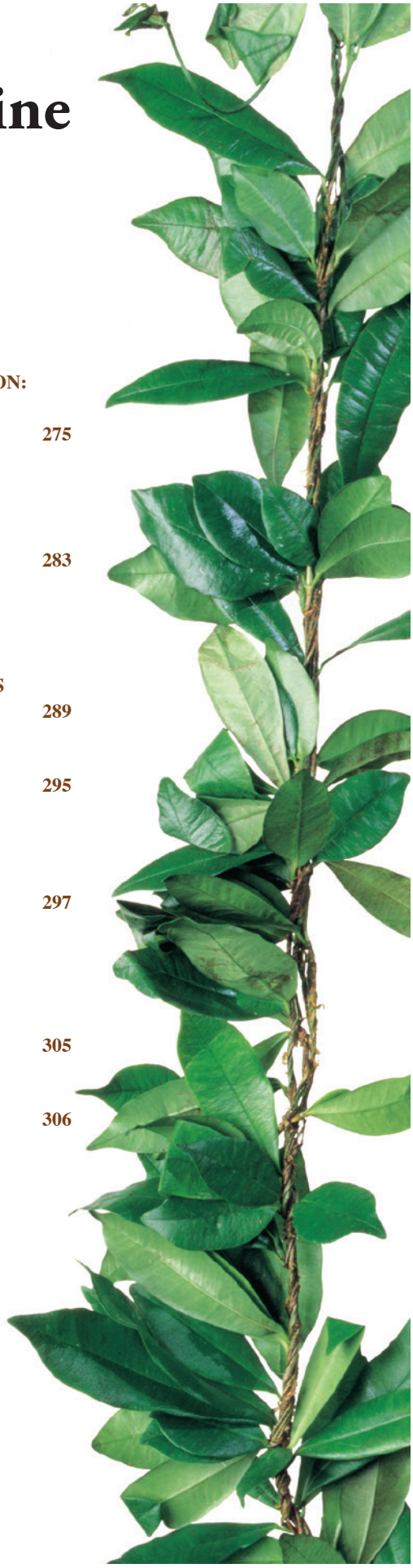
Hawai‘i Journal of Medicine & Public Health

A Journal of Pacific Medicine & Public Health

November 2018, Volume 77, No. 11, ISSN 2165-8218



Hawai‘i Journal of Medicine & Public Health

A Journal of Pacific Medicine & Public Health
ISSN 2165-8218 (Print), ISSN 2165-8242 (Online)

The Journal’s aim is to provide new scientific information in a scholarly manner, with a focus on the unique, multicultural, and environmental aspects of the Hawaiian Islands and Pacific Rim region.

Published by University Health Partners of Hawai‘i (UHP Hawai‘i)
[formerly University Clinical, Education & Research Associates, UCERA]
Hawai‘i Journal of Medicine & Public Health
677 Ala Moana Blvd., Suite 1016B, Honolulu, Hawai‘i 96813
http://www.hjmph.org; Email: info@hjmph.org

The Hawai‘i Journal of Medicine & Public Health was formerly two separate journals: The Hawai‘i Medical Journal and the Hawai‘i Journal of Public Health. The Hawai‘i Medical Journal was founded in 1941 by the Hawai‘i Medical Association (HMA), which was incorporated in 1856 under the Hawaiian monarchy. In 2009 the journal was transferred by HMA to University Health Partners of Hawai‘i (UHP Hawai‘i). The Hawai‘i Journal of Public Health was a collaborative effort between the Hawai‘i State Department of Health and the Office of Public Health Studies at the John A. Burns School of Medicine established in 2008.

The Hawai‘i Journal of Medicine & Public Health (ISSN 2165-8218) is a monthly peer-reviewed journal published by University Health Partners of Hawai‘i (UHP Hawai‘i). The Journal cannot be held responsible for opinions expressed in papers, discussion, communications, or advertisements. The right is reserved to reject material submitted for editorial or advertising columns. Print subscriptions are available for an annual fee of $220; single copy $20 includes postage; contact the Hawai‘i Journal of Medicine & Public Health for foreign subscriptions. Full text articles available on PubMed Central.

Knowledge and Attitudes Towards Fluoride Supplementation: A Survey of Pediatric Medical and Dental Providers in the State of Hawai'i

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Abstract

Hawai'i has the lowest rate of community water fluoridation in the nation, which has contributed to poor oral health for children statewide. When properly prescribed, the benefits of fluoride supplementation for oral health outweigh any potential side effects to the body. Official recommendations give pediatric healthcare providers the authority to prescribe fluoride supplements and guide parents in daily usage. However, knowledge of actual practice and adherence for both providers and patients have never been examined in Hawai'i. This study aims to evaluate pediatric healthcare providers' attitudes, knowledge, and practices, regarding fluoride supplementation. A 37-item survey was developed investigating these domains, and was distributed to pediatric dentists, family practitioners, and pediatricians in the state. One hundred and three responses were collected during the time period of May 2014 through May 2015. Descriptive and bivariate associations with several outcomes were assessed. The majority (87%) reported at least some knowledge of the official guidelines. There was uncertainty in knowledge of fluorosis and the seriousness of the health risk. A recent educational session on fluoride was associated with more knowledge of the guidelines and the signs and symptoms of fluorosis. The majority of providers started fluoride at the recommended age whereas there was more variablility on stopping fluoride. On the patient side, providers reported that 67% of the parents forget to administer and 53% reported that their child does not like the taste. This study provides some information regarding the clinical use of fluoride supplementation in children. More efforts are needed to raise awareness in a consistent manner by both the dental and medical communities on the importance of fluoride supplementation to promote oral health in children while addressing concerns of professionals and the community.

Introduction

The effects of dental caries on the overall health and wellbeing of children are still being identified. Evidence points to a sharp decline in quality of life for children with caries,[1,2] as well as a potential for adversely affecting the child's academic success with an increase in school absenteeism and decrease academic performance.[3,4] Caries commonly present with pain and discomfort but cause more serious sequelae as well, including abscesses, granulomas, or suppurating lesions.[5] Depending on the virulence of the organism(s) and/or delay in proper treatment, osteomyelitis, cellulitis, and/or septic thrombophlebitis could also result.[5]

Fluoride prevents oral caries in children when administered at optimal levels.[6-9] These optimal levels can be reached through a variety of sources including community water flouridations, fluoridated toothpaste, fluoride varnishes, fluoride rinses, and dietary fluoride supplements, all of which should be considered in clinical recommendations.[10] Incorporation of the element into the tooth enamel and dentin forms fluorohydroxyapatite, which is more resistant to the acidic conditions that precipitate dental caries.[11] In 2014, 74.4% of United States (U.S.) citizens on community water systems, received fluoridated water,[12] a cost-effective method of improving oral health and one of the greatest public health achievements of the past century.[13-15]

In the State of Hawai'i, community water fluoridation has been controversial. As of 2014, the state remains last in the U.S. in water fluoridation availability at 11.7% of the population – predominantly found in federally governed military installations.[16-19] Additionally, efforts to increase fluoridation in Hawai'i have been met with considerable community resistance. Moloka'i, Lana'i, O'ahu, the State Senate, and the State House of Representatives have all rejected fluoridation proposals, despite vocal support from agencies and organizations including the Dental Health Division of the Hawai'i State Department of Health (DOH), the Hawai'i Chapter of the American Academy of Pediatrics (AAP), the Hawai'i Dental Association, the Hawai'i Medical Service Association, and the Centers for Disease Control and Prevention.[20-24] A review of the online archives of The Honolulu Advertiser (records available from March 15th, 2001 to June 6th, 2010) and The Honolulu Star-Bulletin (March 18th, 1996 to June 6th, 2010) reveal dozens of editorials expressing negative opinions on systemic fluoridation in Hawai'i. Fluoride was misrepresented as "medication," a "pollutant," "toxic," "highly corrosive," and causing "negative health effects."[22,25-29] Even some members of the healthcare community have voiced their opposition.[20, 30-32] Many dissenters cite "good dental hygiene" as the most important method of preventing dental caries, while pointing to the "pure and sacred" nature of Hawaii's water supply in its current condition.[33,34] As a result, school-aged children in Hawai'i have disproportionately higher rates of dental caries when compared with their peers on the mainland.[35] The Pew Center gave Hawai'i a failing grade in 2011 for not meeting seven out of eight policy benchmarks aimed at improving children's dental health.[36] The State's 2014–2015 data from a screening survey done among third grade children revealed a 70.6% rate (last among the 47 reporting states, the national average being 52%) of tooth decay in third graders with significant disparities found among low income, Micronesian, and Native Hawaiian populations.[37]

In the absence of community water fluoridation, the responsibility for providing fluoride to children falls to pediatric healthcare providers including both dental and medical providers. Dietary supplements delivering systemic fluoride in the form of tablets, drops, or lozenges have been shown to safely

and effectively prevent dental caries in children, particularly in their permanent teeth.[38] Recommendations endorsed by the AAP, American Dental Association, American Academy of Pediatric Dentistry (AAPD), and American Academy of Family Physicians (AAFP), advise their usage from six months of age to 16 years with dosages adjusted according to the presence of other sources of fluoride in the child's lifestyle, such as in infant waters, fluoride varnish, fluoridated toothpaste or rinses, or in naturally occurring mineral fluoride.[10,39-41]

The practice and adherence to supplementation guidelines for both providers and patients have not previously been reported in Hawai'i. Thus, the purpose of this study was to assess attitudes towards pediatric oral fluoride supplementation, knowledge levels and gaps, prescribing habits, and clinician assessments of patient concerns among healthcare providers.

Methods

A preliminary cross-sectional survey was developed by the authors, which included representation from community pediatricians, epidemiology, public health, and pediatric oral health. The electronic survey was peer reviewed by non-author specialists in family medicine, pediatrics, and pediatric dentistry to ensure clarity, resulting in a final 37-item questionnaire. Information on the first page of the electronic survey included: a description of the study; aims of the study; voluntary nature of the survey; assurance that answers would remain confidential and anonymous; and included contact information for questions or concerns. The survey included sections on the recommended fluoride prescribing guidelines, provider prescribing practices, awareness of health impacts of fluoride supplementation, provider awareness of patient use and attitudes towards supplementation, and general demographics of providers and their practices. Two items were free-text response sections allowing participants to provide suggestions "to improve fluoride supplementation rates and awareness in Hawai'i" as well as other feedback. The study received exempt status from the University of Hawai'i Committee on Human Subjects and Hawai'i State DOH Institutional Review Boards.

Awareness of the current ADA recommendations for daily fluoride supplementation was assessed through the question "Do you know the current ADA recommendations for daily fluoride supplementation" with options of "Yes," "No," and "I have some knowledge." Fluorosis as a potential barrier to recommending supplementation was assessed by two questions: Knowledge of the fluorosis was asked with "Do you know the signs and symptoms of fluorosis?" with "Yes," "Somewhat," and "No" as possible responses and "Do you think that fluorosis poses a serious health risk in general?" with "Yes," "No," and "Unsure" as possible responses. To assess recent education on fluoride, providers were asked if they had attended an educational session on fluoride supplementation and/or oral health education which included fluoride supplementation in the past 5 years.

Prescribing habits were assessed by the question: "Do you prescribe or recommend fluoride supplements to your patients?" with options of "Yes" or "No." To check knowledge, providers were then asked about the age they started and stopped recommending fluoride with options of "Birth to 6 months," "6 months to 3 years," "3 years to 6 years," "6 years to 16 years," "After 16 years," and "I do not recommend fluoride supplementations to any of my patients." Starting at the age range of "6 months to 3 years" and stopping "After 16 years" were considered the appropriate times for knowledge of the recommendations.

Patient concerns were addressed by the question "How often do patients ask you about fluoridation concerns?" with options of "Never (0% of visits)," "Rarely (1-24% of visits)," "Sometimes (25-49% of visits)," "Often (50-74% of visits)," "Almost Always (75-99% of visits)," and "Always (100% of visits)." These responses were grouped in pairs and categorized as Rarely/Never, Occasionally, and Frequently/Always. Perceived barriers were assessed by the question "If applicable, what issues do your patients raise about fluoride supplementation?" (choose all that apply: conflicting advice when another healthcare provider said not to use, side effects, child does not like taste, cost, and forget to administer).

The questionnaire also elicited provider characteristics for analysis and included: area of training (dentistry, family medicine, pediatrics), year(s) since training completion, main clinical practice type (community health center, military, private practice of 1–2 person(s), private practice of 3+ persons, 'other'—which included health maintenance organizations, private hospitals, and residency clinics), and practice location which was grouped as O'ahu or Neighbor Island (Big Island, Kaua'i, Maui, Moloka'i, and Lana'i) due to small numbers of respondents serving neighbor islands. Also, included in the questionnaire were: provider gender, location of training, main type of insurance seen in practice, years of practice in Hawai'i average number of pediatric patients per week (1–25, 26–50, 51–75, 76+), and number of caries cases diagnosed in the past 30 days (quartiles).

The survey was administered through the Hawai'i Chapters of the AAP, AAFP, and AAPD with an electronic link to the survey, hosted on Google Forms. The survey was initially distributed to pediatricians (n=250); followed by pediatric dentists (n=34), and then family physicians (n=326). To improve response rates, a reminder was sent 30 days after initial contact to each group. In all, 49 pediatricians, 20 pediatric dentists, and 34 family practitioners inputted valid responses, for a total n=103. Excluded from the study were answers from subspecialists not providing primary care (n=1), adult-only providers (n=1), and inactive providers (n=1).

Descriptive and bivariate analysis between outcomes and characteristics were completed. Measures of associations were based on chi-square testing with all analyses conducted at a significance level ($P < .05$). All analyses were done with SAS, version 9.4 (SAS Institute, Inc, Cary, North Carolina).

Results

The overall survey response rate was 16.9% (103/610). Nearly 1 in 5 respondents were dentists, 1 in 3 were family medicine, and nearly 1 in 2 were pediatricians (Table 1). Nearly 1 in 4 had been in practice 25 or more years. Private practice of any size was the largest group in the sample at 43%, followed by community health centers and 'other'—both at 22%. More than 8 out of 10 practiced on O'ahu. About 2 in 3 reported not having attended an educational session on fluoride in the last 5 years. The most common insurance seen in the practice among respondents was Medicaid/QUEST (51%), followed by private insurance (36%) and military/Tricare plans (13%). About half of the respondents were female. About 1 in 3 reported seeing 0-1 caries in the past 30 days (31%) and nearly 1 in 3 reported more than 20 cases in the past 30 days. A large proportion of respondents saw only 1–25 pediatric patients per week (41%) whereas over a quarter (28%) saw more than 75 pediatric patients per week.

Overall, 72% of respondents reported knowing the current ADA fluoride supplementation guidelines and 16% reported some knowledge of the fluoride guidelines (Table 2). All dentists reported at least some knowledge of the recommendations with 95% reporting they knew the recommendations and 5% reporting some knowledge of the recommendations. Nearly 80% of family medicine providers reported at least some knowledge of the guidelines (53% reported knowing and 27% reported some knowledge). Nearly 90% of pediatric medical providers reported at least some knowledge of the guidelines (76% reported knowing and 12% reported some knowledge). Nearly all providers recommended fluoride (97%; n=100; Figure 1). Of the 100 respondents that recommended fluoride, almost all (95%) reported starting between 6 months and 3 years of age (Figure 1). Information on age to stop recommending fluoride was available for 90 respodents with 60% stopping after 16 years of age, 37% between 6 and 16 years of age, and 3% between 3 and 6 years of age.

Overall, 35% of respondents reported having attended an educational session on fluoride in the past 5 years (Table 2). Nearly two-thirds of dentists (65%) reported attendance compared to less than a third of those in the family medicine (29%) and pediatric medical providers (27%). Of those who had an educational session on fluoride in the past 5 years, 92% reported knowing and 8% reported some knowledge of the recommendations compared with about 80% of those who had not attended a session (61% reported knowing and 19% reported some knowledge).

Ninety-five percent of providers reported at least some knowledge of the signs and symptoms of fluorosis versus 5% who reported no knowledge (Table 3). This varied, with nearly all (93%) neighbor island providers reporting knowing compared to just 56% of O'ahu providers. Those who had attended a recent educational session on fluoride were more likely to report knowledge (81%) compared to those who had not attended a session (51%). Concerning whether providers perceived fluorosis to be a serious health risk, 27% of family medicine and

Table 1. Characteristics of Respondents (N=103) in Fluoride Supplementation Survey

	n	Percent (%)
Specialty		
Dentistry	20	19
Family Medicine	34	33
Pediatrics	49	48
Number of Years Since Training Completion		
Trainee to 6 years	26	25
7–14 years	27	26
15–24 years	26	25
25+ years	24	23
Practice Type		
Community Health Center	23	22
Military	13	13
Private Practice (1–2)	29	28
Private Practice (3+)	15	15
Other	23	22
Practice Location		
O'ahu	88	85
Neighbor Island	15	15
Educational Session		
Yes	36	35
No	67	65
Main Patient Insurer		
Medicaid/QUEST	52	51
Private	37	36
Military/Tricare	13	13
Uninsured	1	1
Number of Years of Practice in Hawai'i		
0 to 3 years	24	23
4–9 years	25	24
10–17 years	28	27
18+ years	26	25
Gender		
Female	52	51
Male	51	50
Number of Caries Cases in Last 30 Days		
0 to 1 case	32	31
2–5 cases	26	25
6–20 cases	20	19
21+ cases	29	28
Average Number of Pediatric Patients Per Week		
1–25 patients	42	41
26–50 patients	22	21
51–75 patients	10	10
76+ patients	29	28
Total	103	100

Note: percentage totals may not sum to 100 based on rounding.

16% of pediatric medical providers reported being unsure on the risk. Similarly, 29% of family medicine providers reported fluorosis as a serious health risk compared to 18% of pediatric and 15% of dentists.

Most providers (67%) reported rarely/never being asked about fluoride supplementation by their patients and only 14% reported being asked by patients frequently/always (Figure 2). About half of providers stated that their patients across all age groups were taking fluoride 'regularly', with about a quarter taking it 'sometimes', and a quarter 'not taking' fluoride at all (data not shown). The most common barriers to fluoride supplement use as reported by providers about their patients were parent forgetfulness (67%), followed by taste issues (53%) and potential side effects (33%; Figure 3). About a quarter of respondents (23%) reported that their patients were being told by another healthcare provider not to use fluoride.

Table 2. Fluoride Supplementation Knowledge and Educational Session Attendance by Selected Characteristics

	Do you know the current ADA recommendations for daily fluoride supplementation? (N=103)				Have you attended an educational session on fluoride supplementation in the past 5 years? (N=103)		
Characteristics	**Yes Percent (%)**	**Some Knowledge Percent (%)**	**No Percent (%)**	***P*-value**	**Yes Percent (%)**	**No Percent (%)**	***P*-value**
Specialty							
Dentistry	95	5	0	.21	65	35	.001
Family Medicine	53	27	21		29	71	
Pediatrics	76	12	12		27	75	
Number of Years Since Training Completion							
Trainee to 6 years	77	19	4	.81	46	54	.45
7–14 years	56	15	30		26	74	
15–24 years	77	15	8		31	69	
25+ years	79	13	8		38	63	
Practice Type							
Community Health Center	74	13	13	.89	44	57	.87
Military	54	8	9		39	62	
Private Practice (1–2)	86	14	0		31	69	
Private Practice (3+)	67	20	13		33	67	
Other	65	22	13		30	70	
Practice Location							
O'ahu	69	16	15	.35	33	14	.30
Neighbor Island	87	13	0		47	53	
Educational Session							
Yes	92	8	0	.003	--	--	--
No	61	19	19		--	--	
Total	72	16	13		35	65	

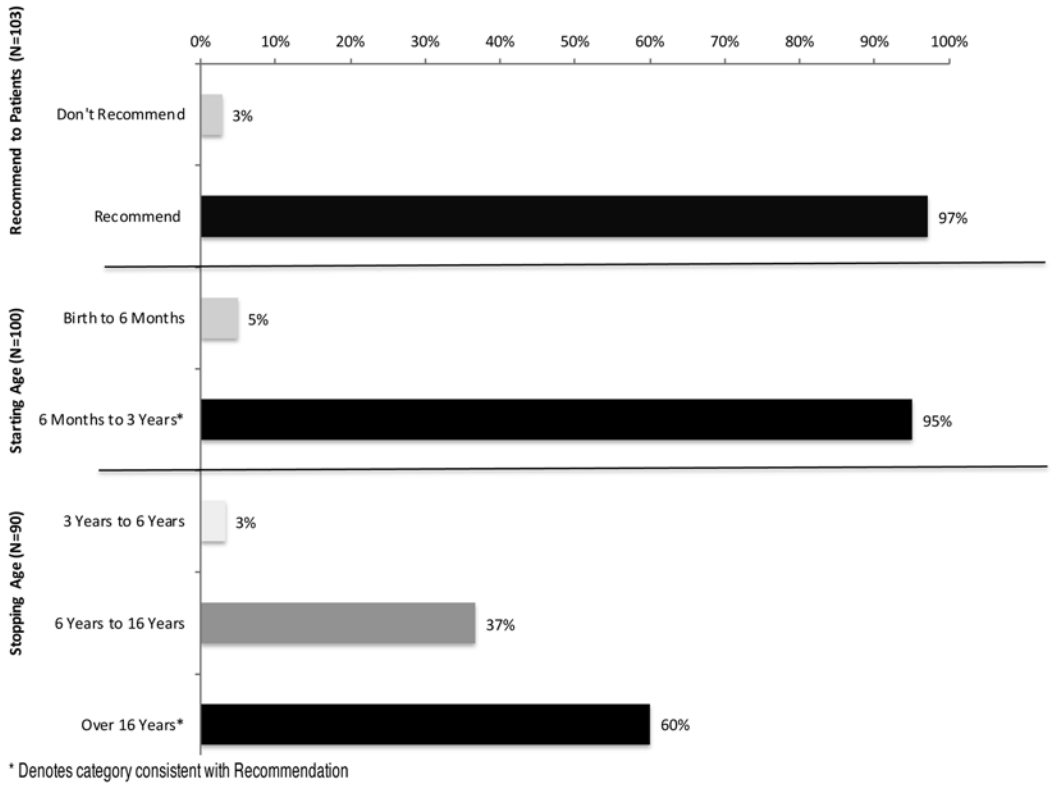

Figure 1. Percent of Providers Recommending Fluoride Supplementation and Associated Start and Stop Ages

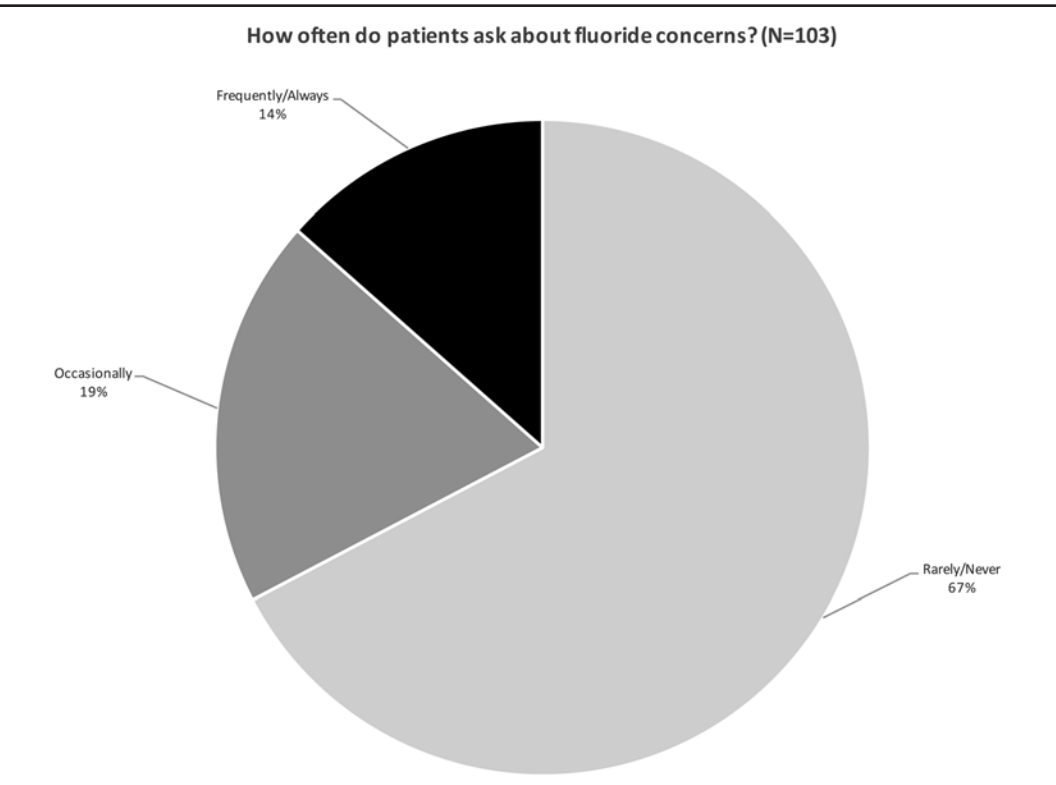

Figure 2: Frequency in which Patients Express Fluoride Concerns as Reported by Providers

Table 3. Knowledge and Perceived Health Risk of Fluorosis by Selected Characteristics

	Knowledge of Fluorosis (N=103)				Think Fluorosis is a Serious Health Risk (N=103)			
Characteristics	**Yes Percent (%)**	**Somewhat Percent (%)**	**No Percent (%)**	***P*-value**	**Yes Percent (%)**	**No Percent (%)**	**Unsure Percent (%)**	***P*-value**
Specialty								
Dentistry	95	5	0	.006	15	85	0	.03
Family Medicine	59	32	9		29	44	27	
Pediatrics	49	47	4		18	65	16	
Number of Years Since Training Completion								
Trainee to 6 years	46	46	8	.17	31	46	23	.20
7–14 years	52	41	7		22	56	22	
15–24 years	65	32	4		19	65	15	
25+ years	83	17	0		13	83	4	
Practice Type								
Community Health Center	48	48	4	.07	30	44	26	.01
Military	77	23	0		39	54	8	
Private Practice (1–2)	66	35	0		10	86	4	
Private Practice (3+)	60	40	0		27	67	7	
Other	61	22	9		13	52	35	
Practice Location								
O'ahu	56	39	6	.02	23	59	18	.29
Neighbor Island	93	7	0		13	80	7	
Educational Session								
Yes	81	17	3	.01	19	72	8	.20
No	51	43	6		22	57	21	
Total	61	34	5		21	62	17	

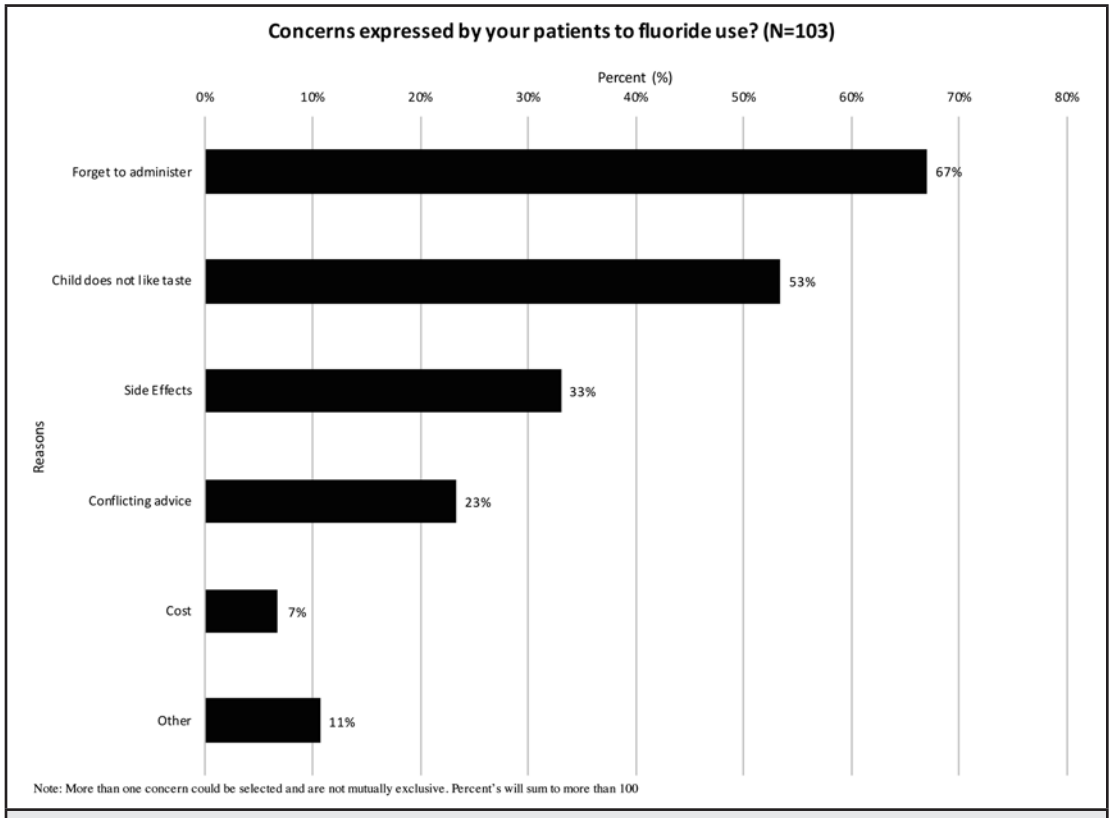

Figure 3. Specific Fluoride Concerns Expressed by Patients as Reported by Providers

Discussion

This study shows that while most pediatric healthcare providers (dental and medical) in Hawai'i surveyed support and prescribe fluoride supplements, knowledge and clinical practice vary from official recommendations and guidelines. Dentists and medical providers both see children and families early on and collaboration and consistent messaging related to fluoride has the potential to improve the oral health of children.

Primary care providers are more likely to see a child in the first two years of life due to frequent well-child visits and thus have opportunities to discuss fluoride supplementation with parents. Whereas dentists are likely to see a child up to twice a year, once established as a patient, compared to a primary care physician who will typically see a child only once a year after the 24 month well-child visit other than during sick visits. Thus, there is significant overlap and consistent messages across disciplines could minimize confusion and potentially raise adherence and acceptance of fluoride among young children. In this study, pediatric dentists were more likely to report knowing the current ADA recommendations compared to family medicine and pediatric physicians. This could be due to the greater focus on oral health in dentistry training and reinforcement through ongoing training compared to medical training. The lower and uncertain knowledge in pediatricians and family medicine providers could also be due to the different focus of training as well as that they were less likely to have attended a recent education session on fluoride compared to dentists. Fortunately, there are several online sources of education and recommendations on oral health including those from AAP and AAFP that can be accessed and provide additional guidance and training on oral health for medical providers.[42, 43]

Knowledge of the guidelines was further assessed by looking at recommended start and stop times in the survey. Unfortunately, interpretation is severly limited due to broad ranges listed in the survey instrument but does grossly represent a high agreement for the likely age to start fluoride supplements after 6 months. There was more variability in stopping with 40% recommending stopping before 16 years of age which represents an area where further education could provide clearer recommendations on age of stopping. However, a more refined range of start/stop years would better characterize knowledge of the guidelines. Pediatric healthcare professionals need to learn about important patient concerns as presented here and be better prepared to counsel on fluoride supplementation and other sources of fluoride. Moreover, further education will hopefully make the issue a more common clinic visit topic, as parental forgetfulness is by far the most-cited reason for patients not taking fluoride. A standardized message—particularly in dosage and age—put forth across provider types will allow for quality oral health care consistent with clinical standards statewide.

This study had several limitations. First, over 80% of surveys sent out did not produce a response, introducing a selection bias that limits the generalizability. It is unclear if those who did not answer the survey would answer in a similar manner, and the very low response rate limits the conclusions. Nonetheless, in the absence of a more focused survey representative of all providers in the state, which would include other health providers caring for young children such as nurse practitioners and physician assistants, this study can help inform the promotion of fluoride supplements in children. Due to the low response rate and small sample numbers, it was necessary to combine all the responses from dentists, pediatric physcians, and family medicine physicians together even though they are very different in their education and timing of contacts with children. In addition, provider assessment of patient concerns may not truly reflect attitudes in the community regarding fluoride supplementation. Lastly, other methods to provide fluoride such as administering fluoride varnish in a primary care setting that has recently been promoted was not included in the survey.[10,44,45]

To gain some qualitative input into ways to improve fluoride supplementation rates and its awareness in Hawai'i, a free response section was included at the end of the survey. In total, 42% of the 103 respondents provided input that can inform efforts on places to raise awareness and educate (eg, patient outreach in daycare centers, schools, media outlets, and social media). Of particular interest is that some discussed the ineffective coordination of care between primary care physicians and dentists with regards to fluoride supplements. The literature has supported fluoride supplementation due to its overwhelming benefits to oral health and lack of associated side effects to the body.[11-14] This study shows some uncertainty in providers knowing the signs and symptoms of fluorosis and in perceived risk. The medical and dental community can work in partnership to raise awareness in the state so providers are comfortable recommending supplementation and patients are comfortable taking the supplements. For example, standardized training in educational programs and through the membership organizations of the various specialties and collaboration with stakeholders involved in oral health could help promote the use of fluoride by providers and ensure the public hears consistent messages on the safety and benefits of fluoride supplementation in children.

Conclusion

Fluoride supplementation is an integral component of oral health care for children in the State of Hawai'i. This study provides some information based on those who responded to the survey regarding clinical use of fluoride supplementation in children. More efforts are needed to raise awareness on the importance of fluoride supplementation in a consistent manner in both the dental and medical communities to effectively promote oral health of children in Hawai'i.

Conflict of Interest

None of the authors identify a conflict of interest.

Acknowledgements

We thank Lee Buenconsejo-Lum, MD and Lynn Fujimoto, DMD for their assistance in disseminating this survey.

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High Prevalence of Non-Communicable Disease Risk Factors among Adolescents in Pohnpei, Micronesia

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Abstract

Non-communicable disease (NCD) related behaviors among adolescents are on the rise globally and in the Pacific region. To better understand and elucidate the prevalence of NCD risk factors among adolescents in Pohnpei state, Federated States of Micronesia, a cross-sectional study was conducted among secondary school students. Of 2965 students enrolled in the 2015-2016 academic year, 2555 (86.2%) completed the survey, and 2386 (80.5%) were included in the final analysis. Of the survey respondents, 21.7% of students self-reported smoking tobacco in the past 30 days, 30.3% self-reported drinking alcohol in the past 30 days, 40.9% self-reported chewing betel nut in the past 30 days, and 21.2% self-reported chewing tobacco with or without betel nut in the last 30 days. Male students, older students, and public school students had higher prevalence of substance use. Additionally, about 17.3% of students were overweight and 10.1% were obese according to physical measures of height and weight. Female students and private school students had higher prevalence of overweight and obesity than male students, and prevalence of overweight was higher in older age groups. These findings indicate a cohort of adolescents at substantial risk for the development of NCDs and signal an urgent need for public health interventions to address NCD risk factors.

Keywords

Secondary school survey, substance use, overweight, obesity, non-communicable disease, Federated States of Micronesia

Background

Non-communicable diseases (NCDs) such as cardiovascular diseases (CVD), cancers, chronic respiratory diseases, and diabetes are the leading causes of death globally.[1] Worldwide, 38 million of the 56 million deaths in 2013 were due to NCDs.[1] Of these deaths, 16 million were premature (occurring before the age of 70), and 82% of these premature deaths occurred in low-and middle-income countries. The majority of these premature deaths could have been prevented.[1]

The Federated States of Micronesia (FSM) is a grouping of 607 small islands in the Western Pacific Ocean about 2,500 miles southwest of Hawai'i, lying just above the equator.[2] The FSM is comprised of four states: Yap, Chuuk, Pohnpei, and Kosrae. The state of Pohnpei is the capital state of FSM, consisting of one main and five outer islands with a total estimated population of 35,981 in 2010.[3]

The World Health Organization's (WHO) STEPwise approach to surveillance (STEPS) survey conducted in 2008 identified high prevalence of NCD risk factors among adults in Pohnpei. Almost one-quarter (24.7%) of 25-64 year-old adults reported having elevated blood glucose levels and/or were diagnosed with diabetes. Additionally, 29.2% currently smoked cigarettes, and 59.9% were overweight or obese.[4]

Areca nut, commonly known as betel nut is chewed in many parts of the world due to its stimulant effect. The International Agency for Research on Cancer has classified regular use of betel nut as being carcinogenic to humans as it is associated with oral cancer and cancer of the pharynx and esophagus.[5] Betel nut chewing is also associated with hypertension,[6] metabolic syndrome,[7] cardiovascular disease,[8] and diabetes.[9] Although betel nut was not traditionally chewed in Pohnpei, it is a relatively new habit that has quickly grown throughout the state. The 2008 STEPS survey conducted in Pohnpei reported that 38.3% of adults chewed betel nut daily, with men (52.4%) reporting a significantly higher proportion of daily betel nut chewing than women (24.0%).[4] In a survey conducted in 2012, 71.4% of seventh and eighth grade students in Pohnpei had ever used betel nut compared to 61.5% in Yap.[10]

In the Commonwealth of the Northern Mariana Islands, a study conducted in 2004 found that 63.4% of the 309 school children surveyed reported regular use of betel nut.[11]

Given the high prevalence of NCDs and associated risk factors amongst adults in FSM, the prevalence of risk factors amongst adolescents are of interest for public health planning, and may have legal and policy implications. As part of a new, statewide NCD Monitoring and Surveillance Plan, biennial surveys of core NCD risk factors of secondary school students have been instituted, of which the first survey was conducted in 2015. The purpose of this study was to examine NCD risk factors among secondary school students in Pohnpei State using this baseline survey, and assess the relationships between demographic data and NCD risk factors.

Methods

Study Design

A cross-sectional survey of major modifiable risk factors for NCDs was conducted among all secondary school students enrolled in the 2015-2016 academic year in Pohnpei State. The survey questions were adapted from the Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Surveillance System (YRBSS) standardized survey tool.[12] The questions were pilot tested on local high school students and simplified based on their qualitative feedback. Questions on chewing betel nut and chewing any tobacco (with or without betel nut) in the past 30 days (that are not included on YRBSS) were developed by adapting tobacco use questions from the YRBSS. All survey questions used were in alignment with the United

States Affiliated Pacific Islands (USAPI) NCD Monitoring and Surveillance Framework.[13] The survey (Annex 1) was piloted in one of the secondary schools before being administered at all secondary schools.

Study Sample

All students enrolled in all of the secondary schools in Pohnpei state during the 2015-2016 academic year were included in this study. Students who attended school on the day of the survey in their school participated in the survey. Parents and students had the right to opt out of the survey, however no parents or students refused participation, therefore the only students who did not participate were those who were not present in school on the day of the survey. There were 2965 secondary school students enrolled in the 2015-2016 academic year. Of these, 2555 students completed the survey for a response rate of 86.2%. Students over the age of 18 (n=167) were excluded from this analysis in order to focus on adolescents. Also, one student with missing age data and one student with missing height and weight measurements was excluded. Therefore, the final study sample used in this analysis was 2368.

Data Collection

Data was collected from seven high schools between October to November 2015. The biggest public school was surveyed over the course of four days. Two additional public schools were surveyed over two days and the remainng four private schools were surveyed over the course of one day. Section one of the data form was completed by trained staff based on face-to-face interviews with students to collect data on the name of the school, current grade, gender, age, and municipality. Height and weight measurements were conducted by trained staff using simple wall measuring tapes and digital weight scales in a private room. Once section one was completed, the form was given to the student to complete section two of the data form. These questions were on substance use (tobacco, alcohol and betel nut use). The student was given a private space to complete their form. Upon completion of section two, students submitted the data form into a protected box with all other forms without any review to maintain confidentiality. Forms did not contain any student names to protect confidentiality of the students. After all forms were submitted, these were all entered into an electronic database by trained public health staff. This electronic database was password protected and retained within the Department of Health Services. All findings were presented on an aggregated level to protect confidentiality.

The age of students was categorized into three groups: 12-14 years, 15-16 years, and 17-18 years. BMI-for-age growth charts were used to calculate BMI percentiles, and <5th percentile was classified as underweight, from 5th to less than 85th percentile was classified as healthy weight, from 85th to less than 95th percentile was classified as overweight, and greater than or equal to 95th percentile was classified as obese.[14,15]

Statistical Analysis

Descriptive statistics were performed on demographic and NCD risk factors. Categorical data (gender, age groups, type of school, grade, and BMI category) were summarized using count and percentage. The prevalence of substance use by age and gender was calculated in this population. Pearson Chi-square tests were used to determine statistical differences when examining risk factors by demographic characteristics and all *P*-values <.05 were considered statistically significant. All analyses were performed using Epi Info, version 7.2 (Centers for Disease Control and Prevention, Atlanta, USA).

Ethical Considerations

Permission for this study was provided by the Pohnpei State Department of Health Services, Pohnpei State Department of Education, and the principals of the private secondary schools in Pohnpei state. The principal of each school informed parents of this survey through a letter home to parents, and passive consent was used. Parents were instructed to call the school if they did not want their child to participate. Parents and students had the right to refuse participation at any point. Given that there is no formal IRB in Pohnpei, or even throughout the whole FSM, formal approvals from relevant government agencies were used as a substitute. Additionally, this survey is considered to be local surveillance rather than research, and due to the limited resources in FSM, outside IRBs were not consulted. Ethics committee approval was given by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease (Paris, France), and study conduct was in accordance with the principles of Good Clinical Practice and the Declaration of Helsinki.

Results

Characteristics of the survey respondents are described in Table 1. A total of 2386 students were included in the sample, of which about half were male (48.9%) and half were female (51.1%). Students ranged from 12 to 18 years old, and almost half (44.3%) were between the ages of 15 and 16. A majority (86.4%) of the students in Pohnpei state were enrolled in public secondary schools, and over one-third (35.0%) were in the ninth grade. According to BMI percentiles, 17.3% of students measured overweight, and 10.1% measured obese. Overall, half (50.0%) of students reported using at least one substance (alcohol, betel nut, or tobacco) over the past 30 days, and 9.7% reported using all substances in the past 30 days. The most common substance behavior reported by students was chewing betel nut (40.9%), followed by drinking alcohol (30.3%), smoking tobacco (21.7%), and chewing tobacco (21.2%).

Table 2 presents BMI percentile classifications by demographic characteristics. Female students were more likely to be overweight compared to male students (23.8% vs 10.8%). Weight status also significantly differed by age group (*P*=.02). Prevalence of overweight was higher in the older age groups

Table 1. Characteristics of Adolescents Survey Respondents in Pohnpei, 2015

Charateristics	N (%)
Gender	
Male	1167 (48.9)
Female	1219 (51.1)
Age Groups	
12-14	554 (23.2)
15-16	1056 (44.3)
17-18	776 (32.5)
Type of School	
Public	2061 (86.4)
Private	325 (13.6)
Grade	
9	836 (35.0)
10	622 (26.1)
11	503 (21.1)
12	425 (17.8)
BMI Category	
Underweight	46 (1.9)
Healthy weight	1687 (70.7)
Overweight	413 (17.3)
Obese	240 (10.1)
Substance Use (30 day)	
Alcohol	723 (30.3)
Chew betel nut	977 (40.9)
Chew tobacco	505 (21.2)
Smoke cigarettes	518 (21.7)
At least one substance used	1194 (50.0)
All four substances used	232 (9.7)
Total	2386

of 15-16 (19.1%) and 17-18 (17.5%) compared to 12-14 year olds (13.5%). Finally, BMI significantly differed by school type ($P<.01$). Obesity prevalence was higher in private school students (17.5%) compared to public school students (8.9%).

Table 3 presents 30-day substance use by demographic characteristics. Male students were significantly more likely to report drinking alcohol (37.6%), chewing tobacco (24.0%), and smoking tobacco (27.8%) compared to female students (23.3%, 18.5%, and 15.8%, respectively). Significant differences in drinking alcohol ($P<.01$), chewing betel nut ($P<.01$), chewing tobacco ($P<.01$), and smoking tobacco ($P<.01$) were also observed by age group. All substance use prevalence was highest amongst 17-18 year olds where 43.4% reported alcohol use, 54.1% reported betel nut chewing, 30.7% reported chewing tobacco, and 28.6% reported smoking tobacco. Consistently, a similar significant trend was observed when substance use prevalence was examined by grade. Finally, use of all substances examined was significantly different by school type. Public schools had a higher prevalence of drinking alcohol (32.5%), chewing betel nut (44.6%), chewing tobacco (23.0%), and smoking cigarettes (23.2%) compared to private schools (16.3%, 17.6%, 9.8%, and 12.0%, respectively).

Discussion

Among secondary school students surveyed in Pohnpei state, we found a high prevalence of NCD risk factors.[16-20] According to the YRBSS, among high school students in the United States (U.S.), 30-day smoking prevalence is 10.8% and 30-day smokeless tobacco chewing is 7.3%. Therefore, adolescent tobacco use prevalence in Pohnpei is about twice as high as in the U.S.[12] However, the adolescent 30-day alcohol prevalence observed in Pohnpei (30.3%) and the overweight/obesity prevalence (27.4%) is similar to U.S. high school students (32.8% and 29.9%, respectively).[12] It should be noted that the most common substance use reported was betel nut chewing, which is unique to the Asia-Pacific region.

The high proportion of adolescents chewing betel nut is concerning given the fact that several negative health outcomes are associated with betel nut chewing such as cancer of the pharynx and esophagus[5], hypertension,[6] metabolic syndrome,[7] cardiovascular disease,[8] and diabetes.[9]. In a recent study among Micronesian adolescents, betel nut use was also associated with oral decay and oral abscesses.[10] In our study, 22.2% of 12 to 14-year-old students reported betel nut chewing in the past 30 days, indicating early initiation. To combat early initiation and use of betel nut among adolescents, legislation prohibiting businesses to sell betel nut to minors was recently unanimously passed by the Pohnpei State Legislature in 2016.[21] However, this legislation will require ongoing enforcement and resources to make sure that business are in compliance.

The increasing prevalence of all risk factors by age in this study suggests that secondary school is a key period for uptake of new NCD risk factors. Since early habits after initiation are easier to change than those that have been established for years,[22] a focus on programs and policies aimed at decreasing

Table 2. Body Mass Index (BMI) Percentile Classifications of Adolescent Survey Respondents in Pohnpei in 2015, by Demographic Characteristics					
Demographic Characteristics	**Underweight n (%)**	**Healthy Weight n (%)**	**Overweight n (%)**	**Obese n (%)**	***P*-value***
Gender					
Male	37 (3.2)	899 (77.0)	123 (10.5)	108 (9.3)	<.01
Female	9 (0.7)	788 (64.6)	290 (23.8)	132 (10.8)	
Age Groups					
12-14	9 (1.6)	406 (73.3)	75 (13.5)	64 (11.6)	.02
15-16	14 (1.3)	739 (70.0)	202 (19.1)	101 (9.6)	
17-18	23 (3.0)	542 (69.8)	136 (17.5)	75 (9.7)	
Type of School					
Public	36 (1.7)	1488 (72.2)	354 (17.2)	183 (8.9)	<.01
Private	10 (3.1)	199 (61.2)	59 (18.2)	57 (17.5)	
Grade					
9	20 (2.4)	613 (73.3)	123 (14.7)	80 (9.6)	.11
10	7 (1.1)	437 (70.3)	117 (18.8)	61 (9.8)	
11	8 (1.6)	337 (67.0)	104 (20.7)	54 (10.7)	
12	11 (2.6)	300 (70.6)	69 (16.2)	45 (10.6)	
Total	46 (1.9)	1687 (70.7)	413 (17.3)	240 (10.1)	

Table 3. Substance Use in Past 30 Days among Adolescent Survey Respondents in Pohnpei in 2015, by Demographic Characteristics								
Demographics	**Drink Alcohol n (%)**	***P*-value**	**Chew Betel Nut n (%)**	***P*-value**	**Chew Tobacco n (%)**	***P*-value**	**Smoke Tobacco n (%)**	***P*-value**
Gender								
Male	439 (37.6)	<.01	491 (42.1)	.27	280 (24.0)	<.01	325 (27.8)	<.01
Female	284 (23.3)		486 (39.9)		225 (18.5)		193 (15.8)	
Age Groups								
12-14	78 (14.1)	<.01	123 (22.2)	<.01	47 (8.5)	<.01	51 (9.2)	<.01
15-16	308 (29.2)		434 (41.1)		220 (20.8)		245 (23.2)	
17-18	337 (43.4)		420 (54.1)		238 (30.7)		222 (28.6)	
Type of School								
Public	670 (32.5)	<.01	920 (44.6)	<.01	473 (23.0)	<.01	479 (23.2)	<.01
Private	53 (16.3)		57 (17.5)		32 (9.8)		39 (12.0)	
Grade								
9	184 (22.0)	<.01	282 (33.7)	<.01	119 (14.2)	<.01	139 (16.6)	<.01
10	186 (29.9)		257 (41.3)		138 (22.2)		148 (23.8)	
11	179 (35.6)		221 (43.9)		113 (22.5)		111 (22.1)	
12	174 (40.9)		217 (51.5)		135 (31.8)		120 (28.3)	

access of children and adolescents to tobacco, alcohol, betel nut, and unhealthy foods may be one of the keys to addressing the epidemic of NCDs in Pohnpei. Of particular concern is the high prevalence of tobacco use amongst adolescents in Pohnpei. Anti-tobacco policies and programs targeted at youth and adolescents need to be strongly considered.

This report presents the first systematic collection of NCD risk factor prevalence in Pohnpeian adolescents. Its strengths include a survey design that allowed for confidential self-reporting of substance use, it included physical measures of height and weight by trained staff for accurate calculation of BMI percentiles, and had a large sample size and high response rate. Limitations of the study include potential sampling bias since the survey only included students attending school, and by possible response bias of students to accurately report on use of illicit substances although the answers were confidential. Future surveys should include more details on frequency of substance use and age of initiation in order to provide insight into behaviors influencing dependence.[23] There is also potential for this survey to be expanded to include other relevant adolescent health issues such as reproductive health. Finally, qualitative assessments should also be considered to better understand why adolescents engage in these risky behaviors, and how substances are accessed in order to provide adequate and appropriate public health programs and policies.

Conclusion

Secondary school students in Pohnpei have a high prevalence of substance use, particularly tobacco and betel nut chewing, and have a high proportion of overweight and obesity. These findings indicate a cohort at substantial risk for the development of NCDs, and an urgent need for public health interventions.

Conflict of Interest

None of the authors identify a conflict of interest.

Funding

Funding for the Operational Research Course that was used to develop this manuscript was provided by The Union and SPC.

Acknowledgements

This research was conducted through the Structured Operational Research and Training Initiative (SORT IT), a global partnership led by the Special Programme for Research and Training in Tropical Diseases at the World Health Organization (WHO/TDR). The model is based on a course developed jointly by the International Union Against Tuberculosis and Lung Disease (The Union) and Medécins sans Frontières (MSF/Doctors Without Borders). The current training was run in the South Pacific by the International Union Against Tuberculosis and Lung Disease (The Union) and the Public Health Division of the Pacific Community (SPC), New Caledonia. Additional support for the course was provided by the School of Population Health, The University of Auckland, New Zealand; the Research Unit, College of Medicine, Nursing and Health Sciences, Fiji National University; Regional Public Health, Hutt Valley District Health Board, New Zealand; University of Melbourne, Australia; The Victorian Tuberculosis Program, Melbourne; Australian National University; Pacific Island Health Officers' Association.

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ANNEX 1: Pohnpei State Non-communicable Disease Secondary School Survey Questionnaire

Pohnpei State High School NCD Core Risks Questionnaire
Students will first be interviewed and measured by trained NCD Survey Staff to complete questions 1-10 in the shaded box.
Then, students will complete questions independently, and then submit forms into a designated box. No names are to be collected.

SECTION 1: To be completed by NCD Survey Staff:

1. Date (M/D/Y): _____/_____/_____

2. Name of School: _____

3. Grade: 9 10 11 12 (circle one)

4. Name of Class or Section: _____

5. Gender: Male Female (circle one)

6. Age (years) _____ years

7. Residence (Municipality): _____

8. Staff Member Initials: _____

9. Height: _____ inches

10. Weight: _____ pounds

11. Staff Member Initials: _____

SECTION 2: To be completed by Student after SECTION 1

This section is for the student to complete (Do not put your name on this sheet. All information is confidential.)

12. During the past 30 days, did you smoke any tobacco? Yes No (circle one)
13. During the past 30 days, did you have at least one drink of alcohol? Yes No (circle one)
14. During the past 30 days, did you chew at least one betel nut? Yes No (circle one)
15. During the past 30 days did you chew any tobacco (with or without betelnut)? Yes No (circle one)

Are There Gender Differences in the Psychological Effects of Ethnic Identity and Discrimination in Hawai'i?

Krysia N. Mossakowski PhD

Abstract

The purpose of this study is to investigate whether there are gender differences in the psychological effects of ethnic identity and discrimination in Hawai'i. Using data from an anonymous survey of undergraduate students (N = 1,033) at a university in Hawai'i, regression results revealed that higher levels of ethnic identification were associated with significantly lower levels of depressive symptoms. This association was statistically significant (P < .001), adjusting for gender, age, socioeconomic status, racial/ethnic group, mixed racial/ethnic status, years living in Hawai'i, immigrant status, and discrimination. Interaction effects (b = 2.55; P < .05) further indicated that the inverse relationship between ethnic identity and symptoms of depression was stronger for men than women. Also, everyday discrimination was significantly more psychologically distressing for women (b = 0.19; P < .05) than men. Overall, these findings suggest that a strong ethnic identity, which encompasses ethnic pride and knowledge, involvement in ethnic practices, and a cultural commitment or feeling of belonging to one's ethnic group, significantly benefits mental health, and to a greater extent among men. Although the chronic stress of discrimination (not necessarily due to race/ethnicity) was linked with increased levels of distress among both men and women, it was significantly more intense among women. Future research is needed to uncover why the mental health consequences of everyday discrimination and a salient ethnic identity would be different for young men and women in this cultural context and whether this holds true in other locations in the United States.

Keywords

ethnic identity, discrimination, gender, symptoms of depression, Hawai'i

Introduction

Whether the psychological effects of ethnic identity and discrimination differ for women and men in diverse communities across the United States warrants inquiry. Recent research has drawn attention to a culturally diverse and underexplored community where discrimination is a chronic stressor and public health problem—Hawai'i.[1-3] In essence, the ethnic diversity of Hawai'i and history of plantation agriculture, settler colonialism, and tourism have perpetuated patterns of discrimination.[4-6] The goal of the current study is to discover whether there are gender differences in the influence of discrimination and ethnic identity on mental health in Hawai'i.

Self-reported discrimination due to racial or ethnic status has been consistently linked with higher levels of depressive symptoms or psychological distress in the research literature.[8-10] There is also evidence that everyday discrimination, not necessarily due to race or ethnicity, is significantly more distressing and chronically stressful than a single experience of racial or ethnic discrimination in a lifetime.[7,9,11-12] There have been inconsistent findings, however, about the relationship between a strong ethnic identity and psychological well-being.[13,14] Ethnic identity involves a sense of ethnic pride or positive feelings towards one's group, knowledge, participation in ethnic group activities, and a cultural commitment or feeling of belonging to one's ethnic group.[15] While studies have found that a stronger ethnic identity is associated with significantly lower levels of depressive symptoms,[11,16,17] other studies have documented that ethnic identity does not have a statistically significant relationship with symptoms of depression.[18-23]

Although research suggests that women have higher rates of depression than men,[24] less is known about whether the strength of the influence of ethnic identity on symptoms of depression differs for men and women. From the social-psychological perspective of identity theory, individuals have multiple identities in a hierarchy within their self-concepts, and the salience of an identity or likelihood of it being invoked in a social situation varies by level of commitment to the group associated with that identity.[25,26] It is plausible that gender could be a more salient identity for women in daily life than their ethnicity compared to men. Gender identity salience could be triggered by women's socially disadvantaged status, gender stereotypes, or sexism, and thus a salient ethnic identity could be drawn upon by men more frequently as a protective resource or to bolster psychological well-being. A salient ethnic identity can also be situational.[27] Furthermore, a meta-analysis of studies indicated that the development of ethnic identity may be distinct for boys and girls, but minimal differences or mixed findings have been provided about whether there are gender differences in strength of the relationship between ethnic identity and symptoms of depression.[14]

Our knowledge is also limited about whether women are more depressed or distressed by discrimination than men. Discrimination could be more distressing for women of color because they can experience the simultaneous "double jeopardy" of sexism and racism.[28] Women may become anxious and depressed as they ruminate constantly wondering if they experienced unfair treatment because of their gender and/or race.[29] Intersecting sexism and racism are known to be multiplicative risk factors that exacerbate psychological distress among African American women.[30-33] Another study found that Asian American women had more deleterious mental health consequences when exposed to a lower threshold of discriminatory experiences than men.[34] Alternatively, masculine role norms could inhibit an emotionally expressed reaction to discrimination among men, which could explain why they could seem to be less distressed by certain levels of it.[35] Research is needed on the distressing effect of discrimination among women compared with men in different cultural contexts in the United States. Thus, rather than focusing only on racial discrimination, more studies are

needed that examine daily experiences of racial discrimination compounded with gender discrimination.[8,11]

When delving into the multifaceted intersections of discrimination, ethnic identity, gender, and mental health, other factors need to be taken into account. Those factors include age, socioeconomic status, immigrant status, and duration of residence in Hawai'i, which can influence mental health trajectories, identity development, as well as exposure to discrimination.[17,36] Moreover, Hawai'i is home to the nation's largest share of "multiracial" Americans: almost one in four Hawai'i residents identify as mixed status.[37] "For example, the largest biracial groups in Hawai'i are White and Asian (18%), Asian and Native Hawaiian/Pacific Islander (18%), and White and Native Hawaiian/Pacific Islander (12%)."[37] According to recent Census estimates, Hawai'i is the only state with an Asian majority: Asian alone (37.7%), followed by Non-Hispanic White alone (22.1%), Native Hawaiian and Other Pacific Islander alone (10.2%), Hispanic alone (10.4%), Black alone (2.2%), and American Indian or Alaska Native alone (0.4%).[38] Therefore, racial/ethnic group membership and mixed status need to be taken into account to evaluate the roles of discrimination and ethnic identity in mental health disparities in Hawai'i.

The present study focuses on Hawai'i and undergraduate students generally in the transition to adulthood, a life stage when symptoms of depression can often emerge.[39] For students, social relations are fundamental to the formation of their ethnic identity and experiences of discrimination can be particularly harmful for their psychological development.[40] The following research questions will be addressed: (1) Is a stronger ethnic identity linked with significantly lower levels of depressive symptoms, adjusting for gender, age, socioeconomic status, racial/ethnic group membership, mixed status, immigrant status, and years in Hawai'i? (2) Do the psychological effects of ethnic identity and everyday discrimination vary by gender? The first hypothesis is that ethnic identity will be associated with lower levels of depressive symptoms. The second hypothesis is that the inverse relationship between ethnic identity and symptoms of depression will be stronger for men than women. The third hypothesis is that the distressing effect of discrimination will be worse for women than men.

Methods

Data were collected using anonymous surveys during Spring 2012 to Spring 2013 semesters. A post hoc analysis verified the statistical power of the regression models and that the sample size and number of variables were sufficient using G*Power 3 software.[41] This study was approved by the university's Institutional Review Board (CHS # 20055). A convenience sample of 1,091 undergraduate students at the University of Hawai'i were surveyed. Professors agreed to have their students complete the survey by writing their responses during class time (10 minutes on average) in undergraduate courses in the departments of Sociology, Women's Studies, Nursing, Philosophy, Accounting, and Engineering. The survey questionnaire informed the students about the purpose of this study as well as the benefits and risks, and that their participation was voluntary, confidential, and would not be compensated financially. Statistical analysis was conducted using STATA v. 12 (StataCorp; College Station, TX).

Measures

The dependent variable was the 20-item Center for Epidemiologic Studies Depression scale (CES-D). The CES-D is a widely used, valid, and reliable measure for adolescents, young adults, and adults to assess levels of depressive symptoms, also referred to as psychological distress.[42] The CES-D has been used on adolescent and adult populations in Hawai'i.[43-45] Respondents were asked how they felt in the past week, such as how often they had crying spells, and felt sad or lonely, and the response categories were: (0) rarely or none of the time or less than 1 day, (1) some or a little of the time or 1-2 days, (2) occasionally or a moderate amount of the time or 3-4 days, and (3) most or all of the time or 5-7 days. Ordinary least squares (OLS) regression models were conducted for the summed scale, dependent variable measuring self-reported levels of depressive symptoms (Cronbach's alpha = .90).

The focal independent variable was a 12-item scale based on Phinney's 14-item Multigroup Ethnic Identity Measure (MEIM).[15] Items from the MEIM have been used in populations in Hawai'i.[46] According to Phinney, ethnic identity involves behaviors, feelings, attitudes, and knowledge about one's ethnic group membership.[15] The scale consisted of the average of the following 12 statements: (1) I have spent time trying to find out more about my ethnic group, such as its history, traditions, and customs; (2) I am active in organizations or social groups that include mostly members of my own ethnic group; (3) I have a clear sense of my ethnic background and what it means for me; (4) I think a lot about how my life will be affected by my ethnic group membership; (5) I am happy that I am a member of the group I belong to; (6) I have a strong sense of belonging to my own ethnic group; (7) I understand pretty well what my ethnic group membership means to me; (8) In order to learn more about my ethnic background, I have often talked to other people about my ethnic group; (9) I have a lot of pride in my ethnic group; (10) I participate in cultural practices of my own group, such as special food, music, or customs; (11) I feel a strong attachment towards my own ethnic group; and (12) I feel good about my cultural or ethnic background. Response choices ranged from strongly disagree (0) to strongly agree (3). Subsidiary analysis was performed to ensure consistency (Cronbach's alpha = .89). The ethnic identity scale had 25 missing values that were mean imputed.

Other focal independent variables included self-reported experience of discrimination due to race or ethnicity in a lifetime (1 = yes; 0 = no) and an everyday discrimination scale (EDS), which included day-to-day experiences of unfair treatment not necessarily due to race or ethnicity.[8] The students were asked to provide the frequency of several everyday situations that happened to them: (1) you are treated with less courtesy than other people; (2) you are treated with less respect than other people; (3) you receive poorer service than other people at restaurants

or stores; (4) people act as if they think you are not smart; (5) people act as if they are afraid of you; (6) people act as if they think you are dishonest; (7) people act as if they're better than you are; (8) you are called names or insulted; and (9) you are threatened or harassed. The 9-item scale was summed. Response categories were: (0) never, (1) less than once a year, (2) a few times a year, (3) a few times a month, (4) at least once a week, and (5) almost every day.

The race/ethnicity variables were based on nine categories from which the survey respondents could select: (1) White, Caucasian, Anglo, European American not Hispanic; (2) Asian; (3) Native Hawaiian; (4) Pacific Islander; (5) Black or African American; (6) Hispanic or Latino; (7) American Indian, Native American, or Alaska Native (8) Mixed, parents are from different racial/ethnic groups, and (9) Other. The respondents were asked to write more specific information for the categories Asian (write in Asian group), Pacific Islander (write in the island), Mixed (write in racial/ethnic groups of parents), and other race/ethnicity. For the mixed race/ethnicity category, the first race/ethnicity that was written by the respondent was selected for the purpose of the current study with the exception of Native Hawaiian, which was coded as listed if at all. Dummy variables were created for White, Japanese, Filipino, Chinese, Native Hawaiian or Other Pacific Islander, and Other Race/Ethnicity.

Other sociodemographic control variables included: gender (female =1) (asked to write in), age, immigrant status (foreign born = 1; United States born = 0), number of years in Hawai'i, and parental education. Parents' levels of education are often used as a measure of family socioeconomic background among students who are in their initial stages of status attainment.[47] Parental education was the highest level of schooling the respondent's father or mother had achieved. Following prior research, missing values were imputed using the following procedure: (1) missing values on father's education were substituted with mother's education and vice versa; and (2) remaining missing values (46 observations) were replaced with the mean.[47]

Results

Instrument Verification

In exploratory analyses, the multidimensional scales measuring ethnic identity and everyday discrimination were verified for this sample. Factor analyses confirmed (factor loadings > .4) that the 12-item ethnic identity scale had high internal consistency for the participants in this study (Cronbach's alpha = .89). Factor analyses (factor loadings > .4) further indicated that the 9 items loaded on one factor for the everyday discrimination scale, which had strong internal consistency for the participants in this study (Cronbach's alpha = .89).

Descriptive Statistics

Table 1 displays the descriptive statistics, including means, standard deviations, and ranges of the variables for the full sample and by gender. The final sample size was 1,033 after list-wise deletion of missing cases and imputation on two scales. About half (54%) of the sample were women and the average age of the students was 21 years. Regarding socioeconomic background, the average level of parental education was 15 years. Racial/ethnic backgrounds were Japanese (20.5%), White (18.7%), Filipino (16.4%), Chinese (9.7%), Other Race/Ethnicity (i.e., Hispanic followed by Black, Native American, Alaska Native or Other). (16.3%), and Native Hawaiian or Other Pacific Islander (17.8%). For analysis, Native Hawaiians (13.5%) were combined with Other Pacific Islanders (4.3%) due to the relatively small number of Pacific Islanders. The racial composition of our sample generally reflected the university's diverse student body (Fall Semester, 2012): Native Hawaiian or other Pacific Islander (17.4%), White (20.9%), Asian (40.4%), Hispanic (2%), Black (1.5%), American Indian or Alaska (0.3%), and race/ethnicity unknown (0.2%).[48] The one exception was that Asians were somewhat overrepresented in the sample: 46.6% versus 40.4%. The average duration of residence in Hawaii was 13 years, 13.5% were foreign-born, and 38% identified as mixed race/ethnicity. About half the sample (50.6%) self-reported experiencing discrimination in their lifetime due to race/ethnicity. The level of everyday discrimination not necessarily due to race/ethnicity was 12.06 (range = 0 – 44). Lifetime racial/ethnic discrimination and everyday discrimination were positively correlated (r = .37) (not shown). The average level of ethnic identification was 2.02 (range = 0 – 3). The level of psychological distress was 13.31 (range = 0 – 60). Table 1 also compared the descriptive statistics for the subsamples of women (n = 568) and men (n = 465). T-tests confirmed that levels of everyday discrimination (women's mean = 11.36; men's mean = 12.91; range 0 – 44) were significantly different ($P < .01$) and the number of Native Hawaiian or Other Pacific Islander students ($P < .05$) (89 women and 95 men).

Ordinary Least Squares Regression Analyses: Main Effects and Interaction Effects by Gender

Table 2 displays five OLS regression models predicting psychological distress. Model 1 shows the main effects, Models 2 through 4 each focused on an interaction effect (ethnic identity x gender or type of discrimination x gender) with controls, and Model 5, the final model, included all control variables and the three interaction effects. In the final model, ethnic identity continued to have a statistically significant inverse association (b = -3.70; $P < .001$) with depressive symptoms, which included all controls and interaction effects. This finding supports our first hypothesis. According to a statistically significant interaction effect (b = 2.55; $P < .05$) in the final model, ethnic identity had a stronger inverse relationship with depressive symptoms among men than women. Ethnic identity was mean centered for the interaction effect with gender. In a supplementary analysis of women only, the main effect of ethnic identity was not statistically significant, but it was inverse (b = -.578), including all control variables: the analysis of men found a statistically significant inverse effect (b = -3.98; $P < .001$). These findings confirm our second hypothesis. Another statistically significant interaction in the final model provided evidence for our third hypothesis that the association between everyday discrimination

Table 1. Demographic Characteristics of Sample of Undergraduate Students in Hawai'i : Percentages, Means, and Standard Deviations									
	Full Sample (N = 1,033)			**Women (n = 568)**			**Men (n = 465)**		
Variables	**N (%)**	**Mean**	**SD**	**n (%)**	**Mean**	**SD**	**n (%)**	**Mean**	**SD**
Racial or ethnic group									
White	197 (18.7%)			114 (19.5%)			83 (17.8%)		
Japanese	212 (20.5%)			114 (19.8%)			98 (21.1%)		
Filipino	169 (16.4%)			101 (17.8%)			68 (14.6%)		
Chinese	103 (9.7%)			57 (9.5%)			46 (9.9%)		
Native Hawaiian or other Pacific Islander	184 (17.8%)			89 (15.7%)*			95 (20.4%)		
Other race/ethnicity	168 (16.3%)			93 (16.4%)			75 (16.1%)		
Mixed status	397 (38.4%)			223 (39.3%)			174 (37.4%)		
Foreign-born	139 (13.5%)			74 (12.8%)			65 (14.1%)		
Lifetime racial/ethnic discrimination	523 (50.6%)			296 (52.1%)			227(48.8)		
Everyday discrimination [0 – 44]		12.06	8.26		11.36**	7.70		12.91	8.84
Years living in Hawaii [0 – 45]		13.03	8.96		12.60	9.05		13.57	8.83
Age [17 – 63 years]		21.21	4.29		20.95	3.55		21.52	5.03
Parental education [0 – 20 years]		14.89	3.12		14.84	3.01		14.95	3.26
Ethnic identity [0 – 3]		2.02	0.50		2.03	0.51		2.02	0.49
Depressive symptoms [0 – 60]		13.31	10.13		13.78	10.15		12.73	10.09

N = 1,033. N (%), proportion, SD, standard deviation. T-tests by gender *P < .05; **P < .01; ***P < .001.

Table 2. OLS Regression Models of Ethnic Identity and Discrimination Among Undergraduate Students in Hawai'i Predicting Psychological Distress: Interaction Effects by Gender.					
Variables	**Model 1 b (SE)**	**Model 2 b (SE)**	**Model 3 b (SE)**	**Model 4 b (SE)**	**Model 5 b (SE)**
Main Effects					
Ethnic identity	-2.23*** (0.63)	-3.74*** (0.91)	-2.23*** (0.63)	-2.26*** (0.62)	-3.70*** (0.91)
Lifetime racial/ethnic discrimination	0.96 (0.65)	0.94 (0.65)	1.04 (0.93)	0.88 (0.65)	1.65 (0.95)
Everyday discrimination	0.39*** (0.04)	0.39*** (0.04)	0.39*** (0.04)	0.31*** (0.05)	0.30*** (0.05)
Female	1.71** (0.60)	1.71** (0.60)	1.79* (0.85)	1.72** (0.60)	2.44** (0.88)
Age	-0.08 (0.07)	-0.09 (0.07)	-0.08 (0.07)	-0.09 (0.07)	-0.10 (0.07)
Parental education	-0.21* (0.10)	-0.22* (0.10)	-0.21* (0.10)	-0.20* (0.09)	-0.21* (0.10)
Japanese[a]	0.14 (1.18)	0.21 (1.18)	0.15 (1.18)	0.08 (1.18)	0.23 (1.18)
Filipino[a]	0.48 (1.15)	0.50 (1.15)	0.49 (1.15)	0.53 (1.15)	0.61 (1.15)
Chinese[a]	-0.24 (1.15)	-0.33 (1.34)	-0.24 (1.34)	-0.19 (1.34)	-0.25 (1.33)
Native Hawaiian or Pacific Islander[a]	1.76 (1.26)	1.79 (1.26)	1.77 (1.26)	1.78 (1.26)	1.89 (1.26)
Other race/ethnicity[a]	1.08 (1.07)	1.15 (1.07)	1.08 (1.07)	1.23 (1.07)	1.35 (1.07)
Mixed status	-0.96 (0.73)	-0.95 (0.73)	-0.96 (0.73)	-0.97 (0.73)	-0.96 (0.72)
Foreign born	2.45** (0.94)	2.50** (0.94)	2.65** (0.94)	2.64** (0.94)	2.50** (0.94)
Years in Hawai'i	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)
Interaction Effects					
Ethnic Identity x Female		2.69* (1.19)			2.55* (1.19)
Lifetime Discrimination x Female			-0.15 (1.19)		-1.46 (1.28)
Everyday Discrimination x Female				0.17* (0.07)	0.19* (0.08)
Intercept	15.64***	11.49***	15.59***	16.69***	12.22***
R^2	0.14	0.15	0.14	0.15	0.15
N =	1,033	1,033	1,033	1,033	1,033

*P < .05; **P < .01; ***P < .001 (two-tailed tests). SE, standard error. [a]Reference category is White.

and psychological distress was significantly stronger for women than men (b = .19; $P < .05$). The interaction effect between everyday discrimination and gender was mean centered. The association between lifetime racial/ethnic discrimination and distress, however, did not significantly vary by gender. Finally, other statistically significant associations worth noting in Model 5 included female, foreign-born, and everyday discrimination, which were associated with more symptoms of depression, and parental education, which was related to lower levels of depressive symptoms. Regression results were consistent using mean imputation or list-wise deletion to handle missing data for the scales measuring parental education and ethnic identity.

Discussion

This study found that a higher level of ethnic identification was linked with significantly lower levels of depressive symptoms, over and above gender, age, socioeconomic status, racial or ethnic group membership, mixed status, duration of residence, immigrant status, and discrimination. In other words, a stronger sense of ethnic pride, participation in cultural practices, and knowledge about one's ethnic group was related to lower levels of psychological distress in Hawai'i. Furthermore, the interaction effects suggested that the psychological advantage of a strong ethnic identity was more significant for men, while the distressing effect of everyday discrimination was more intense for women.

The present study's findings contribute to the mixed evidence about the strength of the relationship between ethnic identity and better psychological well-being.[11,13-23] These findings advance our knowledge of the distinct effect of a strong ethnic identity as a psychosocial asset, regardless of racial/ethnic group membership in Hawai'i, while taking into account various sociodemographic factors including immigrant status and mixed status. The findings further suggested that compared to men, everyday discrimination—not necessarily due to race or ethnicity—may be more psychologically distressing among women in Hawai'i. This could signify the stressful double jeopardy of sexism and racism.[28] Women may also ruminate about whether they experienced unfair treatment due to their gender, racial or ethnic background, socioeconomic background, or another social status, which may be frustrating, confusing, and anxiety provoking.[29] Social psychological research is needed to investigate whether discrimination as a chronic stressor may be appraised differently by women compared with men in certain cultural contexts and life stages, leading to different types of emotional reactions, such as symptoms of anxiety and depression.[49] Rather than internalizing stress as symptoms of depression as women often do, men are more likely externalize their distress via substance abuse and dependence.[24]

Like other studies in this literature, the current study has limitations worth noting, such as cross-sectional data, which show associations rather than causality. Thus, this dataset cannot ascertain whether ethnic identity improved mental health or if symptoms of depression/distress weakened levels of ethnic identification. Also, self-reported frequency of symptoms of depression in the past week were used rather than a clinical diagnosis of depression or long-term trajectories, and self-reported discrimination in a lifetime and frequency in daily life could also be subjective. Another limitation is that other mental health measures were not included in the survey, such as alcohol and drug use disorders, which are more common among men.[24]

The limitations and findings of this study should inspire future studies. For instance, participants in this study self-identified their gender by writing it in the space provided and only binary gender responses (female or male) were offered, so future research could examine transgender students. Also, the extent to which different ethnic identities are associated with patriarchal, cultural expectations should be explored, and how that may contribute to gender differences in the utility of ethnic identity as a coping resource for sexism and racism. More studies should investigate the different ways in which gendered racism specifically affects mental illnesses among young adults and those in other stages of the life course.[31] Finally, ethnic inequality and the complex categorization of ethnicity in Hawai'i deserve more attention to better understand patterns of discrimination. For example, Hispanic, Black, Native American, Alaska Native, and the few Middle Eastern students were included in the "Other Race/Ethnicity" category in this study. Hawai'i has a unique racial/ethnic hierarchy with Asians as the majority group, and more studies should focus on specific ethnic subgroups of Asians and Pacific Islanders to advance our knowledge of discrimination and mental health disparities.[5]

In conclusion, future research should expand the population of study beyond college students and gather representative longitudinal survey data of the state of Hawai'i. Beyond more quantitative survey data, qualitative studies need to improve the conceptualization and operationalization of ethnic identity in Hawai'i.[50] Lastly, what deserves more exploration is the psychological utility of ethnic pride, knowledge, and involvement in cultural practices in different social situations, and how a salient ethnic identity can influence daily social interaction in the unparalleled contexts of the Hawaiian islands.[46]

Conflict of Interest

The author reports no conflict of interest.

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Student Reactions to Receiving Their Acceptance Letter to the John A. Burns School of Medicine

Damon H. Sakai MD

In 1993, the Medical School Hotline was founded by Satoru Izutsu PhD (former vice-dean UH JABSOM), it is a monthly column from the University of Hawai'i John A. Burns School of Medicine and is edited by Kathleen Kihmm Connolly PhD; HJMPH Contributing Editor.

In the last fifteen years it has been getting more competitive for students to pursue a degree in medicine. Nationwide, between 2002 and 2017, the number of medical school applicants has increased by more than 50%. However, the number of applicants who matriculated has increased only by around 30%.[1] In 2016, the John A. Burns School of Medicine (JABSOM) received 2,231 student applications for one of the 70 position in the class scheduled to begin in July 2017. This is a 27% increase in applications within the last five years, whereas the number of spots available had increased only 6% from 66 in 2016. Consequently, to get into medical school successful candidates must accumulate achievements that go beyond good grades. It's not surprising that receiving a letter of acceptance is life changing and accompanied by great joy, elation, relief, gratitude, and a feeling of accomplishment.

Letters of acceptance are sent to successful candidates at JABSOM in the spring. Their stories about receiving their letters vary, but share in common an unbridled enthusiasm for what lay ahead. These new students provide a unique insight into the sacrifices they and their family made to fulfill this dream. The following comments were collected from students at the start of their medical school training in 2012.

When I received my acceptance email from JABSOM I had to read it three times just to be sure they didn't make a mistake or that I hadn't read it wrong. I ran upstairs to tell my fiancé that I got into medical school. We both jumped up and down and screamed like little girls. It was one of the greatest moments of my life.

Finally, lunch time," I said to myself. After spending five hours purifying a synthetic natural product that I thought would one day boost my medical school application, I was ready to put my research behind and walk out of the lab to enjoy my vegetarian instant noodles. While waiting for my noodles to heat up, I checked my email and was surprised to find my acceptance letter from JABSOM. I jumped off my chair, ran through the hallway, and banged on my professor's door. "Yes!" I said to him repeatedly as I gave him a huge hug. I was so happy! I started making phone calls to tell my family. I am finally on my way to become a doctor and can one day take care of my grandmother! I returned to my seat only to realize that 45 minutes had passed since I left the room. "Oh, no… I guess this is my day to learn to eat like a doctor in training," I said to myself after I saw my burnt noodles.

I received an email from the admissions committee entitled "UH JABSOM Acceptance Letter Form". I tried to calm myself and not draw any rash conclusions. It took me a few minutes to gather up the courage to open the email, and when I saw the first word, "Congratulations!" come up on the computer screen, a wave of relief and excitement washed over me. Simply reminiscing about this moment has given me chills. It is something I will never forget.

I called my mom right away and told her the news. She was in Ross at the time and started crying. I heard someone in the background asking her if she was ok since she kept saying "Oh my God, Oh my God, Oh my God."

I was SO happy. I screamed at my roommate "HUG ME, I GOT INTO MEDICAL SCHOOL!!!" Unfortunately, she didn't hear what I had said. She just saw me running at full speed, jumping, and knocking her over.

I thought of all the hard work and perseverance especially through the tough times. Most of all, I am thankful to God and to my mom, dad, family, friends, mentors, and colleagues for their never-ending love and support. I am finally living my dream and on my way to becoming a physician.

I was just overwhelmed with happiness. No words can describe the emotions I felt that day. Receiving my acceptance letter justified all the hours of studying at 3:00am and tears of frustration towards achieving this goal. I'm so fortunate and appreciative. I'm looking forward to growing personally and academically as I strive to earn a medical degree.

When I realized what it was I immediately broke down crying tears of joy. I had put in so much hard work to get to this point, and I was incredibly proud of myself and what I had accomplished.

I remember being in disbelief, elated, thankful, and scared all at the same time. I kept wondering if I was dreaming, even as my coworkers started jumping up and down. It's crazy how one email can change the rest of your life

I found out I was accepted into medical school through the sprinting, hand-waving, and panting of my boyfriend. He was in charge of checking my email when I was in class to watch out for the anticipated letter of notification. After walking out of my biochemistry class, I saw him sprinting from afar, screaming something inaudible. I thought there was something terribly wrong!! When we finally got close enough he exclaimed that I NEEDED TO CHECK MY EMAIL NOW. I quickly grabbed my blackberry, opened the said email and read the first word: Congratulations! I instantly smiled. It was all worth it!

When I got home, my father asked me to check my e-mail. I read "Welcome to JABSOM!" It was the outcome I had been hoping and praying for. I was so grateful and humbled that my prayers had been answered. I couldn't do anything except bow my head down in gratitude to God. I was overwhelmed ... in a fantastic way! I was elated. The best part of it all though was receiving the news from my father - the person who was happier for me than anyone ever could be.

My road to acceptance was a long one. I applied previously to JABSOM three times over the course of five years. I was rejected twice and wait-listed the previous year. It was my fourth attempt and I had been nervously awaiting news since finishing interviews. I checked my e-mail and saw the words "UH JABSOM ACCEPTA..." I thought to myself, "What's an "ACCEPTA?" I opened the email and read, "Congratulations!" I started to tear up uncontrollably. My dad was sitting on the couch. I held my phone up to him and whispered "I think I got into medical school." As he read he started crying. I ran out to the balcony to call my mom. I proceeded to scroll through my phone book to see who else I should call. There were so many people who had been there all those years supporting me, cheering me on and nervously waiting with me. Before each call I would read the email again making sure it hadn't changed. Each person responded with such overwhelming excitement, joy, and pride. It wasn't till I was accepted that I appreciated the emotional investment they all had in my success. I hadn't been the only one striving toward this goal...We all got into medical school.

Of the 2,231 JABSOM applicants for spots in the 2017-2018 academic year 10.5% were Hawai'i residents, as were 78.6% (55) of all that matriculated. Overall, the state of Hawai'i had 90 students that matriculated into a medical school programs. The JABSOM distribution of females were 47.6% of all applications, with the total entering classes of 52.9%m (37).[2] This follows the national trend whereby the ratio of female matriculates has grown by 9.6% in the last three years, with 50.7% total females entering medical school in 2017.[1]

Ethnicities represented included Japanese, Chinese, Mixed Asian, White, Filipino, Korean, Native Hawaiian, Vietnamese, Asian Indian, African American, and Taiwanese. The mean age of the class was 24. The average undergraduate grade point of the entering class was 3.74. Of the 55 students that attended high school in Hawai'i, approximately 60% graduated from private schools. The most frequent undergraduate institution attended by the entering class was the University of Hawai'i at Manoa, but the student body came from schools across the nation.[2]

Following graduation, these students entered fields such as family medicine, internal medicine, pediatrics, psychiatry, neurology, surgery, obstetrics and gynecology, orthopedic surgery, radiology, emergency medicine, and anesthesiology. Besides matching with University of Hawai'i residency programs, students from this class are currently doing their residency training at institutions such as Stanford University, Harvard University, Yale University, University of California Los Angeles, and University of California San Francisco. Throughout this journey, these students carry with them lasting memories of the event that started their medical career—receiving a letter of acceptance from JABSOM.

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Data Highlights from the Hawai'i Youth Risk Behavior Survey: Links Between Academic Achievement and Health Behaviors

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Abstract

The Youth Risk Behavior Survey is administered biennially in odd years to public middle and high school students in Hawai'i. Data highlights are presented from Hawaii's 2017 high school survey results to enhance understanding of the relationship between health and academic achievement. This article reviews a select set of health-risk behaviors and their association with academic grades for Hawai'i public school students. The findings demonstrate that students who self-reported engaging in health protective behaviors also reported higher academic grades in school, while those who engaged in health-risk behaviors were more likely to report lower grades in school. This discussion can provide useful background information and benchmarks for research, policy, and local initiatives. It also supports the need for continued collaboration and a synergistic approach between education and health partners in Hawai'i in order to improve the health and academic achievement of our youth.

Background on Educational Attainment and Health Behavior in Hawai'i

Research over the past 25 years has demonstrated a robust, multifaceted connection between academic achievement and health-related behaviors.[1-7] Physical activity programs in schools can improve cognitive skills, including concentration, attention, and behavior.[5,8] Nutrient deficiencies and hunger are associated with lower grades, diminished concentration among students, and higher rates of absenteeism.[5,9-11] A wide range of health behaviors are significantly associated with academic achievement, including substance use, sexual health, and violence-related risk behaviors.[1,5,12-16]

Importantly, associations between education and health exist in both directions: student health behavior impacts academic performance and academic performance impacts health behaviors.[1,9,17] The school environment thus provides an opportunity to meet two critical goals: positively influencing the health of students and improving their academic achievement.

The Hawai'i Department of Education (HDOE) acknowledges the importance of both health and education in their vision: "Hawaii's students are educated, healthy and joyful lifelong learners who contribute positively to our community and global society."[18] The HDOE also "recognizes that when students' wellness needs are met, they attain higher achievement levels."[19]

The Hawai'i Department of Health (HDOH) similarly acknowledges the links between education and health. As HDOH's former Health Director, Dr. Virginia Pressler noted: "Part of providing a well-rounded education includes health and physical education classes, as well as educational activities about nutrition and healthy eating."[20] To support this effort, HDOH launched the Healthy Hawai'i Initiative (HHI) in 2000 to strengthen health policies and programs in Hawaii's communities, schools, and workplaces.[21,22]

Together, HDOE and HDOH have worked in partnership to facilitate the implementation of HDOE Wellness Guidelines, which address the United States Department of Agriculture (USDA) requirements for a local wellness policy and support healthy eating and physical activity in schools. Since 2011, all public non-charter schools have been required to meet the HDOE Wellness Guidelines. Also, for the past 15 years, the HDOH HHI has provided funds to the HDOE to support the implementation of wellness policy, health education, and physical education. These funds have been used to hire state and district-level personnel to provide instructional resources, professional development, and technical assistance to all 256 HDOE public schools.

Current statewide data demonstrating the relationship between educational performance and health behavior could be useful to inform cross-sector partnerships and help target resources where the needs are greatest. Yet there is limited current, statewide research on the connections between academic achievement and health behaviors in Hawai'i. While a large amount of literature shows the relationship between health behavior and academic performance, much of this research took place years ago and/or in specific geographic regions or states that may not be applicable to students in Hawai'i.[1,15]

This paper describes a useful data source for the goal of providing current, actionable information around student health

behaviors and academic performance: the Hawai'i Youth Risk Behavior Survey (YRBS). Highlights are provided from recent YRBS findings on the relationship between health behaviors and academic grades in Hawai'i. Having a greater understanding of the relationship between education and health can facilitate partnerships, resources, and initiatives in Hawai'i, and ultimately help students become healthier and more successful learners. These data may also provide useful background information and benchmarks for programs, research, and policy.

Specifically, this article highlights key findings and conclusions around a subset of health indicators of interest from the 2017 Hawai'i YRBS. It was hypothesized that students in Hawai'i who self-report engaging in positive health behaviors would also report higher grades in school, while those who report engaging in health-related risk behaviors would be more likely to report lower grades in school.

Youth Risk Behavior Survey

The Centers for Disease Control and Prevention (CDC) developed the Youth Risk Behavior Surveillance System to monitor six health-related categories associated with the greatest morbidity and mortality among both youth and adults in the United States: injury and violence; sexual risk behaviors; alcohol and other drug use; tobacco use; nutrition; and physical activity. To produce national-level estimates on these key outcomes, the YRBS is administered biennially by the CDC as a self-reported survey to high school students across the United States (US).

In 2017, the CDC assisted 46 states and 21 large urban school districts in administering their own survey to produce local and county-level estimates.[23] States are required to use a subset of the "core" questionnaire but are allowed to include additional questions of local interest. These features allow states to longitudinally benchmark and compare their progress across several health areas and an even greater number of indicators.

In Hawai'i, the YRBS is a joint effort between the Departments of Health and Education, and the University of Hawai'i Curriculum Research & Development Group. The Hawai'i YRBS uses a two-stage cluster design to produce representative weighted estimates for both public high school and middle school students in odd-numbered years. The Hawai'i YRBS has an opt-out consent process, which means that information about the survey is distributed to students and their families prior to administration so that parents and legal guardians are afforded the opportunity to exclude their children from participating. For further information, detailed methodology of the YRBS has been previously published[24,25] and Hawai'i's YRBS results are available for the public to view through the Hawai'i Health Data Warehouse.[26] The 2017 Hawai'i YRBS high school survey had a sample size of 6,031 students and an overall response rate of 77%.

Risk Behaviors and Academic Achievement Report

In 2017, Rasberry, et al, published a study in the Morbidity and Mortality Weekly Report (MMWR) using the national YRBS 2015 data to examine the association between health-related behaviors and academic achievement among high school students in the US.[15] Soon after, the CDC released data tables for states to download for YRBS 2017 as a report.[27] This report analyzed and tabulated YRBS health behavior indicators by academic grades for each state. The grade question is worded as follows: *During the past 12 months, how would you describe your grades in school?* Students were allowed to choose "Mostly A's," "Mostly B's," "Mostly C's," "Mostly D's," "Mostly F's," "None of these grades," or "Not sure." For the analysis, students who reported mostly D's or mostly F's were combined into a single category, while the other grades were reported separately. Students who reported "None of these grades" or "Not sure" were excluded from all analyses. The data tables for each state reported the weighted prevalence estimates and 95% confidence intervals. Significance was set at $P < .05$ and was determined based on further logistic regression modeling controlling for the potentially confounding effects of sex, race/ethnicity, and grade level (ie, 9th, 10th, 11th, and 12th).

The 2017 YRBS high school questionnaire contained 99 questions.[27] The CDC's extensive data tables in the Hawai'i report on each of these questions were informative, but difficult to synthesize for programmatic, research, or policy work as the lengthy document did not provide any discussion of findings or context that would allow for a cumulative analysis of the findings.[27]

In this paper, we chose to examine in detail 29 health indicators that covered six main health topics using the data reported in CDC, 2017.[27] The selected indicators to highlight were based on those chosen for the 2017 Rasberry, et al. MMWR study[15] and were confirmed by Hawai'i health and education partners as areas of interest. To aid in the interpretation of the data, the prevalence estimates were organized into bar graphs according to six main topic areas.

Dietary Behaviors and Food Security

Included dietary indicators were: eating breakfast on all seven days (during the seven days before taking the survey); eating vegetables three or more times per day (including green salad, potatoes, carrots, and other vegetables, during the seven days before the survey); not drinking a can, bottle, or glass of soda or pop (during the seven days before the survey); and eating fruit or drinking 100% fruit juices three or more times per day (during the seven days before the survey). Additionally, food security was operationalized as reporting "most of the time" or "always" going hungry because there was not enough food in their home (during the 30 days before the survey).

Physical Activity and Sedentary Behaviors

The Hawai'i YRBS includes several measures related to physical activity and sedentary behavior. Physical activity indicators selected for this paper include: being physically active for at least 60 minutes per day (on five or more days during the seven days before the survey) and playing on at least one sports team (during the 12 months before the survey). The sedentary be-

haviors chosen include watching television for three or more hours per day (on an average school day) and playing video or computer games or using a computer three or more hours per day for something that was not school work (on an average school day).

Bullying, Violence, and Suicide Ideation

The Hawai'i YRBS contains multiple indicators around bullying, violence, and suicide ideation. We included five indicators. One indicator relates to electronic bullying, which includes being bullied through texting and social media (during the 12 months before the survey). Additionally, two suicide indicators include making a plan about how they would attempt suicide (during the 12 months before the survey) and attempting suicide one or more times (during the 12 months before the survey.) School safety was ascertained by students reporting they did not go to school because they felt unsafe at school or on their way to school (on at least one day during the 30 days before the survey). Finally, a violence indicator of interest includes being in a physical fight one or more times (during the 12 months before the survey).

Sexual Risk Behaviors and Sexual Violence

The two sexual risk behaviors chosen for further review include currently sexually active (defined as having sexual intercourse during the three months before the survey) and not using any method to prevent pregnancy during last sexual intercourse (among youth who are currently sexually active). In addition, one indicator around sexual violence includes anyone forcing them to do sexual things that they did not want to do (during the 12 months before the survey). Finally, HIV/AIDS education was ascertained by reporting ever being taught about AIDS or HIV infection in school.

Substance Use Behaviors

The Hawai'i YRBS has a large section of questions devoted to substance use including alcohol, tobacco, prescription drugs, and illicit drug use. Indicators selected for inclusion were currently drinking alcohol, using electronic vaping products, and smoking cigarettes (on at least one day during the 30 days before the survey); current marijuana use (one or more time during the 30 days before the survey); ever prescription pain drug use, including Vicodin, OxyContin, Hydrocodone, and Percocet; and ever methamphetamine use (one or more times in their life).

Other Health Behaviors

Many other health behaviors are measured in the Hawai'i YRBS including access to health care, general health, and protective factors that are not included in the national YRBS survey. We included the following: not going to school because they were sick (on one or more days during the 30 days before the survey); sleeping eight or more hours per night (on an average school night); seeing a dentist for a check-up, exam, teeth cleaning, or other dental work (during the 12 months before the survey); seeing a doctor or nurse for a check-up or physical exam when they were not sick or injured (during the 12 months before the survey); and having at least one teacher or other adult in school they can talk to if they have a problem.

Data Highlights

The highlighted 2017 YRBS results for Hawai'i public high school students are displayed in Figures 1-6. The bar graphs have been shaded from a dark gradient (mostly A's) to a light gradient (mostly D/F's) to illustrate the association between academic grades in school and health indicators. Protective health behaviors are indicated in bold font, while health-risk behaviors remain in regular font. The majority of health behaviors (25 of the 29) were statistically significant when compared with academic achievement results. (Decimals of 0.5 and higher were rounded up to the nearest whole number in the bar graphs.)

Dietary Behaviors and Food Security

Students that reported mostly A's and mostly B's had a higher prevalence of eating breakfast on all seven days and not drinking soda in the past week (Figure 1). For example, 43% of students with mostly A's ate breakfast on all seven days. This means that 57% of students with mostly A's did not eat breakfast on all seven days. This compares to 22% of students with mostly D/F's who ate breakfast on all seven days, thus 78% of students with mostly D/F's did not eat breakfast on all seven days before the survey. Higher achieving students also reported a lower prevalence of hunger during the 30 days before the survey. It should be noted that regardless of the academic grade achieved, more than 50% of students in each letter grade category reported not eating breakfast on all seven days.

Students who earned mostly D/F's had a higher prevalence of having at least three or more vegetables and three or more fruits/juices per day. At the same time, this group also had the highest prevalence of going hungry all or most of the time because there was no food in their home.

Although no statistical association was found between having fruit or fruit juices three or more times per day and students' grades, the remaining four dietary variables in Figure 1 all showed a significant relationship with academic grades in school.

Physical Activity and Sedentary Behaviors

Students who reported mostly A's and mostly B's received more physical activity than those who reported mostly C's and mostly D/F's. Academic grades were significantly associated with being on a sports team during the last year and being physically active for at least 60 minutes per day on five or more days in the last seven days (Figure 2). Grades were not statistically associated with watching television or playing video/computer games or using a computer for three or more hours per day. Noticeably, approximately 40% of all students played video/computer games or used a computer for at least three hours per day and approximately 20% of students watched three or more hours of television regardless of their grades.

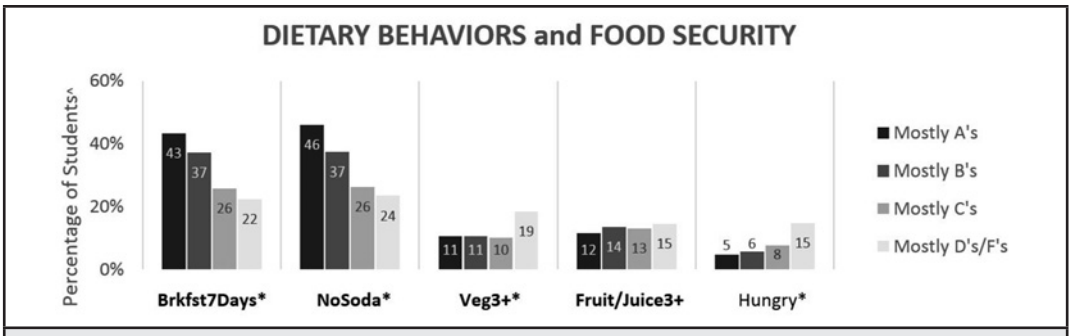

Figure 1. Percentage of Hawai'i Public High School Students Self-reporting Dietary Behaviors and Food Security

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], *P* < .05
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
Brkfst7Days: Ate breakfast on all 7 days during the 7 days before the survey
NoSoda: Did not drink a can, bottle, or glass or soda or pop during the 7 days before the survey
Veg3+: Ate vegetables three or more times per day during the 7 days before the survey
Fruit/Juice3+: Ate fruit or drank 100% fruit juices three or more times per day during the 7 days before the survey
Hungry: Most of the time or always went hungry because there was not enough food in their home during the 30 days before the survey

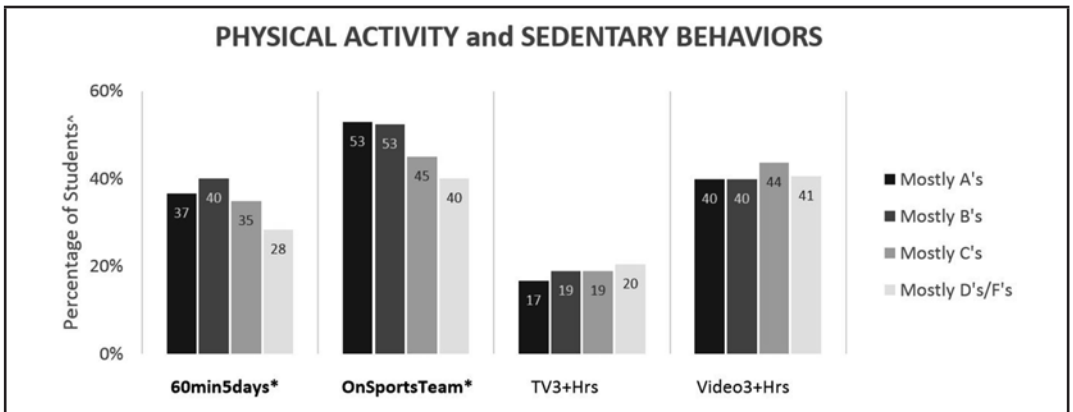

Figure 2. Percentage of Hawai'i Public High School Students Self-reporting Physical Activity and Sedentary Behaviors

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], *P* < .05
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
60mins5days: Physically active at least 60 minutes per day on 5 or more days during the 7 days before the survey
OnSportsTeam: Played on at least one sports team during the 12 months before the survey
TV3+Hrs: Watched television 3 or more hours per day on an average school day
Video3+Hrs: Played video or computer games or used a computer 3 or more hours per day for something that was not school work on an average school day

Bullying, Violence, and Suicide Ideation

Academic grades were significantly associated with all five of the bullying, violence, or suicide-related behaviors (Figure 3). A common pattern emerged that students who reported mostly D/F's exhibited the highest prevalence for each health-risk behavior. The gradient followed accordingly that those who reported mostly C's were the second highest group to self-report these risk behaviors. For example, being in a physical fight was highest among students who received mostly D/F's at 34%, and this decreased to 25% for students with mostly C's, followed by 15% for students with mostly B's, and 10% of students with mostly A's.

Sexual Risk Behaviors and Sexual Violence

Academic grades were significantly associated with being currently sexually active, experiencing sexual violence, and being taught about AIDS or HIV in school (Figure 4). Not using any method to prevent pregnancy during the last sexual intercourse had no significant association with educational outcomes, although the prevalence did increase as academic grades declined.

Students who reported receiving mostly D/F's were more likely to be involved in the health-risk behaviors of being sexually active, experiencing sexual violence in dating, and not using any birth control method compared to those earning A's or B's.

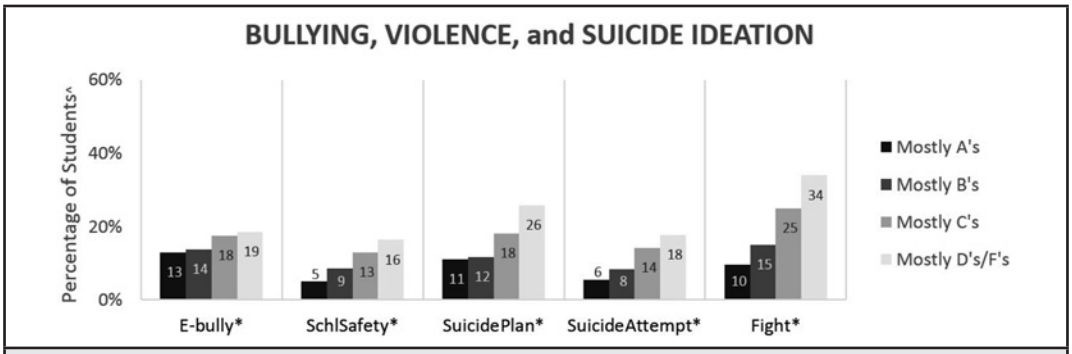

Figure 3. Percentage of Hawai'i Public High School Students Self-reporting Bullying, Violence, and Suicide Ideation

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], $P < .05$
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
E-bully: Ever were electronically bullied during the 12 months before the survey
SchlSafety: Did not go to school because felt unsafe at school or on their way to or from school on at least 1 day during the 30 days before the survey
SuicidePlan: Made a plan about how they would attempt suicide during the 12 months before the survey
SuicideAttempt: Attempted suicide one or more times during the 12 months before the survey
Fight: In a physical fight one or more times during the 12 months before the survey

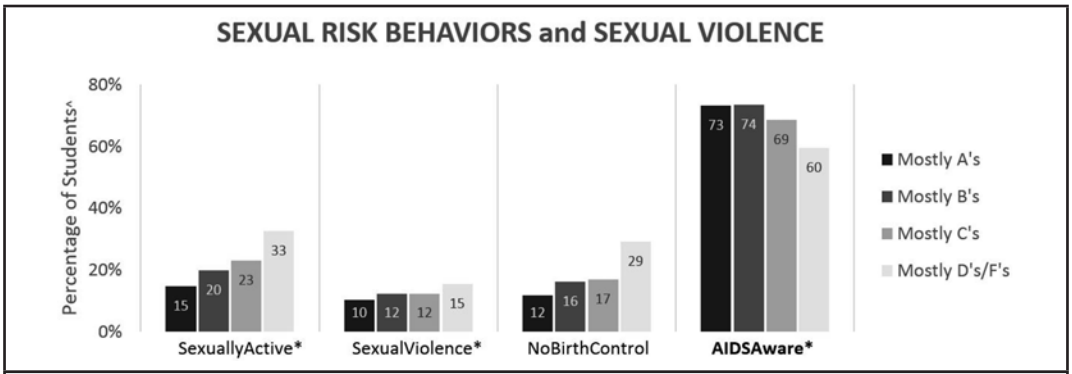

Figure 4. Percentage of Hawai'i Public High School Students Self-reporting Sexual Risk Behaviors and Sexual Violence

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], $P < .05$
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
SexuallyActive: Currently sexually active during the 3 months before the survey
SexualViolence: Experienced sexual violence one or more times during the 12 months before the survey
NoBirthControl: Did not use any method to prevent pregnancy during last sexual intercourse
AIDSAware: Students who have ever been taught about AIDS or HIV infection in school

Substance Use Behaviors

Academic grades were significantly associated with all six substance use behaviors (Figure 5). Students earning mostly C's and mostly D/F's reported higher prevalence estimates than those with mostly A's and mostly B's. For example, 16% of students with mostly A's reported currently e-vaping, while 43% of students with mostly D/F's engaged in current e-vaping in the last 30 days. Current use of cigarettes was lower compared to current e-vaping and ever taking drugs without a prescription, while current use of marijuana and alcohol were higher than current use of cigarettes.

Other Health Behaviors

The last health topic comprises a variety of health behaviors. Academic grades were significantly associated with all five variables (Figure 6). When asked if they missed school because they were sick on one or more days during the last month, prevalence estimates were higher among students who received mostly D/F's and mostly C's, but lower on all protective health behaviors including seeing a dentist, having a check-up or physical exam, having a teacher or adult they can talk to if they have a problem, and getting at least eight hours of sleep. Regardless of academic grades, the majority of students reported not getting enough sleep with 25% or fewer students receiving eight or more hours of sleep each day in all four of the grade categories.

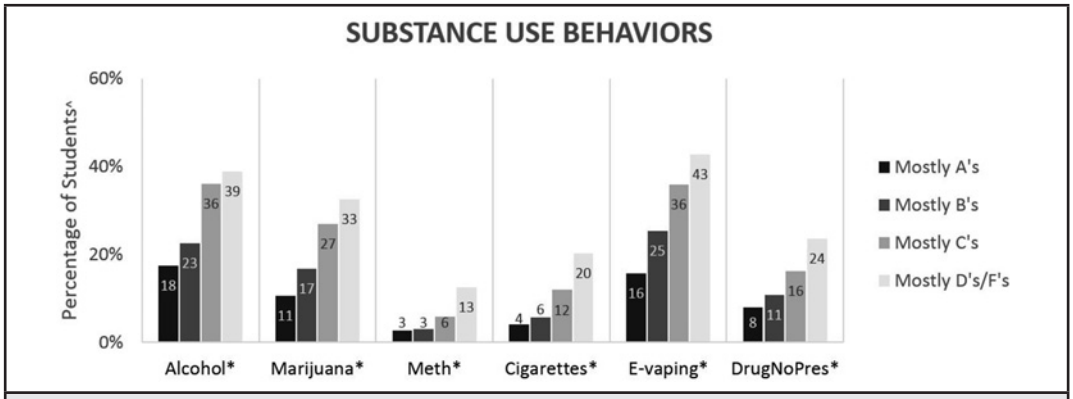

Figure 5. Percentage of Hawai'i Public High School Students Self-reporting Substance Use Behaviors

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], $P < .05$
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
Alcohol: Currently drank alcohol on at least 1 day during the 30 days before the survey
Marijuana: Currently used marijuana one or more times during the 30 days before the survey
Meth: Ever used methamphetamines one or more times during their life
Cigarettes: Smoked cigarettes on at least 1 day during the 30 days before the survey
E-vaping: Currently use electronic vaping products on at least 1 day during the 30 days before the survey
DrugNoPres: Ever took prescription drugs without a doctor's prescription one or more times during their life

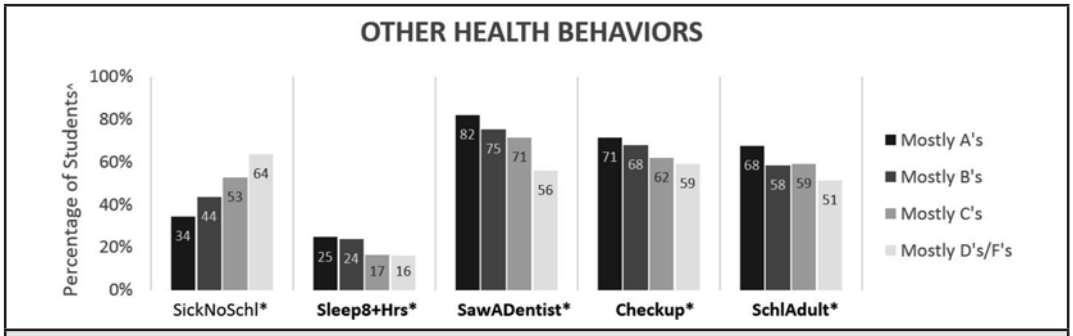

Figure 6. Percentage of Hawai'i Public High School Students Self-reporting Other Health Behaviors

* Based on logistic regression analysis controlling for sex, race/ethnicity, and grade in school as reported in CDC, 2017[27], $P < .05$
^ Decimals of 0.5 and higher were rounded up to the nearest whole number
SickNoSchl: Did not go to school because they were sick on one or more days during 30 days before the survey
Sleep8+Hrs: Sleep 8 or more hours per night on an average school night
SawADentist: Saw a dentist during the 12 months before survey
Checkup: Saw a doctor or nurse for check-up or physical exam when not sick during the 12 months before survey
SchlAdult: Students who had at least one teacher or other adult in school they can talk to if they have a problem

Discussion

These data highlights from the larger CDC report[27] demonstrate clearly that students in Hawai'i who achieved mostly A's and B's were more likely to report engaging in health protective behaviors compared to students with C's and D/F's. In a similar manner, students with mostly C's and D/F's were more likely to engage in health-risk behaviors than students who earned mostly A's and B's. Table 1 shows the key findings.

These findings support the expected relationship between health protective behaviors and academic achievement in the state of Hawai'i and coincide with previous national findings.[27] While the general trends are similar for the US and Hawai'i, some differences are noted. For example, the likelihood of using meth and e-vaping products among Hawai'i students in 2017 was higher than the national average; however, the trend of current alcohol usage was lower for Hawai'i students.[26,28] Similarly, the likelihood of being concerned about school safety and attempted suicide was higher among Hawai'i high school students in 2017 compared to the US, but the trend for being involved in physical fights was lower for Hawai'i students.[26,28] Hawai'i students were also less likely to be sexually active than their average US counterparts, but they experienced more sexual violence.[28]

In Hawai'i, there are several health behaviors that warrant additional attention and resources irrespective of academic grade achievement or significant associations. These include high levels of sedentary behavior, high e-vaping use, not eating breakfast daily, and not getting enough sleep for all students. Other high-risk health behaviors in Hawai'i that should be of immediate concern include the proportion of students who reported going hungry, ever taking meth, and having made a suicide plan or attempted suicide.

Limitations

There are several limitations to keep in mind when interpreting these findings. Hawai'i YRBS data are based on self-report, and behaviors could be under- or over-reported, especially if they are stigmatized ones. However, YRBS questions have demonstrated good test-retest reliability.[24,25] YRBS data are also cross-sectional, and thus causation cannot be determined alone from this analysis, only an association between variables. Some students in Hawai'i do not participate in the survey as the Hawai'i YRBS is only administered to public schools, and 15.6% of students in Hawai'i attended private schools in 2013.[29] Additionally, most students who were absent on the day the survey was administered were not included in the results and thus students with poorer health and lower grades may be excluded. Hawai'i public schools had a chronic absenteeism rate of 15% and a four-year high school dropout rate of 14.4% in the 2016-2017 school year.[30,31] Also, these highlights are drawn from analyses and data in a previous report;[27] we did not conduct the analyses ourselves. Despite these limitations, these data highlights should contribute to a deeper understanding about the relationship between academic achievement and health for students in Hawai'i.

Conclusion

This study provides specific evidence and a consistent pattern of the association between health behaviors and academic achievement among public high school students in Hawai'i and highlights key relationships seen in detailed YRBS data. The findings help support the need for public health and education agencies and professionals to strengthen their collaboration to achieve improved health and education outcomes for youth. Promoting healthy lifestyles and encouraging academic achievement do not need to be viewed as separate, competing concepts, but as synergistic and complementary ways for school health stakeholders, parents, and communities to support the development, health, and education of our youth.[17,32]

These data can also be used to help identify priority areas for health education curricula and for professional development for teachers and staff. In addition, these data can be used to support legislation and policies that promote health and/or education. These highlights may also be useful for those seeking funds or grant opportunities to support new school health initiatives. If there is interest, this study could be expanded in the future by conducting new analyses to assess additional dimensions of the health indicators including geographic region (ie, county), sexual identity, and race/ethnicity.

Table 1. Summary of Select YRBS Results for Public High School Students in Hawai'i

In Hawai'i, when compared to students with lower grades, students with higher grades are…	
More likely to:	**Less likely to:**
• Eat breakfast on all 7 days during the last week	• Have gone hungry because there was no enough food in their home during the last month
• Have been physically active for at least 60 minutes per day on at least 5 or more days in the last week	• Have had 3 or more vegetables and 3 or more fruits per day during the last 7 days
• Have played on at least 1 sports team during the past year	• Have made a suicide attempt or a plan about how they would attempt suicide in the last year
• Have slept at least 8 hours per night on an average school night	• Have had a physical fight in the last year
• Have not had soda during the last week	• Have been electronically bullied during the last year
• Have seen a dentist in the last year	• Have been sexually active during the last 3 months
• Have seen a doctor or nurse for a check-up or physical exam when not sick during the last year	• Have experienced sexual violence one or more times during the last year
• Have used birth control to prevent pregnancy during last sexual intercourse	• Have engaged in all substance use behaviors including alcohol, marijuana, methamphetamine, cigarettes, e-vaping, and taking prescription drugs without a doctor's prescription
• Have been taught about AIDS or HIV infection in school	• Have missed school because they were sick on 1 or more days in the last month
• Have had at least one teacher or other adult they can talk to if they are having a problem	• Have missed school because they felt unsafe at school or on their way to/from school on 1 or more days in the last month

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HAWAIʻI JOURNAL WATCH

KAREN ROWAN MS

Highlights of recent research from the University of Hawaiʻi and the Hawaiʻi State Department of Health

Farmers' Markets

Oʻahu needs more farmers' markets that accept SNAP debit cards, finds a new study led by Opal Vanessa Buchthal DrPH, assistant professor with the Office of Public Health Studies. The study used GIS spatial analysis of Oʻahu to look at market locations and income levels of neighborhoods. Results showed that only nine of the 55 farmers' markets on Oʻahu accept SNAP debit cards. Buchthal and colleagues concluded that if farmers' markets in just six specific neighborhoods (https://www.cambridge.org/core/journals/public-health-nutrition/article/using-spatial-analysis-to-examine-best-placement-of-electronic-benefit-transfer-services-at-farmers-markets-in-honolulu-county-hawaii-usa/40B9427C04BB4BDAE110871DEB11D613) could start accepting the debit cards, then the percentage of Oʻahu's SNAP participants who would have access to a nearby market that takes the cards would increase from the current 44 percent to 67 percent. The study was published August 29 in the journal Public Health Nutrition.

Cervical Cancer Screening

In areas where women have limited access to healthcare, visual inspection of the cervix offers a low-resource method of cervical cancer screening. Researchers led by Susan Driscoll PhD, MPH, assistant professor with the School of Nursing and Dental Hygiene, reviewed previous studies that had looked at whether community-based programs using adequately-trained community health workers (CHWs) could expand access to screening. Results showed that the sensitivity in detecting cervical cancer (https://obgyn.onlinelibrary.wiley.com/doi/full/10.1002/ijgo.12535) by visual inspection was 15 percentage points higher among CHWs than physicians. Provider training was a significant predictor of the sensitivity and specificity of the screening. The study was published in the September issue of the International Journal of Gynaecology and Obstetrics.

Rat Lungworm Disease

More research is needed to improve diagnosis and treatment of angiostrongyliasis, or rat lungworm disease, according to a viewpoint paper. The nematode (*Angiostrongylus cantonensis*) that causes the disease is found in rats and in slugs and snails, but cases have occurred in children under age 1 who have had no known direct exposure to slugs. It is possible, although not proven, that rainwater catchment systems provide another route (https://pubs.acs.org/doi/10.1021/acschemneuro.7b00299) of human exposure, according to senior author Susan Jarvi PhD, professor with The Daniel K. Inouye College of Pharmacy, and colleague Kathleen Howe. Current work is focusing on developing an immunoassay to estimate the exposure of people in east Hawaiʻi. The paper was published in a recent issue of the journal ACS Chemical Neuroscience.

Eating Habits of Teenagers

A new study of eating behaviors suggests that for teen girls on Oʻahu, BMI is positively correlated with uncontrolled eating and emotional eating, and also with cognitive restraint, which means consciously restricting food to control or lose weight. Senior author Jinan Banna PhD, RD, associate professor with the College of Tropical Agriculture and Human Resources, and colleagues gathered data from 84 girls ages 9 to 13. Given that there was no correlation between energy intake and restrained eating in this study, the results suggest that other factors, such a desire to give a socially acceptable answer on a questionnaire, may help explain the positive correlation between restrained eating and BMI (http://www.mdpi.com/2072-6643/10/9/1279/htm). The study is published in the September issue of the journal Nutrients.

Native Hawaiian Diaspora

Native Hawaiian elders living in California (https://link.springer.com/article/10.1007%2Fs10823-017-9335-3) who left Hawaiʻi during their teen or young adult years report that they experienced a higher standard of living and less discrimination after they moved, according to a study led by Colette Browne DrPH, professor with the Myron B. Thompson School of Social Work, and Kathryn Braun DrPH, professor with UH Public Health. Through key informant interviews and focus groups, the study found that financial concerns are a common barrier to accessing long-term care. A strong love of Hawaiʻi persisted with all of the participants. Strategies to support these elders and their caregivers may include attending to financial needs and improving the cultural sensitivity of their social service and health care providers. The study was published in a recent issue of the Journal of Cross-Cultural Gerontology.

Ovarian Cancer

Women with ovarian cancer who have recently (within the past 2 years) used aspirin or other NSAIDs after their diagnosis may have lower risk of dying from ovarian cancer (https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(18)30373-5/abstract), according to a new epidemiological study. Researchers led by Melissa Merritt PhD, assistant researcher with the UH Cancer Center, looked at data from about 240,000 nurses who were part of the Nurses' Health Study and the Nurses' Health Study II. If the findings are confirmed, clinical trials should look at whether the use of aspirin and other NSAIDs after an ovarian cancer diagnosis could improve women's prognosis, as well as determine the dose levels that are most protective, Merritt and colleagues wrote. The study was published in the August issue of The Lancet Oncology.

THE WEATHERVANE

RUSSELL T. STODD MD; CONTRIBUTING EDITOR

THE HOSPITAL: A GOOD PLACE TO AVOID.

According to the Centers for Disease Control and Prevention (CDC) on any given day approximately one in 25 patients develops at least one infection contracted during a hospital stay. Health-care-acquired infections associated with antibiotic-resistant bacteria kill tens of thousands a year in American hospitals. To curb infections, hospitals are stepping up with more rigorous hygiene standards, focusing on commonplace equipment such as stethoscopes and blood pressure cuffs. They often collect bacteria and can transmit disease. Doctors were asked when they last cleansed their stethoscopes? Answers were disturbing if not shocking? "What? I rarely bother with that." A 2014 study at a Swiss hospital published in the Mayo Clinic Proceedings found that "the contamination level of the stethoscope is substantial after a single physical examination and comparable to the contamination of parts of the physician's dominant hand." At NYU Langone Hospital—Brooklyn a clinical trial was conducted examining stethoscopes for bacteria. Marwa Moussa, attending physician, decided that medical residents should learn early on to clean their stethoscopes. "You wash your hands, but never clean your stethoscopes." Her analysis found that some of the stethoscope diaphragms were loaded with bacteria, including the superbug MRSA. But hey, technology dominates. Doctors today prefer to use high-cost CT scans and MRI machines, and insurers are willing to pay. Should the stethoscope be in a museum next to the wooden slide rule?

DEMENTIA — TECHNOLOGY IS ON THE WAY FOR THIS WORLD-WIDE PROBLEM.

According to the World Health Organization (WHO) an estimated 50 million people suffer from dementia – a number that is expected to rise exponentially as the global population increases. For families of patients who require nursing homes or outside help, the cost can be crushing. Dr. P. Murali Doraiswamy Director of the neurocognitive disorders program at Duke University states "Ultimately we want the nursing home to disappear." People want to live peacefully in their own home. Technology has the potential to help preserve independence or at least maintain it for many years more than is currently possible. Products already available are remote home-surveillance systems that enable basic monitoring of patients from a distance using a mobile phone. Wrist-worn motion detectors and GPS devices can help detect what a person is doing inside the home; sleeping, or detecting a fall, or leaving the premises and becoming lost. A smart pillbox can be added that can reveal when someone is or is not taking their medicine. Dr. Pat Blanchette, Professor of Geriatric Medicine at the John A. Burns School of Medicine has a broad background in gerontology with study at Dartmouth and Harvard and can elaborate on all of the above, and a lot more. She is a remarkable talent to have on our University faculty.

DESPITE HIS OUTRAGEOUS FLAWS, HE WAS A GOOD AUTO DESIGNER.

Sometime in the middle 1930s the leader of the Third Reich in Germany designed an automobile he called the "people's car." The name stuck and some 15 years later following WWII a small company in Wolfsburg, Germany began to produce the Volkswagen. With the engine in the rear and its simple design and function its popularity gradually spread in the western world. Because of its characteristic bug-like appearance it became known as the Beetle and with several modifications it has maintained a niche in the auto industry for generations. But like so many other cherished items, alas the Volkswagen Bug is passing and will soon be a bittersweet memory. Auf Wiedersehen Beetle.

WHERE ARE THE MOST VIRUSES AT THE AIRPORT? HINT: NOT THE TOILET.

Researchers found evidence that plastic trays in security lines are a haven for respiratory viruses and bacteria. Travelers are tightly crowded often in poorly ventilated causeways, struggling with their shoes, iPhones, and personal effects, forced to share air and baskets. The result is easy transmission of viral disease. Meantime the toilet fixtures are remarkably clear of infectious agents.

THIS COULD BE ANY STREET HERE IN PARADISE.

In Toronto, Ontario, Canada, a pothole got a new life. The pothole, which is several feet in size, had been expanding for months, neighbors said. Area residents had grown weary of waiting for the city repair it.. They began filling it with tomato plants that are now ripening and growing very tall and require wire cages for support. It has become a community project. Finally Mayor John Tory has agreed to not only fill the pothole, but to move the tomato plants to a nearby garden.

IMPRESSIVE, DEBBIE. WHAT DO YOU DO FOR A FOLLOW UP?

Debbie McCulley of Salem, Virginia, has been banned from all future Floyd County sporting events. On the bright side, her indecent exposure case may be dropped following an incident area lawyers are calling "moon over Floyd." Her husband is the JV softball coach for the high school, and the charges resulted from Debbie's unusual reaction to his team's loss. She stood on the pitcher's mound and pulled down her pants to expose her right cheek. The Roanoke Times reported that Debbie wrote a letter of apology and will perform community service.

ADDENDA

- According to a study published in the Proceedings of the National Academy of Sciences looking at 70 fathers, Dads with smaller testicles were rated by their partners as better fathers. (How did they conduct this research?)
- Near Mason City, Iowa, on August 20 the Iowa State Patrol pulled over a Ferrari 488 Spider that was clocked doing 137 mph during a rainstorm. The trooper posted on Facebook with a photo of the radar read out. The driver was unfazed; she thought she was going about 100. The fine was $335.
- According to FiveThirtyEight.com only 5% of American diners prefer their steak rare, compared with 8% who prefer their steak well-done.
- The oldest known school bus was in Quincy, Massachusetts, in 1869. It was horse drawn of course.
- She used to be Snow White but she drifted.
- As Miss America my goal is to bring peace to the entire world and then get my own apartment.
- In the United States anybody can be president. That's the problem.
- Nice guys finish last, but we get to sleep in.
- Enjoy life. There's plenty time to be dead.

ALOHA AND KEEP THE FAITH rts

(Editorial comment is strictly that of the writer.)

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