HHS Public Access

Author manuscript

Frontiers (Boston). Author manuscript; available in PMC 2025 April 01.

Published in final edited form as:

Frontiers (Boston). 2024 April ; 36(1): 418–498. doi:10.36366/frontiers.v36i1.871.

Travel Health-Related Preparation Practices of Institutions of Higher Education and Occurrence of Health-Related Events among Undergraduate Students Studying Abroad, 2018–2021

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Abstract

Background: Knowledge of specific health-related events encountered by students studying abroad and the availability and use of pre-travel healthcare for these students is lacking.

Methods: Anonymous web-based questionnaires were sent to study abroad offices, student health centers, and undergraduate students after studying abroad at eight institutions of higher education in the United States and Ireland from 2018–2021. Analyses were descriptive; relative risks and 95% confidence intervals were calculated for health-related events.

Results: One study abroad office required a pre-travel consultation. All student health centers had pre-travel counseling available. Among 686 students, there were 307 infectious and 1,588 non-infectious health-related issues; 12 students (2%) were hospitalized. Duration of travel and timing of a pre-travel consultation impacted the risk of health-related events. Certain mental health conditions were associated with increased risk of alcohol and drug use.

Conclusion: Future studies should address the optimal timing and best practices to optimize health for students studying abroad.

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Authors Contributions

KMA, KC, JR, AS, CE, GTF, GB, SK conceived the study; KMA, JR, AS, CE, GTF, SK designed the study protocol; JR, AS, CE, GTF, SK performed data collection; KMA, KC analyzed the data; KMA, KC, JR, AS, CE, GTF, GB, SK interpreted the data; KMA wrote the first draft of the manuscript; KC, JR, AS, CE, GTF, GB, SK critically revised the manuscript for intellectual content. All authors read and approved the final manuscript.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. The authors report there are no competing interests to declare.

Keywords

Alcohol; drugs; mental health; pre-travel consultation; study abroad

Introduction

The number of students studying abroad has increased annually since the 1980s. In the US academic year 2018–2019, over 345,000 US students studied abroad, an increase of 1.6% over the previous academic year (Open Doors, 2021). Europe is the most common study abroad destination for US students (56%). Approximately 1.3 million international students studied abroad in the European Union in 2018 (Erasmus, 2019; Eurostat, 2016). Studying abroad in low or low-middle income countries has also increased (Open Doors, 2021). However, the COVID-19 pandemic severely impacted students' ability to study abroad due to international travel restrictions. In the 2019–2020 academic year, just over 160,000 US students studied abroad in comparison to the previous academic year (−53%), and more than 55,000 students returned to the United States prematurely due to the pandemic (Open Doors, 2021).

Students may travel to similar destinations as other travelers, but their risk of certain health-related events may be different (Angelo et al., 2020) (Angelin et al., 2015). Common health-related events encountered by students studying abroad include infectious diseases, psychological issues, and injuries, including traffic accidents (Angelin et al., 2015). Students may be at risk for infectious diseases acquired through risky behaviors (Angelo et al., 2020). US students studying abroad even can acquire tropical diseases, including malaria and dengue (Angelo et al., 2018). Students may also experience alcohol-related negative consequences, including legal issues and sexual assault (Aresi et al., 2016a, 2016b; Hummer et al., 2010; Pedersen, Larimer et al., 2010). Mental health issues may be triggered or unveiled, a finding that worsened during the COVID-19 pandemic (Fanari & Segrin, 2021).

Most studies of preparation practices and health-related events for students studying abroad involve small cohorts or students from a single country. Knowledge about availability of resources at institutions of higher education (IHE) and health-related events encountered by students studying abroad is lacking. The purpose of this study was to characterize ways to improve the health of undergraduate students studying abroad by: 1) identifying gaps in IHE study abroad office health preparations; 2) understanding the role and practices of student health centers in study abroad preparation; and 3) identifying health-related events among students studying abroad.

Materials and Methods

IHEs with study abroad offices were recruited by the International Society of Travel Medicine's (ISTM) Student Travel Abroad Interest Group. Each participating IHE was responsible for questionnaire administration using standardized email templates. Anonymous web-based questionnaires were sent to three groups at participating IHEs from January 2018 to December 2021: 1) study abroad offices (Appendix A); 2) student health centers, if available (Appendix B); and 3) undergraduate students within two weeks of

returning from studying abroad (Appendix C). Reminder emails were sent every other day for three attempts and once more at two weeks, or until the questionnaire was completed. All students were screened to ensure they did not meet the exclusion criteria and submitted a web-based informed consent. Students received a gift card for $5 (USD) once they completed the questionnaire. Each IHE obtained IRB approvals in accordance with state and national regulations.

Exclusion Criteria

Students were excluded if they were less than 18 years of age at the time of the questionnaire or if they self-certified during screening that they could not accurately recount health-related events during their time studying abroad.

Data Management and Analysis

Data were collected and managed using REDCap electronic data capture tools at the US Centers for Disease Control and Prevention (CDC) and analyzed using Microsoft Excel and R v4.1.2 (Vienna, Austria). Demographic analyses were descriptive; relative risks (RR) and 95% confidence intervals (95% CI) were determined for pre-travel consultation characteristics in relation to a health-related event, student travel characteristics in relation to reporting a health-related event, and mental health diagnoses (including worsening) in relation to alcohol and drug use. Relative risk was calculated as the ratio of the probability of an event in the exposed group divided by the probability of the event in the unexposed group. The rate of infectious health-related conditions acquired by students per week was calculated using the median number of weeks in each timeframe (*i.e.,* 28 weeks for 24–32 weeks) and the upper limit for >32 weeks (32 weeks). The chi-square test was performed for outcome variables and significance was defined as alpha <0.05.

Results

IHEs and Study Abroad Offices

Eight IHEs with study abroad offices were enrolled; seven IHEs were located in the United States and one in Ireland. Among the eight IHEs, six study abroad offices (86%) completed the study abroad office questionnaire. The most common travel destination was Western Europe, although the duration of study abroad programs, the primary program organizer, and the number of staff varied among offices (Table 1).

Of the six study abroad offices who responded, half reported that IHE staff always or sometimes accompany students on their trip. Only one (17%) study abroad office required a pre-travel consultation with a healthcare professional and only if the students were traveling to a destination that was considered high-risk by the study abroad office. Four (67%) offices required that students provide the program with health information before departure and five (83%) required travel health insurance. All six US study abroad offices in the United States required enrollment in the US Department of State’s Smart Traveler Enrollment Program (STEP). Five (83%) offices required attendance at a program sponsored pre-travel education session.

Student Health Centers

All seven student health centers who completed the questionnaire had pre-travel consultations available (Table 2).

Although many travel medicine issues were routinely addressed at visits, mental health counseling was not included at six (88%) student health centers. All but one student health center kept vaccines in stock; five (71%) had travel-specific vaccines (e.g., yellow fever) available. All student health centers were able to prescribe travel-related medications and conduct post-travel evaluations.

Students

In total, 686 students completed the questionnaire (Table 3).

Students were most frequently between 20–21 years of age (67%), female (77%), in their third year of university (junior) (53%), white (70%), and non-Hispanic (87%). Students most frequently reported studying abroad in Western Europe (65%). Of 40 students enrolled at an IHE in Ireland, six (15%) traveled only to the United States; there were no statistical differences in demographics or outcomes between these students and students enrolled at an IHE in Ireland who traveled elsewhere or students enrolled at an IHE in the United States. The most frequent study abroad duration was four to eight weeks (29%). Trip durations less than eight weeks were associated with decreased risk of acquiring an infectious health condition, however, the rate of infections per week was lower for students who traveled for longer durations (Table 4).

Students reported travel to additional countries apart from their program of study country while abroad (median: two countries; range 1–20); 20 students traveled to 10 or more countries. Most students (61%) did not attend a pre-travel consultation with a healthcare professional. Of the 251 students who attended a pre-travel consultation, 43% went to their student health center and 55% did so one to four weeks before departure. Seeing a healthcare professional at any time before travel was not associated with a lower risk of experiencing a health-related event (RR 1.1; 95% CI 0.98–1.18). However, among students who saw a healthcare professional before departure, those who did in the four weeks before departure had a decreased risk of having a health-related event (RR 0.76; 95% CI 0.67–0.86; $p<0.001$). Students who traveled to the United States or Western Europe were less likely to attend a pre-travel consultation than those who traveled to other countries (RR: 0.47; 95% CI: 0.38–0.59; $p<0.001$). Only 73% of US students registered with STEP. Pre-travel health-related information was reported to be obtained from study abroad office staff (24%), healthcare professionals (13%), and peers (11%).

Of 1,895 health-related issues reported by students while abroad, 307 (16%) were infectious diseases and 1,588 (84%) were non-infectious health issues (Table 5).

The most frequently reported infectious health conditions were the common cold (24%), travelers' diarrhea (8%), and food poisoning (7%). No students reported acquiring COVID-19. The most frequently reported non-infectious health issues were jet lag (51%), insect bite or sting (38%), and generalized anxiety (27%). Three students (<1%) were

victims of sexual assault. Twelve students (2%) were hospitalized while abroad, most frequently for travelers' diarrhea (n = 4) or an accident or injury (n = 3) (Table 6).

Mental health conditions such as generalized anxiety, stress, and depression were frequently reported (see Table 7 on the following page).

The most common mental health conditions that worsened during the study abroad period included bipolar disorder (50%), generalized anxiety (25%), stress (25%), panic attacks/ severe anxiety (23%), and depression (22%).

Students with generalized anxiety reported more alcohol consumption than students without generalized anxiety (RR 1.08; 95% CI 1.02–1.16). There was no increased risk of alcohol use among students whose mental health conditions worsened while abroad compared to those whose mental health conditions were the same or better. Eighty-four percent of students (n = 578) reported consuming alcohol while abroad. Among 567 responses, 279 (49%) reported they drank more alcohol than usual. Among 569 responses, students most frequently drank one to five drinks (332; 58%) or 6 to 10 drinks (132; 23%) per week; 4 (1%) drank more than 30 drinks per week. Over one-third binge drank (217; 38%).

Students with generalized anxiety (RR 1.58; 95% CI 1.15–2.18), depression (RR 1.75; 95% CI 1.25–1.47), panic disorder (RR 1.59; 95% CI 1.06–2.38), post-traumatic stress disorder (RR 2.87; 95% CI 1.76–4.69), and stress (RR 1.81; 95% CI 1.32–2.49) were more likely to use illicit or recreational drugs while abroad than students who did not report each of those conditions. Students whose generalized anxiety worsened while abroad more often used recreational drugs (RR 1.86; 95% CI 1.14–3.04) than those who reported their generalized anxiety was the same or better. Illicit or recreational drugs used included marijuana (115; 17%), hashish (13; 2%), mushrooms (12; 2%), and ecstasy (11; 2%). Most students (440; 64%) reported not taking illicit or recreational drugs while abroad.

Of 673 students who responded to questions about sexual activity, 112 (17%) reported having a new sexual partner while abroad. Of 211 students who engaged in risky sexual behaviors (sexual encounters with strangers, having sex in exchange for money or drugs, or not using barrier protection to prevent pregnancy and sexually transmitted infections); 92 (44%) engaged in the same number of risky behaviors as they would when not studying abroad, 90 (43%) engaged in fewer, and 29 (14%) engaged in more. One student reported acquiring an STI (*Chlamydia*).

Discussion

Our study is the largest to date that assessed health-related events among students studying abroad and the preparatory practices at their IHEs. These findings emphasize the need for integrated pre-travel coordination between the study abroad office, student health center, and the students themselves to optimize health during the study abroad experience.

Based on prior reports, between 18–70% of students studying abroad attend a pre-travel consultation, depending on presumed destination risks (Angelo et al., 2018; Hartjes et al., 2009). All IHEs in this study had pre-travel counseling available at the student health centers

and had vaccines in-stock, but not all study abroad offices collaborated with their health center to provide a pre-travel consultation for students before departure. Students may be unaware that travel health services can be provided (Neave et al., 2017) and may instead obtain their pre-travel information from youth-oriented travel books or peers (Hartjes et al., 2009). In our study, only one IHE required a pre-travel consultation and only if the student was traveling to a high-risk destination. Given that most students studied abroad in Western Europe, often perceived as a low-risk region, it is no surprise that many students did not seek pre-travel care. Conditions preventable with vaccination (mumps, varicella) and medication-preventable conditions (e.g., motion sickness, altitude illness) were reported, which may have been mitigated through vaccination or medications provided at a pre-travel consultation. Closing the loop between the study abroad office and the student health center is important to improve preparedness and mitigate risk, especially for students who are not up to date with current vaccines or would like more information on preventive practices (American College Health Foundation [ACHF], 2022). Also, risks at the students' primary destination are not the only concern, given that almost 65% of students traveled to a country other than the one where they studied, over 50% traveled to 2–3 additional countries, and 20 students traveled to 10 or more countries. If plans are not known, the student should be provided with resources for advice while abroad (e.g., contact information for travel clinics at their study abroad destination, web-based resources to check for health concerns at a destination) to prevent illness (Flaherty & Md Nor, 2016). Although this study did not demonstrate a decreased risk of having a health-related event after having a pre-travel consultation, it is important to note this finding is likely influenced by confounding factors we are unable to account for with the data collected (e.g., individual risk perception, the high frequency of unavoidable or expected events like jet lag or stress, etc.).

CDC recommends that travelers attend a pre-travel consultation at least one month before departing for all destinations (Chen & Hochburg, 2020). This recommendation is based on timing to complete vaccination schedules for travel-related diseases, but the findings in this study suggest that being seen by a healthcare professional less than 4 weeks before traveling decreased the risk of health-related events compared with being seen more than 4 weeks before traveling. This suggests that the closer to departure date that health-related information is provided, the more likely students will follow the advice. Additional studies are needed to explain if this finding is specific to students studying abroad or if all travelers would benefit from pre-travel consultations closer to their departure.

Baseline mental health issues were high, indicating that these conditions are prevalent and may be underreported (University of Minnesota, 2019); among students with a mental health diagnosis prior to departure, few reported that they received adequate support from their IHE and not all health centers routinely performed mental health counseling during pre-travel consultations. Despite students being more willing in recent years to discuss their mental health conditions (UCAS, 2021; University of Minnesota [UMN], 2019), reporting illness contributes to stigma and worry (Education Policy Institute, 2018; UCAS, 2021; UMN, 2019) that they may not be accepted into the program. Surveys suggest approximately half of students with a condition may not report it (Pedersen, LaBrie et al., 2020), adding difficulty in adequately preparing students with mental health needs (Education Policy Institute, 2018; Lucas, 2009). IHEs play a central role in this preparation — students

should be encouraged to disclose mental health conditions, and this should be confidential unless the student is a risk to themselves or others, and not be used to make an academic judgment (ACHF, 2022; United Educators, 2020). Study abroad offices must remember that study abroad can be uplifting for students with mental health issues and early intervention could help to alleviate possible mental health crises while abroad. Developing mental health strategic plans and written policies (Li et al., 2020) and assisting students to develop a crisis plan with emergency mental health resources at the destination by the study abroad office or student health center can be beneficial. IHEs can focus on developing IHE infrastructure to address mental health needs, including health consultation coordination before, during, and after travel, ensuring IHE wellness resources are promoted and easily accessible, and focusing on fostering empathy instead of stigma (Lucas, 2009; United Educators, 2020; UMN, 2019). Post-travel debriefings and mental health checks can be considered after return to ensure students are adequately supplied with resources upon reintegration (ACHF, 2022). In the event of a mental health crisis while abroad, repatriation insurance must cover mental health issues. The increased risk of alcohol and illicit drug use among students with various mental health conditions suggests substance use as a coping or treatment mechanism (Colder et al., 2019; Li et al., 2020). Marijuana use in college students has been linked to depression (Buckner et al., 2007), yet it is unclear if marijuana use worsens depression (Li et al., 2020) or if depression predisposes to increased use (Colder et al., 2019). More studies are needed to address the impact of mental health conditions on coping behaviors (and vice versa) while abroad and how to best prepare students with mental health conditions to safeguard their health during their study abroad experience.

This study also demonstrates the importance of trip duration in determining the risk of acquiring an infectious health condition. Although students studying abroad for longer durations were more likely to report an infectious disease health condition at some point during their experience, the weekly risk of acquiring a condition decreased with increasing study abroad durations, indicating an attenuating risk in the ensuing months after arrival. This finding is novel in the travel medicine literature; studies have shown that long-term travelers such as expatriates are likely to become ill with infectious diseases (Kitro et al., 2022), but no study to date has quantified the change in risk with travel duration. The higher rate of infectious conditions despite overall decreased risk for shorter term (<8 weeks) travelers may be explained by early exposure to pathogens in a new environment. Health-related reminders from the IHE (*i.e.,* emails to remind about personal protective measures) to students traveling for more than 8 weeks may help mitigate some risk, but in certain circumstances (*i.e.*, travel to high-risk destinations) consideration may be given to having IHE staff accompany students to serve as a resource for mitigating health-related events. Students in this study who had staff accompany them on trips reported this person was able to assist them with navigating their health-related issues in most circumstances. Study abroad offices could also consider providing communication plans to the students to prepare for emergencies and ensuring overseas institutions or program staff have accessible medical resources.

This study revealed findings inconsistent with the current literature about sexual health while studying abroad. There were few reports of sexual assault in this study, although this may occur in up to one-fifth of US students studying abroad (Pedersen et al., 2021). Only one

student reported an STI, which is surprising given the link between alcohol use, sexual encounters, and STIs while abroad (Aresi et al., 2019; Hummer et al., 2010). Sexual health may not be commonly discussed at pre-travel consultations but is an opportunity to provide sexual health education (*e.g.,* condom or long-acting reversible contraception use, STIs) and post-travel STI screening.

Alcohol drinking behaviors identified in this study also differed from the literature. Most students used alcohol while abroad in our study, but their alcohol consumption behaviors were infrequently associated with increased use (more than half drank less or the same amount of alcohol as usual), binge drinking, presence of mental health conditions (except for students with generalized anxiety) or worsening of mental health conditions. In contrast, other studies reported that students studying abroad may engage more often in harmful drinking behaviors during study abroad trips (Aresi et al., 2016a, 2016b, 2019; Hummer et al., 2010; Mitchell et al., 2016; Pedersen, LaBrie et al., 2010; Pedersen, Larimer et al., 2010), with up to 63% of students studying abroad binge drinking (Mitchell et al., 2016). Heavy alcohol consumption has been associated with alcohol-related consequences in some studies, including injuries, crime, unprotected sex (Hummer et al., 2010), or sexual assault (Flack et al., 2014). However, it has not been associated with increased risk taking and negative consequences in others (Aresi et al, 2016a). Several factors have been documented to possibly contribute to excess alcohol consumption, including demographics (younger white males) (Pederson, Larimer et al., 2010) (Pederson, LaBrie et al., 2010), intention to drink before departing (Pedersen, LaBrie et al., 2010), location (students studying abroad in Europe have the largest increases) (Pederson, LaBrie et al., 2010; Pederson, Larimer et al., 2010), level of acculturation (students with lower acculturation drank more heavily) (Aresi et al., 2016a), and differences in legal drinking ages in comparison to the home country. Lower alcohol use has been associated with greater acculturation and higher host country living cost (Aresi et al., 2019), which may explain the findings in this study. Given the discrepancies in the literature regarding sexual health and substance use among students studying abroad, more studies are needed to determine the specific factors and circumstances impacting engagement in these behaviors.

This analysis has some limitations. IHE enrollment was subject to selection bias because recruitment was performed through ISTM student health contacts, resulting in most enrolled IHEs having an accessible student health center. Despite the confidential nature of responses, reporting bias may occur, particularly regarding sensitive topics (*e.g.*, sexual health, illicit substance use). Also, health-related conditions were based upon self-report. This study focused on undergraduate students only, so findings are not generalizable to all student travelers studying abroad (*e.g.,* graduate students). Also, the COVID-19 pandemic disrupted data collection due to the dramatic decline in students studying abroad (only 26 students completed the questionnaire from March 2020 through December 2021), and also limited the number of recruited IHEs that completed their internal review board documentation to participate in the study. Therefore, the seven US IHEs that were enrolled represent only a small percentage of IHEs and are not intended to encompass all study abroad offices, programs, or student experiences. We were unable to access the number of students that were sent the questionnaire by each study abroad office, thus student response rates could not be calculated.

Conclusions

Summarized from the findings in this study, the recommendations listed below are for IHE study abroad offices and may help to optimize health preparations for students studying abroad:

- Increase collaboration between study abroad offices and student health centers,
- Promote pre-travel consultations,
- Encourage the confidential disclosure of mental health conditions,
- Provide mental health resources for students,
- Discuss sexual health and substance use (alcohol, illicit drugs); and
- Offer post-travel health assessments (including a mental health check).

IHEs in this study might benefit from coordination between the study abroad office and student health center, including promoting pre-travel consultations. Further large prospective cohort studies are warranted to address the optimal timing and best practices for health-related issue prevention for students abroad. Healthcare professionals and public health officials may use the findings from this and future studies to enhance or change recommendations for students studying abroad and develop formal guidelines for IHE study abroad offices regarding student travel health best practices.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

This work was supported by funds from the CDC Foundation and the Stanford Nurse Alumnae Legacy Project.

Biographies

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Gerard T. Flaherty, MD, PhD, gained Membership of the Royal College of Physicians of Ireland in 2002 and Fellowship in 2011. He holds a Diploma in Travel Medicine from Glasgow. He has completed three Masters degrees, including a Masters in International and Travel Health and Masters in Medical Education. He is the current president of the International Society of Travel Medicine. His research interests include travel health behavior and mental health issues and travel.

Gary Brunette, MD, is a preventive medicine physician and medical epidemiologist who served as branch chief for the US Centers for Disease Control and Prevention's Travelers' Health Branch. He was the Editor-in-Chief of the CDC Yellow Book until 2019. He is now the lead of the Future Leaders in Infections and Global Health Threats (FLIGHT) program at CDC which aims to prepare participants to address global public health threats. He is also a Captain in the US Public Health Service.

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Data Availability

These data are of each individual institution, and access to these data requires contacting the respective institution for permission.

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Table (1):

Characteristics of IHE study abroad programs, 2018–2021 ($N = 6$)

Characteristics		*N*	%
Most common region (countries) of travel	Western Europe (Denmark, France, Germany, Italy, Spain, The Netherlands, United Kingdom)	6	100
Duration of study abroad programs (minimum and maximum)	<1 week through 9–12 months	1	17
	1–2 weeks through 9–12 months	2	33
	2–4 weeks through 6–9 months	1	17
	6–8 weeks through 9–12 months	1	17
	>12 weeks through 9–12 months	1	17
Primary program organizer(s)[a]	IHE sponsored programs	6	100
	Private agencies	3	50
	Other IHEs	2	33
Number of full-time staff	1–2	1	17
	3–4	1	17
	5 or more	4	67
Number of staff focusing on health-related issues	1–2	4	67
	None	2	33
Policies for a travel consultation with a healthcare professional	Required[b]	1	17
	Recommended or suggested[c]	3	50
	Neither	2	33
Required disclosure of students' health information before travel	Yes	4	67
	No	2	33
Staff accompany students abroad	Yes, always	1	17
	Sometimes[d]	2	33
	Never	3	50
Health professionals accompany students abroad	Yes	0	0
	Sometimes[e]	1	17
	No	5	83
Written policies for travel health insurance	Yes	6	100
Required insurance	Yes[f]	5	83
	No	1	17
Required enrollment in STEP[g]	Yes	5	100
Emergency contact information provided	Yes	6	100
IHE pre-travel education or training session required or mandated	Yes	5	83
	No	1	17
Additional health resources students are directed to for information[a]	US Department of State	5	83
	CDC webpages	4	67
	IHE student health website or printed mateials	4	67
	CDC Yellow Book	3	50
	National Association of International Educators	2	33

Characteristics		*N*	%
	World Health Organization	2	33
	Other[h]	3	50

[a]More than one option could be chosen.

[b]The consultation was only required if the student was traveling to a high-risk destination. Students were sent to the student health center or other travel medicine specialist.

[c]Students were instructed to go to the student health center ($n = 3$), their primary care provider ($n = 3$), a travel medicine specialist ($n = 2$), or the health department ($n = 1$). One study abroad office only recommended a consultation if the student was traveling to a high-risk destination.

[d]Staff only accompany students to short term programs run through the IHE.

[e]Qualified medical doctors accompany students to short term high-risk destinations.

[f]Of the 5 study abroad offices that required or mandated travel insurance, one IHE supplied it free of charge to the student, 3 supplied it but the student needed to pay, 3 allowed students to obtain insurance directly from an insurance company, and one allowed them to change their existing policy to include international coverage. Of the 4 IHEs that supplied insurance, all included accident and illness, 24-hour emergency, medical evacuation, and repatriation coverage.

[g]STEP = US Department of State's Smart Traveler Enrollment Program; among 5 US-based IHEs

[h]Department of Foreign Affairs, Safety Abroad First-Educational Travel Information Clearinghouse, and internal IHE materials

Table (2):

Characteristics of the IHE student health centers and the students who attended a pre-travel consultation, 2018–2021 ($N = 7$)

CHARACTERISTICS		N	%
Pre-travel counseling available	Yes	7	100
Topics routinely covered at the pre-travel consultation[a]	Altitude illness	7	100
	Chemoprophylaxis for malaria	7	100
	Country-specific concerns (e.g., political unrest)	7	100
	Environmental hazards (e.g., heat and cold related conditions)	7	100
	Immunizations	7	100
	Personal safety (e.g., accidents, animals, extreme sports)	7	100
	Prevention of vector-borne diseases	7	100
	Rabies exposures	7	100
	Sexual health	7	100
	Travelers' diarrhea	7	100
	Mental health	6	86
	Other[b]	1	14
Resources used to guide recommendations[a]	CDC Travelers' Health webpage	6	86
	Health Information for International Travel (CDC Yellow Book)	6	86
	US Department of State	5	71
	International Society of Travel Medicine	4	57
	Shoreland TRAVAX	4	57
	World Health Organization	3	43
	Up to Date (www.uptodate.com)	2	29
	Other[c]	4	57
Stocks vaccinations	Yes	6	86
	No	1	14
Specific vaccination in stock ($n = 6$)			
Cholera	Yes	1	17
Hepatitis A	Yes	6	100
Hepatitis B	Yes	6	100
Herpes zoster	Yes	0	0
Influenza	Yes	6	100
Japanese encephalitis	Yes	5	83
Measles, mumps, rubella (MMR)	Yes	6	100
Meningococcal (polysaccharide or conjugate)	Yes	6	100
Pneumococcal (7, 13, or 23-valent)	Yes	3	50
Polio	Yes	6	100
Rabies	Yes	5	83

Tetanus, diphtheria, and/or pertussis (DT, Td, DTaP, Tdap)	Yes	6	100
Tick-borne encephalitis	Yes	0	0
Typhoid (oral live attenuated)	Yes	6	100
Typhoid (Vi capsular)	Yes	5	83
Varicella	Yes	6	100
Yellow fever	Yes	5	83
Able to prescribe travel-related medications (e.g., malaria chemoprophylaxis, acetazolamide, antibiotics)	Yes	7	100
Post-travel services available	Yes	7	100
Number of students seen for post-travel healthcare	1–20	4	80
services the previous academic year[d]	None	1	20

[a] More than one option could be chosen.

[b] Indications for healthcare follow-up after travel, how to find medical care while abroad, and how to pack a first aid kit.

[c] American Travel Nurses Association, National Travel Health Network and Centre, State/local public health department, TravelCare,

[d] Common reasons to seek post-travel services included infestations, jet lag, lacerations, skin issues/rashes, and travelers' diarrhea.

Table (3):

Characteristics of the students who studied abroad, their trip information, and pre-travel preparation practices, 2018–2021 (N = 686)

Characteristics		n	%
Students			
Age, in years (during the study abroad experience)	<18	1	<1
	18–19	166	24
	20–21	459	67
	22–23	42	6
	>23	17	2
	Would rather not answer	1	<1
Gender identity	Woman	529	77
	Man	147	21
	Both/Neither/Fluid	5	1
	Don't know	1	<1
	Would rather not answer	4	1
Transgender	Yes	4	1
	No	676	99
	Don't know	4	1
	Would rather not answer	2	<1
Year of school	Year 1 (freshman)	42	6
	Year 2 (sophomore)	112	16
	Year 3 (junior)	366	53
	Year 4 (senior)	144	21
	Other (year 5+)	21	3
	Don't know	1	<1
Race	White	482	70
	Asian	128	19
	Other[a]	40	6
	Don't know	7	1
	Would rather not answer	29	4
Ethnicity	Non-Hispanic	599	87
	Hispanic	61	9
	Don't know	11	2
	Would rather not answer	15	2
Country of IHE enrollment	United States	646	94
	Ireland[b]	40	6
Study abroad trip information			
Academic year of travel	2018–2019	542	79
	2019–2020	119	17
	2020–2021	25	4

Top 20 countries of travel[c,d]	Spain	91	12
	United Kingdom	89	12
	Italy	66	9
	France	63	8
	Germany	45	6
	Ireland	29	4
	China	22	3
	Japan	21	3
	Australia	19	2
	South Africa	19	2
	Sweden	18	2
	Netherlands	17	2
	Argentina	16	2
	South Korea	16	2
	Austria	15	2
	Costa Rica	13	2
	Greece	13	2
	India	13	2
	United States of America	13	2
	Slovenia	12	2
Setting (*n* = 675)	Urban	554	82
	Rural	41	6
	Urban and rural	80	12
Purpose	Study / academic coursework	615	90
	Internship	35	5
	Research	20	3
	Conferences or presentations	4	1
	Service	2	<1
	Other (multiple or unspecified)	7	1
	Don't know	1	<1
	Would rather not answer	2	<1
Duration, in weeks[e]	<4	170	25
	4–8	196	29
	>8–12	128	19
	>12–24	159	23
	>24–32	14	2
	>32	19	3
Residence	Dormitory or other student housing	283	41
	Home stay with non-relatives	160	23
	Hotel	137	20
	Hostel	36	5
	Home stay with relatives	5	1
	Other[f]	65	10

Program coordination (*n* = 685)	Own IHE	561	82
	External private agency	70	10
	Other IHE	28	4
	University-related organization	13	2
	Other[g]	2	<1
	Don't know	9	1
	Would rather not answer	2	<1
IHE staff accompanied students	Yes[h]	375	55
	No	295	43
	Don't know	16	2
Median number of countries traveled to — study abroad destinations plus other trips (range)	2 (1–20)		
Pre-travel preparation practices			
Attended a pre-travel consultation	Yes	251	37
	No	419	61
	Don't know	13	2
	Would rather not answer	3	<1
Healthcare professional seen for the pre-travel consultation (n = 251)	Student health center	109	43
	Primary care provider	105	42
	Travel medicine specialist	23	9
	Health department	2	1
	Other[i]	9	4
	Don't know	3	1
Timeframe before trip when attended the pre-travel consultation (weeks) (n = 251)	<1	14	6
	1–4	139	55
	>4	85	34
	Don't know	12	5
	Would rather not answer	1	<1
IHE mandated travel health insurance	Yes	614	90
	No	25	4
	Don't know	46	7
	Would rather not answer	1	<1
Attended IHE education or training session	Yes	589	86
	No	87	13
	Don't know	9	1
	Would rather not answer	1	<1
Registered with STEP (US students only; *n* = 685)	Yes	468	73
	No	114	18
	Don't know	57	9
	Would rather not answer	6	1
Where obtained health-related information[d]	Study abroad office staff	355	52
	Consultation with healthcare professional	187	27

CDC Travelers' Health webpage (including Yellow Book)	185	27
Advice from peers	160	23
IHE health center	158	23
IHE student health website	151	22
US Department of State	111	16
World Health Organization	31	5
Other[j]	28	4
None of the above	52	8
Don't know	42	6
Would rather not answer	1	<1

[a] Black or African American (34; 5%), Native American or American Indian (4; 1%), Native Hawaiian or other Pacific Islander (2; 0%).

[b] Six students studied abroad only in the United States.

[c] Total number of study abroad country experiences is 777; students may have studied in more than one country.

[d] More than one option could be chosen.

[e] Most students (671; 98%) stayed the full duration as planned; 1% did not stay the full duration and 1% didn't know or would rather not answer.

[f] Private apartment ($n = 51$), Airbnb ($n = 7$), camping ($n = 2$), other on-site accommodation ($n = 1$).

[g] Federal program or scholarship ($n = 1$), other partner program ($n = 1$).

[h] Staff was used by 144 (38%) students as a resource for health-related questions; they were unable to assist 7 (5%) students.

[i] Psychiatrist or therapist ($n = 6$), urgent care ($n = 2$), parents who are doctors ($n = 1$).

[j] Family ($n = 4$), internet ($n = 2$), external study abroad staff ($n = 2$), handbooks ($n = 1$), counselor ($n = 1$).

Table (4):

Association of length of study abroad duration on students acquiring an infectious health condition while studying abroad, 2018–2021

Length of study abroad	Infectious conditions	Students	RR (95% CI)	*p*-value	Number of infections per week (per 100 students)
<4 weeks	34	170	0.45 (0.31–0.64)	<0.001	10
4–8 weeks	60	196	0.69 (0.52–0.92)	0.01	5
>8–12 weeks	57	128	Reference *	Reference *	4
>12–24 weeks	77	159	1.09 (0.85–1.40)	0.51	2
>24–32 weeks	7	14	1.12 (0.64–1.96)	0.70	2
>32 weeks	14	19	1.65 (1.19–2.30)	0.02	2

RR= relative risk; 95% CI = 95% confidence interval

* Reference denotes the group used as the comparator for all calculations.

Table (5):

Infectious (N = 307) and non-infectious (N = 1,588) health-related events reported by students studying abroad, 2018–2021 (N = 686)

	Condition	n	% of all students	Duration of illness in days, median (range)	Had a pre-travel consultation with a healthcare professional, n (%)
Infectious	Common cold	166	24	5 (1–60)	64 (39)
	Travelers' diarrhea	53	8	3 (1–60)	32 (60)
	Food poisoning	46	7	2 (1–14)	22 (48)
	Fungal infection	20	3	Not provided	9 (45)
	Influenza	8	1	4.5 (4–14)	0 (0)
	Gastroenteritis or colitis	4	1	2.5 (1–5)	3 (75)
	Other skin disease[a]	3	<1	7 (3–40)	1 (33)
	Rickettisioses[b]	2	<1	7	1 (50)
	Hepatitis A	1	<1	Not provided	0 (0)
	Pinworm	1	<1	30	0 (0)
	Chlamydia	1	<1	4	0 (0)
	Mononucleosis	1	<1	25	1 (100)
	Scabies	1	<1	30	1 (100)
Non-infectious	Jet lag	349	51		128 (37)
	Insect bite/sting	262	38		107 (41)
	Anxiety, generalized	187	27		68 (36)
	Stress	183	27		64 (35)
	Depression	124	18		53 (43)
	Motion sickness	121	18		54 (45)
	Panic/severe anxiety	78	11		25 (32)
	Fall	40	6		11 (28)
	Heat exhaustion	38	6		18 (47)
	Altitude sickness	24	4		15 (63)
	Hives	24	4		10 (42)
	Edema/swelling	21	3		12 (57)
	Air pollution/asthma	20	3		8 (40)
	Post-traumatic stress disorder	18	3		6 (33)
	Other accidents[c]	15	2		4 (27)
	Marine sting	12	2		7 (58)
	Other crimes[d]	12	2		5 (42)
	Other mental health[e]	12	2		6 (50)
	Violent crime[f]	11	2		5 (46)
	Other environmental hazard[g]	11	2		5 (46)
	Heat stroke	6	1		2 (33)
	Vehicle accident	5	1		2 (40)
	Dog/cat bite	3	<1		0 (0)

Condition	n	% of all students	Duration of illness in days, median (range)	Had a pre-travel consultation with a healthcare professional, n (%)
Monkey bite	2	<1		2 (100)
Other bite/sting[h]	2	<1		1 (50)
Bipolar disorder	2	<1		2 (100)
Psychosis	2	<1		2 (100)
Pedestrian accident	1	<1		1 (100)
Frostbite	1	<1		1 (100)
Water accident	1	<1		1 (100)
Anaphylaxis	1	<1		0 (0)

[a] Bedbug bites ($n = 1$), eczema ($n = 1$), piercing ($n = 1$)

[b] Acquired in Thailand ($n = 1$) and Australia ($n = 1$)

[c] Skin injury from minor trauma ($n = 6$); sprain, strain or dislocation ($n = 4$); closed head injury ($n = 2$); sports-related injury ($n = 2$); ear injury ($n = 1$)

[d] Robbery, theft, or pickpocketing ($n = 12$)

[e] Obsessive compulsive disorder ($n = 4$), attention deficit hyperactivity disorder ($n = 3$), eating disorder ($n = 2$), seasonal affective disorder ($n = 1$), borderline personality disorder ($n = 1$), other ($n = 1$)

[f] Mugging ($n = 7$), sexual assault ($n = 3$), physical assault ($n = 1$)

[g] Smoke inhalation ($n = 5$), dust or allergies ($n = 4$), skin issues ($n = 2$)

[h] Bedbug ($n = 1$), spider ($n = 1$)

Table (6):

Health-related events leading to hospitalizations, including location and pre-travel consultation status, 2018–2021 (*N* = 12)

Health-related event	n[a]	Location	Had a pre-travel consultation with a healthcare professional, n (%)
Travelers' diarrhea	4	Chiang Mai, Thailand Sydney, Australia Taipei, Taiwan Barcelona, Spain	3 (75)
Fall	3	Oxford, England (*n* = 2) Bordeaux, France (*n* = 1)	0 (0)
Other accident/injury	2	Heredia, Costa Rica Graz, Austria[b]	0 (0)
Rickettsiosis	1	Chiang Mai, Thailand	1 (100)
Food poisoning	1	Chiang Mai, Thailand	1 (100)
Scabies	1	Santa Barbara, United States	1 (100)
Monkey bite	1	Hong Kong	1 (100)
Violent crime	1	London, England	0 (0)

[a] One student was hospitalized with three conditions (travelers' diarrhea, rickettsiosis, food poisoning).

[b] Skiing-related injury, glass injury

Table (7):

Mental health condition characteristics and the association of mental health conditions with alcohol and drug use among students abroad, 2018–2021

Mental health condition	Med taken for condition, n (%)	Hospitalized before study abroad, n (%)	Condition worse while abroad, n (%)	Received adequate IHE support before, during, or after study abroad, n (%)	Used alcohol, n (%)	RR (95% CI)	*P*-value	Used drugs, n (%)	RR (95% CI)	*P*-value
Anxiety, generalized (*n* = 187)	62 (33)	10 (5)	47 (25)	86 (46)	167 (89)	1.08 (1.02–1.16)	0.03	47 (25)	1.58 (1.152.18)	0.01
Bipolar disorder (*n* = 2)	2 (100)	2 (100)	1 (50)	0 (0)	2 (100)	N/A	N/A	1 (50)	2.76 (0.6811.15)	0.80
Depression (*n* = 124)	58 (47)	16 (13)	27 (22)	77 (62)	105 (85)	1.00 (0.92–1.09)	0.91	35 (28)	1.75 (1.251.47)	0.02
Panic attacks/severe anxiety (*n* = 78)	20 (26)	9 (12)	18 (23)	34 (44)	69 (89)	1.05 (0.96–1.15)	0.31	21 (27)	1.59 (1.062.38)	0.03
Post-traumatic stress disorder (*n* = 18)	1 (6)	1 (6)	1 (6)	6 (33)	16 (89)	1.06 (0.89–1.25)	0.84	9 (50)	2.87 (1.764.69)	0.001
Psychosis (*n* = 2)	1 (50.0)	2 (100)	0 (0)	0 (0)	2 (100)	N/A	N/A	1 (50)	2.75 (0.6811.15)	0.80
Stress (*n* = 183)	25 (14)	5 (3)	45 (25)	89 (49)	163 (89)	1.07 (1.00–1.14)	0.06	50 (27)	1.81 (1.152.18)	<0.001
Other[a] (*n* = 12)	5 (42)	3 (25)	2 (17)	4 (33)	11 (92)	1.09 (0.91–1.29	0.78	4 (33)	1.86 (0.824.20)	0.32

RR= relative risk; 95% CI = 95% confidence interval; N/A = not applicable

[a]Obsessive compulsive disorder (*n* = 4), attention deficit hyperactivity disorder (*n* = 3), eating disorder (*n* = 2), seasonal affective disorder (*n* = 1), borderline personality disorder (*n* = 1), other (*n* = 1)