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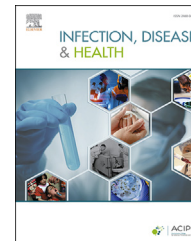
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Research paper

Travel health risk perceptions of Chinese international students in Australia – Implications for COVID-19

Tara Ma ^{a,*}, Anita Heywood ^a, C. Raina MacIntyre ^b

^a School of Public Health and Community Medicine, UNSW Australia, Kensington, NSW, 2052 Australia

^b Biosecurity Program, The Kirby Institute, UNSW Australia, Kensington, NSW, 2052 Australia

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Abstract *Background:* International students frequently return to their country of origin to visit friends and relatives (VFR), and are at increased risk of travel-associated infections. Little is known of their travel health seeking behaviours. China is the biggest source of international students studying in Australia and the unprecedented epidemic of COVID-19 in China makes this an important area of research.

Methods: Focus groups of Chinese international students were conducted to explore travel health-related knowledge, attitudes and practices. Eligible participants were studying in Sydney, and had travelled to China and Hong Kong to visit friends and relatives in the preceding 18 months. A variety of topics were explored, using a focus group guide. Thematic analysis was undertaken on the transcripts using nVivo software. The list of codes and themes were not pre-determined but developed through content analysis.

Results: Two focus groups were held with a total of 28 participants. Risk perception about VFR travel was generally low among Chinese international students. Pre-travel healthcare was not sought. Students strongly relied on the Internet, social media, parents and friends in China for travel health advice.

Conclusion: This research provides insights into Chinese international students as VFR travellers. It confirms students could be a risk population for importations of infections such as COVID-19 because of low risk perception and lack of seeking travel health advice. This can inform health promotion strategies for students.

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* Corresponding author. School of Public Health and Community Medicine, University of New South Wales, Kensington, NSW, Australia.
E-mail addresses: tara.ma@sydney.edu.au (T. Ma), a.heywood@unsw.edu.au (A. Heywood), r.macintyre@unsw.edu.au (C.R. MacIntyre).

Highlights

- International students are a potential source of outbreaks on campus.
- Chinese international students severely underestimate infectious risks of VFR travel.
- They often rely on the internet for health advice and outbreak information.
- They do not see any need for professional pre-travel medical advice or vaccination.
- They face multiple cultural and systemic barriers in accessing health care.

Introduction

During the first two months of 2020, the COVID-19 epidemic, which began in Wuhan in late 2019, spread rapidly across China and also to many other countries around the world, via domestic and international travel [1–3]. By late February, multiple countries had developed large-scale local epidemics, causing international concern of a potential pandemic [4]. In response, the Australian government introduced a travel restriction, denying entry to all foreign nationals who had been in China within 14 days of arrival [5]. In Australia, where there is a sizeable Chinese international student population [6], the travel ban prevented nearly 100,000 students travelling to Australia to commence or continue their studies [7–9]. This decision remains controversial among a wide range of stakeholders, and is subject to continued review by the government [8–10], including phased lifting of the ban such as exempting international high school students in March 2020. At the heart of the conversation is whether the return of Chinese international students poses an epidemic risk for Australia, and whether this risk can be mitigated.

University-aged students are an important group of travellers, with their own unique risk profile. Previous studies have suggested that university-aged travellers are generally at a higher risk of travel-related illness than older travellers [11,12]. Travellers of this age group commonly have low risk perceptions regarding travel-related infectious risks, and hence often undertake inadequate travel health preparation before and during travel. Previous studies have shown that younger travellers are more willing to take health risks [13,14], for example, eating street food while travelling [13], less likely to comply with travel-related preventive measures, for example, taking antimalarial chemoprophylaxis [13], and less willing to cancel air travel if unwell during outbreaks [15]. An online cross-sectional study of Australian university students in 2010 found that students generally had low risk perception across a wide range of potential health threats, including respiratory infections, vector-transmitted illnesses, food poisoning, and other infectious and non-infectious risks [16]. The study also found that international students were less likely than domestic students to have undertaken adequate preparations for travel in a wide variety of areas, including obtaining travel health insurance, bringing medication, first aid kits or insect repellents for use while travelling, and undertaking food and water avoidance measures during travel [16]. Similar to other travellers visiting friends and relatives (VFR), international students have also been shown to have low uptake of pre-travel health advice [16].

Globally mobile university students pose an additional public health concern due to the congregation of a large population of at-risk young adults studying, and often living, in a campus environment. University campuses are particularly conducive to the spread of certain infectious diseases [17], with multiple reports of outbreaks of influenza with high attack rates associated with university campuses [17–19] and outbreaks of a range of other diseases like mumps, norovirus infections and conjunctivitis [20–22]. More serious infections may also be carried by international students, and potentially spread to other students. The diagnosis of polio in a returned Pakistani international student in Melbourne in 2007 highlighted this risk [23,24] and half of reported cases of multi-drug resistant tuberculosis in Victoria, Australia, during the 10 years up to 2007 in international students [25].

University students may be under-immunised [26], have frequent close interpersonal contact [27,28] and may be unaware of increased risks of infection related to dormitory living, all amplifying outbreak potential. During the 2009 H1N1 pandemic, it was reported that 60% of students were not aware that dormitory living posed an additional risk [27], were not concerned about the pandemic [29], not aware of their risks [30] with only 21% adopting hand hygiene, and 67% prepared to attend university with flu-like symptoms, if they had an examination or assessment deadline [29]. In light of this, it is important to ensure that international student travellers are aware of their infectious risks, and undertake adequate travel health preparations and precautions in relation to their travel. Therefore, we aimed to better understanding the travel-related health risks pertaining to the Chinese international student population in Australia to inform the development of potential interventions to improve their travel health knowledge, attitudes and practices.

Methods

A qualitative focus group study was conducted with Chinese international students studying in Australia. A qualitative methodology was deemed appropriate for the study due to the paucity of data in this field. Compared to quantitative methodologies, qualitative research methods provide a more in-depth and detailed view of a topic [31,32] since the collection of data is not restricted to a static quantitative questionnaire. It is therefore especially suitable for exploratory research [33], where much about the topic remains essentially unknown. Furthermore, qualitative research can illustrate both the presence of phenomena

contributing to health outcomes, as well as the underlying reasons for their occurrence [34]. Qualitative research can also provide insights into the underlying dynamics that led to a particular behaviour or viewpoint [35].

Eligible participants were ethnic Chinese international students currently enrolled at UNSW Sydney (the University of New South Wales, Sydney Australia), who were aged 18 years or older and who had returned to mainland China or Hong Kong during the preceding 18 months for the purpose of visiting friends or relatives. There were no additional exclusion criteria. All participants who were interested and eligible were included in the study. UNSW is a major university in Australia, with a substantial Chinese international student population.

A combination of recruitment methods were used including via poster advertisements placed on campus, and electronic advertisements on selected university publications and websites. Heads of School across all faculties, the UNSW Chinese Student Association and the UNSW Hong Kong Student Association were approached to assist with distributing the study information. Invitations to participate were sent to students by Heads of School and student associations via email distribution lists.

Two focus groups were conducted on 5 June 2013 at UNSW. Written, informed consent was obtained prior to commencing the focus group sessions. Participants also completed a short demographic questionnaire. During the focus groups, selected topics were explored in sequence. See the Supplement section for the focus group guide. Each focus group took approximately 2 h. Focus groups were conducted in English by experienced researchers (Dr Tara Ma, PhD student who previously had public health training and had also worked as a medical doctor in a hospital setting; and Dr Anita Heywood, PhD Epidemiologist and public health researcher) from the Faculty of Medicine, UNSW Sydney who were familiar with data collection method. TM is of ethnic Chinese background and AH is of Caucasian background. Moderators were available to translate certain Chinese terms where required. Findings were discussed at the end of each focus group by TM and AH. As an incentive for participation, participants received a \$30 gift card and a travel health information pack.

All focus group discussions were recorded, and then transcribed manually by two transcribers fluent in Mandarin and/or Cantonese. The data was transcribed anonymously. Participants were first assigned a number, and only referred to by their number in all subsequent transcription, data analysis and write-up. The portions of the conversation in Cantonese or Mandarin were translated verbatim into English where possible. Where there were occasional difficulties in direct translation, translations aimed to preserve as much of the original meaning as possible. Random sections of the transcripts were checked for accuracy by a third transcriber who was fluent in both Mandarin and Cantonese. Analysis using nVivo 10 software was decided a priori, using a thematic analysis approach. The data was encoded into a structure of codes, each code representing a theme. The code list of major themes was developed through content analysis of the data and were constructed independently by TM and cross-checked and repeated by AH. No pre-determined themes were used, and a final agreed thematic framework was applied to all interviews. The coded data was then analysed and summarised.

Results

Participant characteristics

A total of 28 respondents participated in the two focus groups. The demographic characteristics of the focus group participants are presented in Table 1.

Risk perception and awareness of travel-associated infectious diseases

International students generally believed that China, including rural areas, was not a high-risk travel destination for infectious diseases, and reported familiarity as the main reason for this perception. The international students still had a family home to return to in China and many had not made the decision to permanently emigrate to Australia. Therefore, there was a particularly strong feeling of China being 'home', which reinforced the perception of familiarity and low risk.

Preparing for travel to China

None of the participants reported consulting a medical professional before any of their return trips to China. However, some participants said they were open to seeking pre-travel medical advice before going to China after long-term immigration to Australia.

I think if once settled in Australia probably yes, 'cause I see in this group most of us have been in Australia for

Table 1 Focus group participant demographics (N = 28).

Characteristic	Number (n)	Percentage (%)
Age (years)		
18–24	25	89
25–34	3	11
Gender		
Male	6	21
Female	22	79
Education		
High school certificate	13	46
University degree	15	54
Employment		
Not employed	23	82
Casual and part-time	5	18
Study		
Full- or part-time study	28	100
Length of residence in Australia		
Less than 1 year	11	39
1–5 years	17	61
Number of trips to China since living in Australia		
Average ^a	2.6	—
Range	0–8	—

^a The average number of return trips to China includes only participants who provided a response to the question "Since you have lived in Australia, how many times have you been back to China?" If participants provided a range, the midpoint of the range was used. No response was recorded for 7 participants.

like 2 years, which is a pretty short time, and the health awareness is not that strong compared with those Australians. I think after 10 years we live in Australia, probably the health awareness will be rise ... if you get a job, I think the job will, the organisation will grant you some health insurance, and some other stuff, and you will get used to a GP regularly. But for us international students, we stay here for studying and we go back home regularly. And again, as she said, it's our hometown, we don't really care, or that awareness is not that strong as your case. (Participant 505)

Many participants complained that accessing health care was not convenient in Australia, for example due to the need to book an appointment before seeing a GP. The cost of seeing a doctor was also a factor in not seeking medical advice. One participant said that they may see a GP prior to returning to China if they lived in Australia for a long time, because they would have health insurance through their job which would encourage them to see a GP regularly. Furthermore, there was also a concern that doctors in Australia may not know the situation in China very well.

I don't think the doctor in Australia knows more than me. (Participant 504)

The majority of participants instead relied on health information from other sources, particularly family and friends in China and the internet. Familiarity was again an important reason why participants did not seek professional pre-travel medical advice.

You grew up in China and you're familiar with all the environment, and you can adapt to changing circumstances. So you don't feel unsafe because you grew up there. (Participant 508)

The internet was a particularly common source of travel information including the use of social media in China, such as Weibo (the Chinese version of Twitter), and online Chinese news websites to source information. The internet was used both for searching for information and for communicating with family and friends in China about their need for specific preparations prior to travel.

I think the first source is the internet, 'cause information is shared through the internet, and everyone go to internet and we can talk with friends and talk about what they think about if we go back to China. (Participant 502)

Family and friends in China are also major sources of information. Relatives may even provide unsolicited advice, including influencing changes to travel plans in the event of infectious disease outbreaks.

Most time I go to the internet, and I call my family just to ask the kind of situation there. (Participant 207)

Vaccinations and travel

Many participants were open to the idea of receiving vaccines prior to travel to China if recommended by their doctor. While some participants would not accept the vaccine, others described a number of factors that would

influence their decision, such as a current outbreak, the prevalence of the disease, the seriousness of the disease, and potential vaccine side effects and safety. Preference of relying on their family and friends for vaccine advice prior to travel was described as was the belief that Australian GPs may overestimate the risk and the need for vaccination for travel.

Information from a wide range of sources before deciding whether to have a vaccine was described. In relation to getting the HPV vaccine, one participant (411) said that she visited government websites, Yahoo Answers, 'Googled' information and asked friends who were studying medicine before making a decision to get the vaccine. She expressed a need to know how the vaccine works as well as the side effects. She also said that her doctor did not mention any side effects, and she only learned about the side effects from her own research.

Many participants were concerned about the side effects and safety of vaccines, some after hearing of cases of adverse reactions, while others expressed concern that vaccines were safe for people of European descent but may not be as safe for Asians. There was also confusion over how long vaccines are effective for. In general, participants did not feel well informed about vaccines.

I would think that for general citizens we lack proper information about the exact vaccination we are getting. (Participant 407)

Sometimes we are confused because some vaccines are once and for all, but some are short term. (Participant 506)

Travel activities and itineraries

International students described involvement in a variety of activities with family and friends during their return trips to China. These included eating outside the home and visiting rural areas or other parts of China with family and friends. Students commonly reported timing their return trips to China during the Australian university summer holidays (December/January), which coincides with the Spring Festival in China.

Usually when we're going back to China from December to February, we usually have Spring festival dinner with families, so that's our usual activity. (Participant 506)

Worryingly, some participants said they would travel on a plane between Australia and China even when sick. Some participants also said they would not necessarily see a doctor before travelling.

If it's a deadly disease I won't board the plane, but if just a cold then it's like normal. (Participant 504)

Discussion

This study identified that international students shared many attitudes and risk perceptions with other VFR travellers [36–41], including a similar study of Australian

Chinese VFR travellers from the community (that study will be published separately) [42]. The most important of these is the common underestimation of the risk of VFR travel, unwillingness to seek pre-travel medical advice, and hesitancy and knowledge deficits regarding vaccination. These findings are relevant to the current concerns about COVID-19 as a travel-related infection. However, they also have many unique attitudes and behaviours.

Many international student participants expressed a strong feeling of China as their 'home'. This may be because many international students have not made a decision to permanently emigrate to Australia, and they often have family in China but not in Australia. This has implications for pretravel health seeking and has been reported in other studies of VFR travellers [37,43–45]. Travel health promotional material and advice provided by healthcare providers must take this into account when targeting international students. Increasing awareness of the additional responsibility to protect close contacts on campus, may also be an important element of a pretravel advice, with students potentially becoming the index case for an outbreak on campus [17–19].

The use of the internet in pre-travel preparations was extensive among the international student participants in this study. The internet is a common source of travel health information for university students [46], with extensive searches including information and opinions on vaccination, and the use of both official and unofficial sources of information. Communicating with family and friends in China, including on social media, is an important source of travel health advice, particularly in understanding current infectious disease outbreaks. Informal feedback from on a public health education initiative for international students regarding VFR travel health in Victoria, Australia states that electronic and social media was the preferred way of disseminating health information to university student VFR travellers [47]. The internet and social media are therefore potentially very effective avenues for raising awareness of VFR travel-related health risks and promoting proper pre-travel health preparations among international students.

Most international student participants unsurprisingly had family, including parents, in China. Many reported that their parents provided advice regarding both health issues in general as well as travel health-related issues, including via the internet. Family and friends as a major source of advice among student travellers has been previously reported in the literature. A US study of student travellers found that family and friends are a common source of advice [46]. Reliance on advice from family may be an important reason for not seeking professional travel health advice. A study of Australian travellers found that 'country of origin or staying with family' and 'advised by friends or others it was safe' were commonly reported reasons for not seeking professional pre-travel health advice [45]. It appears that advice from relatives may be both helpful, for example, advice about current outbreaks in China, and counterproductive, for example, advice not to take a vaccine based on unjustified reasons. It is notable that a study on Hong Kong university student travellers found that those who received non-professional travel advice were more than twice as likely to experience travel-related illness compared to those who received professional advice [11].

The extensive use of the internet to search for information and the use of social media among younger Chinese VFR travellers present a great opportunity to disseminate targeted education campaigns to this population. This could be done in multiple ways. Information could be made available in an accessible form on the internet that could be searched for via search engines. There could also be campaigns to correct misconceptions in online discussions regarding various health issues [48]. The use of social media is also likely to be helpful. Social media accounts (e.g. on Facebook, Twitter and Weibo) could be set up to connect with younger Chinese VFR travellers, and then disseminate information via these connections. Such information may then be further shared and disseminated via social media to even more potential Chinese VFR travellers [48,49].

In this study, participants stated having a regular GP and having health insurance coverage as potential reasons why longer-term migrants are more likely to seek pre-travel health advice. Therefore, not having a regular GP and inadequate health insurance coverage are potentially important barriers for international students that need to be addressed. Provision of travel health advice and vaccinations at the university clinic would potentially improve access for international students. Studies regarding vaccinations and students have previously found an association between access to health services and vaccination rates [50,51].

Another important barrier identified in this study was the view that Australian doctors are not familiar with China. To convince Chinese international students to consult Australian health professionals before VFR travel, it is necessary to demonstrate to them that these health professionals have a strong understanding of travel health-related issues pertaining to China. A possible solution would be for the university to establish a travel health service, with practitioners being specially trained regarding travel health issues in common travel destinations, including China.

Many international student participants reported travelling to China around the time of the Spring Festival, in January to February each year. Although other Chinese VFR travellers may also choose this time for travelling, international students are especially likely to do so, given that it is also the time of the annual vacation for Australian universities. This is consistent with the current situation, where nearly 100,000 Chinese international students who had travelled to China during the vacation are now unable to return to Australia due to the COVID-19 related travel restrictions [7–9]. Importantly, this period is also the peak period for seasonal influenza in many parts of China [52–54]. Therefore, it would be particularly important for people travelling during this period to be vaccinated for seasonal influenza prior to their travel, and be aware of ways they can reduce their risk of getting influenza during their trip. One major barrier to this is that the northern hemisphere influenza vaccine is not licensed for use, and is therefore not available, in Australia. The WHO releases semiannual recommendations for influenza vaccine formulations, in preparation for the peak influenza seasons in the northern and the southern hemispheres respectively. The composition of annual vaccinations patients receive prior to the peak season in each hemisphere are therefore based on information only 8 months old [55]. If Chinese VFR

travellers travel to China in December or January and obtain influenza vaccination in Australia before they travel, they would still be receiving the southern hemisphere vaccine for the previous season. The vaccine formulation would be based on information that is more than 1 year old and less up to date than if they were immunised using the current northern hemisphere vaccine. This situation can be improved if the Australian Therapeutic Goods Administration were to license the use of the northern hemisphere vaccine for use in travellers, and suppliers are willing to supply this vaccine to Australia.

This is the first published study of travel health knowledge, attitudes and practices of Chinese international students as VFR travellers. Although the study population was drawn from only one university, UNSW is a major university and representative of an urban Australian university with a substantial international student community. However, students studying at regional universities may face different issues. The qualitative methodology used enabled the exploration of issues in depth. However, we were unable to quantify the proportion of participants who held particular views. This study was not conducted during a pandemic situation like COVID-19. However, there was a then-current H7N9 influenza outbreak in many parts of China [56], and outbreak concerns were highly relevant for participants in that context. Furthermore, it is important for students to be well prepared for the risks of VFR travel at all times, since an outbreak can arise quickly and unexpectedly. Despite the aforementioned limitations, this study reports findings, which are useful in informing national or community communication strategies and other interventions to improve travel-health outcomes for Chinese international students. This is now particularly important, as the COVID-19 pandemic continues to unfold in potentially unexpected ways.

Understanding international students and their travel risk perceptions is important for the targeting of disease control initiatives in this high-risk and highly mobile population, especially for serious emerging infections such as COVID-19. This focus group study on issues surrounding the VFR travel of Chinese international students studying in Australia was unique in that there are currently no published qualitative studies regarding international students as VFR travellers. As such, several important issues have been newly identified or explored in further depth than in existing published literature.

Overall, this research has provided useful information on Chinese international students as VFR travellers, especially regarding areas where travel health preparation is inadequate, and identified issues that commonly apply to Chinese VFR travellers as well as issues specific to this population. This information should inform future education interventions targeted at improving the travel health outcomes of this population.

Ethics

The study was approved by the UNSW Medical and Community Human Research Ethics Advisory Panel (reference number: 2012-7-40). The study was conducted as per protocol and there were no variations from the approved protocol valid at the date on which the study was

conducted. Informed consent was obtained from all participants before the focus groups. There were no withdrawals of consent.

Authorship statement

Tara Ma: Conceptualization; Methodology; Formal analysis; Investigation; Data Curation; Writing - Original Draft. **Anita Heywood:** Conceptualization; Methodology; Formal analysis; Investigation; Writing - Review & Editing; Supervision. **Raina MacIntyre:** Conceptualization; Methodology; Writing - Review & Editing; Supervision.

Conflict of interest

TM has no conflict of interest to declare. AH has received funding to conduct investigator-driven research from GSK and Sanofi Pasteur unrelated to this manuscript. CRM receives funding from vaccine manufacturers GSK and CSL Biotherapies for investigator-driven research unrelated to this manuscript.

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Appendix A. Supplementary data

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