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Review

Foreign travel, casual sex, and sexually transmitted infections: systematic review and meta-analysis

R. Vivancos [a,b,*], I. Abubakar [a], P.R. Hunter [a]

[a] School of Medicine, Health Policy & Practice, University of East Anglia, Norwich NR4 7TJ, UK
[b] School of Translational Medicine, University of Manchester, Manchester M13 9PT, UK

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SUMMARY

Objectives: With increasing international travel it is important to understand how frequent casual travel sex and unprotected intercourse are, and what impact this may have on the risk of acquiring sexually transmitted infections (STIs).
Methods: We conducted a systematic review, and where appropriate meta-analyses, to ascertain the influence of foreign travel on behavior, including new partnerships, unprotected intercourse, and STI acquisition.
Results: The pooled prevalence of travel-associated casual sex was 20.4% (95% confidence interval (CI) 14.8–26.7%), with 49.4% (95% CI 38.4–60.5%) of these having unprotected intercourse. The predominant characteristics of people who had new sexual partners abroad were: young age, male gender, single status, and traveling alone or with friends, with a previous history of multiple sexual partners or an STI. People who travel or stay abroad for longer periods and men who have sex with men are at higher risk of developing new sexual partnerships and having unprotected intercourse. The risk of developing an STI is increased up to 3-fold in people who experience casual travel sex.
Conclusions: New sexual partnerships and unprotected intercourse abroad are relatively common. People who develop new sexual partnerships and have unprotected intercourse abroad have an increase risk of STIs. There is, however, a paucity of information related to strategies to prevent the risk of STI acquisition during foreign travel.

1. Introduction

The number of individuals traveling abroad has increased consistently over the last three decades.[1] Foreign travel is in many ways related to the spread of diseases and, with the increasing affordability of air travel, there is a risk of the rapid globalization of emerging infections. These trends are also likely to affect the incidence, distribution, and types of sexually transmitted infections (STIs).

Historic trends suggest that this phenomenon is not new and has had devastating consequences in certain populations. Syphilis is said to have been taken into America by explorers, the globalization of HIV has also been helped by travel and migration,[2] and cases of resistant strains of *Neisseria gonorrhoeae* in the UK and other developed countries have also been identified as imported.[3–6] There are many reasons that make foreign travel a risk factor for the acquisition of STIs. When abroad, whether on business or on holiday, people may feel less inhibited due to a perceived relaxation of social and moral constraints, leading to changing sexual behavior and exposure to STIs.

We conducted a systematic literature review to identify the prevalence of new sexual partnerships acquired abroad and the rate of unprotected intercourse, factors associated with increased sexual risk behavior, in order to assess the implications that these may have on prevention.

2. Methods

2.1. Search strategy and selection criteria

We searched Medline (from 1950), CINAHL (from 1980) and EMBASE (from 1974) up until the end of January 2008 with the terms 'sexually transmitted diseases', 'sexually transmitted infections', or 'sexual behavior', and 'travel' or 'holiday', and 'international', 'foreign' or 'abroad'. Truncations were used for terms that could have more than one spelling and to include the plural and singular of the same word. Specific infections were also searched using MeSH terms. Titles and abstracts identified were screened. We retrieved any original research article. We also screened the references of identified review articles.

* Corresponding author. Tel.: +44 (0)1603 591699.
E-mail address: r.vivancos@uea.ac.uk (R. Vivancos).

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Studies were included in the review if they related to sexual behavior in the context of foreign travel and reported figures on casual sex, unprotected intercourse with a new partner, or incidence of STIs; they were excluded if they related to migration and travel in-country or if travel was between two developing countries only. Any study designs (i.e., cohort, case–control, and cross-sectional) and studies in any language were included.

Studies were read by two reviewers, who extracted the data. Discrepancies were discussed to reach agreement. The following information was extracted where available: prevalence of new sexual partnerships, unprotected intercourse, the risk factors associated with these, and the incidence of STIs. The same researchers independently reviewed all studies included in the review, paying attention to the following criteria: whether the research question was clearly stated; the study design and methods appropriately addressed the research question; the recruitment framework used minimized bias and the sample was representative of the population being studied; the criteria for inclusion/exclusion were explicit; the outcome measures were adequate for inclusion in a meta-analysis (i.e., they reported either new sexual partnerships, unprotected intercourse, or a new diagnosis of STIs) or if other outcomes were included, these were relevant; the analysis used any form of adjustment or correction for possible or known confounders; and claims in the discussion were supported by the data presented.

The questions relating to recruitment framework and explicitness of inclusion and exclusion criteria were used to assess the possibility of bias, whereas the assessment of the type and rigor of analysis were used to assess the possible effect of confounders. For each of these topics, reviewers were asked to state whether the study addressed the issue adequately, not adequately, or whether the information provided was not reported or unclear. Overall, studies were rated depending on the reviewers' impression of how well the study was conducted as ++ (>75% criteria well covered), + (50–75% criteria well covered), or − (<50% criteria well covered).

Studies were not excluded on the basis of quality criteria if they met the inclusion criteria. Instead, a descriptive summary of the quality of studies is provided in the Results section and this was used as the basis to stratify the analysis. In broad terms a quality gradient exists from larger population-based studies (highest quality or ++), through clinic-based studies (mostly +), to studies sampling populations of travelers (generally lowest, + or −). This classification is also convenient, as the background risk is also likely to be highest among clinic users and lowest in the general population samples. Meta-analysis was done with all the studies together, but also stratified by gender and by type of population sampled to assess whether differences exist in the prevalence of casual travel sex and unprotected intercourse.

To explore cultural differences associated with casual travel sex and unprotected intercourse we compared the pooled rates between studies that sampled UK residents only with those that drew samples from other countries or international students.

2.2. Quantitative analysis

Studies reporting either occurrence of new sexual partnerships, unprotected intercourse, or STIs in groups of men and women traveling were included in a meta-analysis. A random effects model was used to estimate pooled rates of casual travel sex and unprotected intercourse through meta-analysis if the I^2 statistic was high; otherwise a fixed effect model was used. To ascertain the rate of casual sex and unprotected intercourse with a new partner associated with foreign travel we calculated pooled proportions, while to estimate the risk of acquiring an STI through casual travel sex we calculated pooled odds ratios (OR). A 95% confidence interval (CI) was estimated for all the results. All the analyses were conducted using StatsDirect version 2.6.3 (StatsDirect, 2007).

We used Forest plots for graphical representation of the various meta-analyses. This type of representation shows the estimate from each individual study with 95% CI, together with the pooled estimate; it can also show the amount of variation between the studies and the overall result at a glance.

A narrative synthesis of studies reporting characteristics associated with sexual partnership acquisition abroad or unsafe sex was used, as meta-analysis was not appropriate due to heterogeneity of study design and differences in the populations being studied.

3. Results

3.1. Study characteristics

A total of 246 articles were identified with the initial search (115 in MEDLINE, 21 in CINAHL, and 110 in EMBASE). After removing duplicated articles 75 and 59 reviews, and adding 3 articles identified cited elsewhere, we reviewed the title, keywords and abstract of the remaining 115 articles. A further 71 articles were excluded because they were letters, editorials, or guidelines and did not report primary research. Fourty-four articles were selected for further assessment (Figure 1).

Of the 44 articles reviewed, only 37 fulfilled the inclusion criteria. Twenty-eight studies included groups of men and women of mixed sexual preferences. Of these, two studies were later excluded because they studied samples of people who had traveled, but not necessarily abroad.[7,8] Three articles reported different aspects of the same study.[9–11] This was a study of foreign travel-associated casual sex in women only. Additionally, seven studies referred to people who had stayed in foreign countries for a prolonged period of time (e.g., volunteers, casual workers, and military personnel),[12–18] two to male travelers who have sex with men,[19,20] and one to HIV-positive people who traveled abroad.[21]

3.2. Type and quality of studies

Of 25 remaining studies included in the qualitative analysis, nine were conducted in clinical settings,[10,22–29] mainly genitourinary medicine (GUM) clinics, 11 were surveys of travelers, generally returning from a journey overseas or in the departure lounge of the airport,[3,30–36,38–40] another two studies prospectively recruited travelers seeking pre-travel advice from a clinical setting,[41,42] and the remaining three were surveys of the general population or subsets of the population, such as a sample of university students.[37,43,44]

Table 1 summarizes the characteristics of the studies included in the review. One study referred only to women.[10] Two studies focused mainly on men who had sex with commercial sex workers (CSWs) among frequent travelers to mainland China from Hong Kong, although information was also available on casual travel sex with non-CSW partners.[39,40] Most of the studies were conducted in the UK or sampled UK travelers (Table 1).

Of the 25 studies analyzed, two were case series,[22,27] another two were intervention studies,[36,42] one was a case–control study,[43] and the rest were cross-sectional surveys. The period of travel studied varied from study to study, from the trip people were returning from or the most recent journey abroad to any travel within the past five years.

All the studies together represent a sample of 33 966 participants who had traveled. However, the two studies that sampled directly from the general population had the largest number of participants,[43,44] and they also had the most rigorous sampling frameworks to reduce selection bias. Most studies

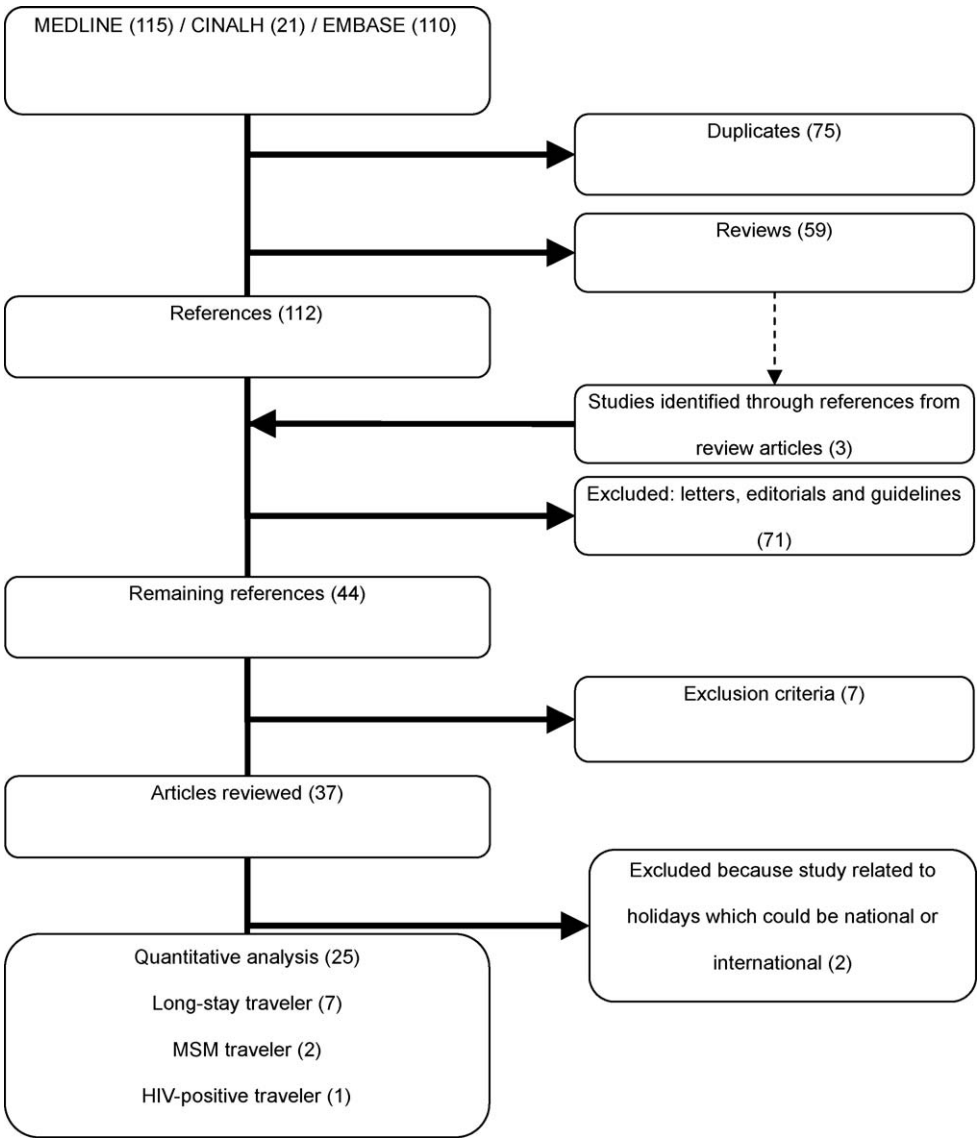

Figure 1. Literature search and selection flowchart.

recruited subjects after the period of travel; however, two studies recruited participants prospectively before the planned travel and surveyed them after the period in which travel took place.[41,42]

From an analytical point of view, only nine studies that assessed the characteristics of risks associated with engaging in casual travel sex adjusted the analysis for known confounders or used multivariable logistic regression in their analyses.[3,26,31,33,34,37,41,43,44]

In general terms, studies that recruited from the general population were of highest quality because they had larger samples, more strict sampling frameworks, and provided adjustment for possible confounding factors in their analyses. Conversely, studies that sampled from returning travelers were more vulnerable to bias because they used convenience samples, with less strict sampling frameworks and were less likely to use adjustment in the analysis. Studies that recruited from a clinical setting lay somewhere in between those using convenience samples and those using populations.

3.3. New sexual partnerships abroad

Twenty-two studies of men and women of mixed or undetermined sexual preference and the study of women only, reported on or had enough information to allow estimation of the proportion of subjects engaged in casual sex abroad. The prevalence of travel-associated casual sex ranged between 5.6% and 62.9%. There was considerable variation across studies (I^2 99.5%, 95% CI 99.4–99.5%). The pooled prevalence from all the studies was 20.4% (95% CI 14.8–26.7%) with considerable variation between studies, shown in the Forest plot (Figure 2). The prevalence of new sexual partnerships associated with foreign travel varied depending on the type of population sampled, being highest among samples drawn from clinical settings (31.8%, 95% CI 20.7–43.9%; I^2 98.6%) and travelers (19.7%, 95% CI 10.3–31.3%; I^2 99.6%) and lowest in samples drawn from people in the general population (9%, 95% CI 6.3–12.13%). It also depended on travel destination and age of the sample. For example, people returning from Peru[32,33] had lower rates than people returning from Ibiza[30,34] or Tenerife.[31]

Carter et al. found an increase in the rate of sexual contact during travel abroad compared with the 3 months before, suggesting that there are changes in sexual behavior with travel.[23] On the other hand, a similar study by Hawkes et al. suggested a greater rate of new sexual contacts in the 3 months before travel.[25] Also, Nemoto et al. asked about people's behavior abroad and back in their home country and found that the rate of casual sex abroad

Table 1
Characteristics of published literature on sexual behavior and foreign travel included in the meta-analysis (search last updated in January 2008)

Author (year) [Ref.]	Study type	Analysis	Setting	Participants	Population studied	Sample size	Period
Abdullah (1998) [3]	Cross-sectional	Adjusted	Departing international travelers	Men and women aged 18–65 years not accompanied by their family	International	383	CTS within last 12 months
Arvidson (1996) [10]	Cross-sectional		Family planning clinic	Women only	Sweden	996	CTS ever
Batalla-Duran (2003) [30]	Cross-sectional	Unadjusted	Returning UK travelers from Tenerife (Spain)	Men and women aged 15–62 years	UK	136	CTS in recent visit abroad
Bavastrelli (1998) [22]	Case series	Unadjusted	O&G/ID or tropical medicine clinic	Men and women aged 14–25 years	Italy	130	
Bellis (2000) [34]	Cross-sectional	Adjusted	Returning travelers from Ibiza (Spain)	Men and women aged 15–35 years	UK	846	CTS in recent visit abroad
Bellis (2004) [31]	Cross-sectional	Adjusted	Returning travelers from Ibiza (Spain)	Men and women aged 15–35 years	UK	1559	CTS in recent visit abroad
Bloor (1998) [43]	Case–control	Adjusted	General population	Men and women aged 18–34 years who had traveled without a partner; cases had a new sexual relationship during their trip	UK	5276	CTS in previous 2 years
Cabada (2002) [32]	Cross-sectional	Unadjusted	Returning travelers from Peru	Men and women aged 15–49 years	International	442	CTS in recent visit abroad
Cabada (2003) [33]	Cross-sectional	Adjusted	Returning travelers from Cuzco (Peru)	Men and women aged 15–51 years	International	2540	CTS in recent visit abroad
Carter (1997) [23]	Cross-sectional	Unadjusted	GUM clinic	Men and women aged 15–57 years who had traveled	UK	325	CTS in last 3 months
Croughs (2008) [41]	Cross-sectional survey	Adjusted	Patients recruited prospectively from a travel clinic and surveyed 6 weeks later, after travel.	Men and women aged 18–50 years, who traveled for less than 4 weeks and spoke Dutch	The Netherlands	1907	CTS in recent visit abroad
Daniels (1992) [24]	Cross-sectional	Unadjusted	GUM clinic	Men and women aged 18–64 years	UK	243	
Egan (2001) [35]	Cross-sectional	Unadjusted	Traveling backpackers	Men and women aged <35 years staying at youth hostels and self-defined as backpackers	International	504	CTS while traveling in Canada
Gagneux (1996) [42]	Cross-sectional/ intervention study	Unadjusted	People seeking pre-travel advice	Men and women	Switzerland	1839	CTS during recent visit abroad
Gehring (1998) [36]	Cross-sectional/ intervention study	Unadjusted	Arriving and returning travelers	Men and women aged 16 years or older	German-speaking	1381	CTS in recent visit abroad
Hawkes (1994) [26]	Cross-sectional	Adjusted	Tropical medicine clinic	Men and women attending clinic	UK	757	CTS in recent visit abroad
Hawkes (1995) [25]	Cross-sectional	Unadjusted	GUM clinic	Men and women attending clinic	UK	386	CTS in last 3 months
Lau (2000) [39]	Cross-sectional	Unadjusted	Returning travelers at a border crossing	Men only, aged 18–60 years	Hong Kong	1448	CTS
Lau (2001) [40]	Cross-sectional	Unadjusted	Returning travelers at a border crossing	Men only, aged 18–60 years	Hong Kong	1254	CTS
Mendelsohn (1996) [27]	Case series	Unadjusted	GUM clinic	Men and women aged 17–45 years	UK	4436	CTS in last 6 months
Mercer (2007) [44]	Cross-sectional	Adjusted	General population	Men and women aged 16–44 years	UK	8877	CTS in last 5 years
Nemoto (2002) [38]	Cross-sectional	Unadjusted	Japanese travelers in a tourist area of Bangkok	Men and women aged 18 years and over	Japan	150	CTS in last 12 months
Nemoto (2007) [37]	Cross-sectional	Adjusted	Japanese nationals in Honolulu	Men and women aged 18 years and over	Japan	249	CTS in last 12 months
Tveit (1994) [28]	Cross-sectional	Unadjusted	GUM clinic	Men and women	Norway	599	CTS in last 5 years
Velasco (2001) [29]	Cross-sectional	Unadjusted	Tropical medicine outpatients	Men and women	Spain	1008	CTS in recent visit abroad

CTS, casual travel sex; O&G, obstetrics and gynecology; ID, infectious diseases; GUM, genitourinary medicine.

was lower than in the home country.[37] As these studies asked retrospectively about behavior before traveling abroad, they are subject to recall bias; also the periods of observation are different (i.e., recent casual sex abroad compared with casual sex in the home country). None of the studies compared a group that had traveled abroad with one that had not traveled; as a result, it is not possible to ascertain from their results whether the prevalence of casual travel sex is any different to that of casual sex in those who do not travel.

3.4. Unprotected intercourse

Only 14 studies had enough information to estimate the rate of unprotected intercourse among those who have casual travel sex.

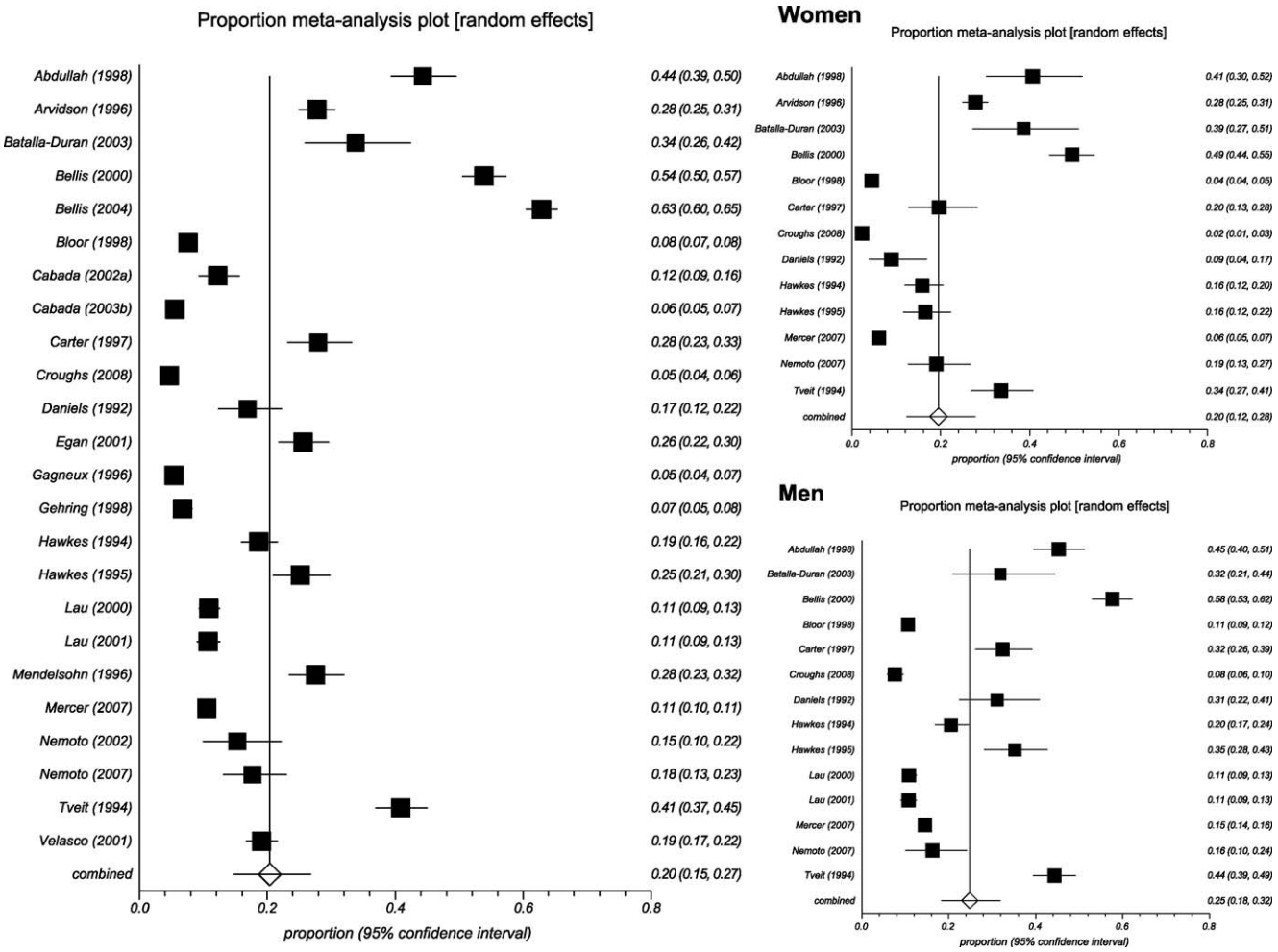

Figure 2. Proportion meta-analysis of new sexual partnerships acquired abroad, overall and by sex.

Again there was a high level of heterogeneity across studies (I^2 97.5%, 95% CI 97.1–97.9%), therefore a random effects model was used to calculate the pooled rate; this was 49.4% (95% CI 38.4–60.5%). The Forest plot (Figure 3) shows variations between the studies used in the meta-analysis. There were no differences in the rates according to recruitment setting: returning travelers 43.1% (95% CI 27.9–59%; I^2 98.7%) and clinical setting 55.2% (95% CI 47–63.2%; I^2 78%).

Carter et al. suggested that there is no change in the rate of unprotected intercourse associated with foreign travel and that those who inconsistently use condoms before travel also do so when they have new sexual contacts abroad.

3.5. Risk factors

Eighteen studies looked at the characteristics associated with developing new sexual partnerships abroad (Table 2). Most studies agreed that typically those engaging in casual travel sex are men,[3,23,24,32,33,36,41–43] single,[30,32,33,36,43] and of younger age.[3,30–33,43,44] They are people who tend to travel alone[32,33,36] or without their partner,[41,42] generally on business, or with friends.[43] Six studies identified people who stayed abroad for longer periods of time as being at an increased risk of developing new sexual relations.[26,32–34,36,43]

From their sexual behavior, men who have sex with men (MSM) are more likely to engage in casual travel sex.[32–34,44] Similarly, people who have casual travel sex tend to have a history of multiple partnerships[3,31,34,35,41–44] and a history of previous diagnosis with an STI[26,44] or visit to a sexually transmitted diseases clinic.[25] Three studies linked the development of new sexual partnerships with having paid for sex in the past, although this was only applicable to men.[26,28,37,44] Some studies have described an expectation to have sex or packing condoms.[30,33,35,43]

Other risk-taking behaviors have also been studied. Both drug[31,35] and alcohol[34,35,37] use have been associated with casual travel sex. However, Nemoto et al.[37] suggested that there is no difference in drug and alcohol use pre- and during travel in those who develop new sexual partnerships .

3.6. Cultural differences

Sub-analysis by country of residence suggests that a larger proportion of UK residents engage in casual travel sex (27.4%, 95% CI 15.8–40.9%; I^2 99.7%) when compared with those of other countries (16.1%, 95% CI 10.7–22.2%; I^2 98.9%). However, the 95% CI of the pooled proportions are wide and overlap. On the other hand, there is no difference in the proportion of casual sex that is unprotected in UK residents (48.2%, 95% CI 33.6–62.9%; I^2 97.8%) compared to those from other countries (50.6%, 95% CI 34.9–66.4%; I^2 96.4%).

3.7. Women travelers

One study was based on a female-only sample,[9] while another conducted stratified analyses by gender.[44] Another 12 studies provided enough information to calculate a pooled rate of casual travel sex.[3,8,23–26,28,30,34,37,41,43] Only four of these studies provided

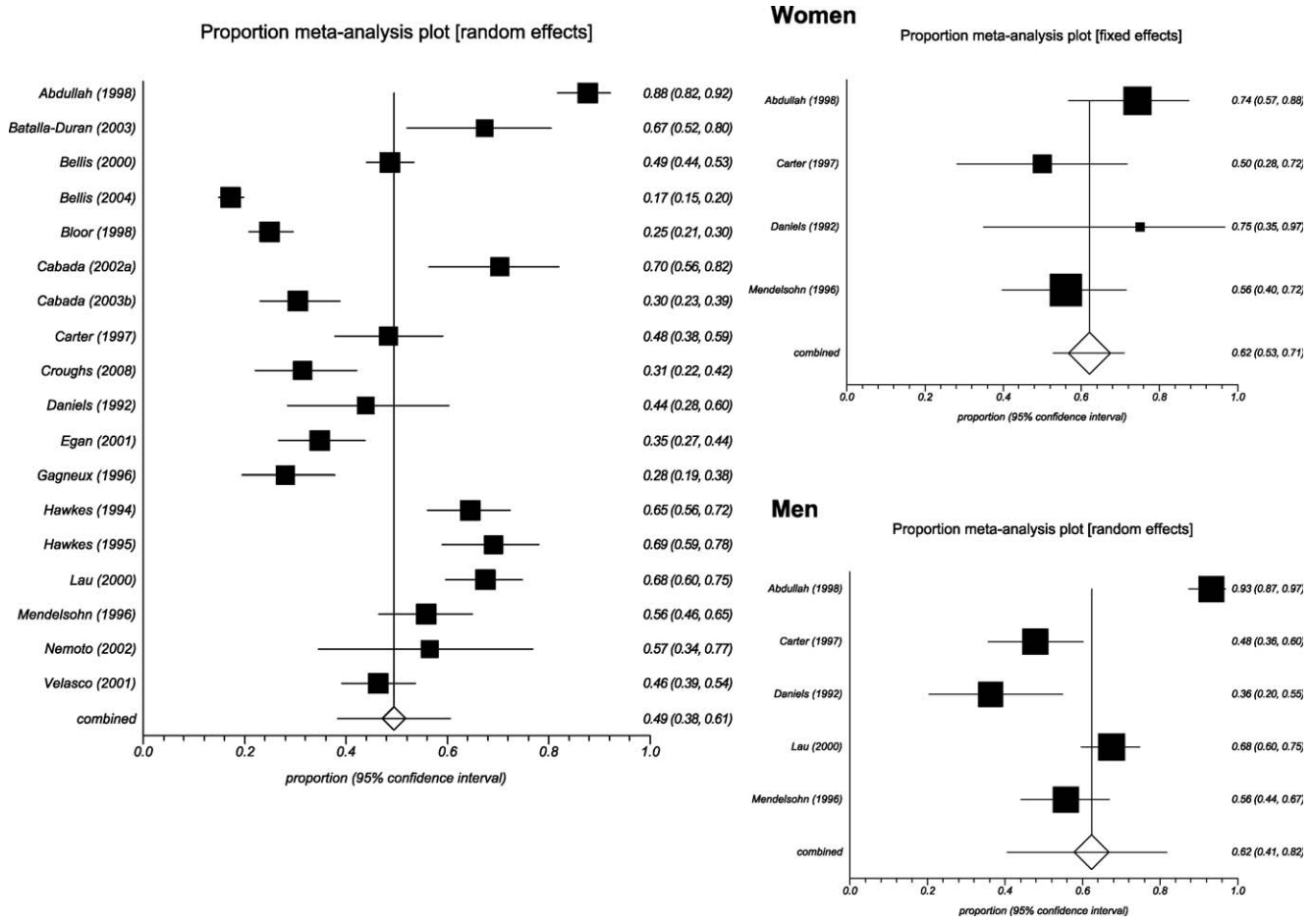

Figure 3. Proportion meta-analysis of unprotected intercourse, overall and by sex.

sufficient information to allow the calculation of a pooled rate of unprotected intercourse.[3,8,23,24]

The pooled rate of casual travel sex in women from these studies was 19.5% (95% CI 12.4–27.8%; I^2 98.9%), while that of men was 24.8% (95% CI 18.3–31.9%; I^2 98.6%) (Figure 2). The rate of unprotected intercourse among those women who had casual travel sex was 62.1% (95% CI 52.9–70.9%; I^2 35.8%), while that in men was 62.3% (95% CI 40.6–81.7%; I^2 95.5%) (Figure 2).

Two studies agree that women who have casual travel sex are more likely to be single and living alone.[9,44] The study by Arvidson et al., conducted in a sample of only Swedish women attending a clinic for contraceptive advice, also suggested that they are usually of higher education and are more likely to use alcohol, smoke, and use cannabis.[9] Mercer et al. found a greater risk in residents from Greater London and those who have had same-sex partners.[44]

Women who experience casual travel sex have a higher reported incidence of STIs compared to women who do not report new sexual partnerships abroad.[11,44] Mårdh et al. also found a higher prevalence of human papilloma virus associated with casual travel sex.[11] At the same time they also experience higher rates of induced abortion, a higher incidence of pelvic inflammatory disease, and lower rates of childbirth.[11] Mercer et al. also found an association with greater perception of HIV risk and higher rates of reported HIV testing.[44]

3.8. Long-stay travelers

A number of studies on people traveling internationally have identified those who stay for longer periods abroad as being at a higher risk of getting involved in new sexual partnerships and casual sex.[26,32–34,36,43] In addition one study comparing British visitors to an international holiday destination with British casual workers at the resort suggests that the latter are five times more likely to have casual sex and three times more likely to have unprotected intercourse.[16] In this group, drug use is associated with having multiple sexual partners. Another study of US Peace Corps Volunteers also highlights the influence of alcohol use, in this case related to inconsistent use of condoms with new sexual partners acquired abroad.[17]

Studies conducted in expatriates posted overseas suggest that casual sex and unprotected intercourse are relatively common despite improvements achieved over time.[14,15] Moreover, in expatriates working abroad the proportion of men with casual sexual partners admitting to having paid for sex at least once was found to be around 59%, and higher than that of men who had casual sexual partners back in the Netherlands.[14] This study also identified younger age, being single, and working for a commercial company as independent characteristics associated with casual sex abroad.

In-depth interviews among a group of expatriates who had casual sex abroad suggest that there may be four different groups in relation to having sex abroad, depending on their pre-travel sexual behavior, this abroad, and their perception of HIV risk and condom use.[13] These varied from those who have little or no experience with casual sex and no expectation of having sex abroad, to those who have had multiple partners, who experience both casual sex and paying for sex, and who have multiple casual sexual contacts abroad.

Table 2
Characteristics associated with casual travel

Author (year) [Ref.]	Male	Single	Homo/ bisexual	Young age	Travel alone	Travel with friends	Multiple partners	Previous STI	Business travel	Drugs	Alcohol	Condom or expect to have sex	Longer duration	Other
Abdullah (1998) [3]	Y			18–25			Y							White ethnic background
Arvidson (1996) [10]														
Batalla-Duran (2003) [30]		Y		<25								Y		
Bellis (2000) [34]							Y						Y	
Bellis (2004) [31]				16–25			Y			Y				
Bloor (1998) [43]	Y	Y		18–24		Y	Y				Y	Y	Y	Holidaymakers, long haul destinations and first sexual experience at ≤16 years
Cabada (2002) [32]	Y	Y	Y	15–35					Y				Y	Being American
Cabada (2003) [33]	Y	Y	Y	15–35	Y	Y						Y	Y	Being American
Carter (1997) [23]	Y				Y	Y			Y					
Croughs (2008) [41]	Y						h/o casual sex		Y			Y		Travel without steady partner and high-risk destination (Central and South America)
Daniels (1992) [24]	Y													
Egan (2001) [35]							h/o casual sex			Y	Y	Y		
Gagneux (1996) [42]	Y						h/o casual sex							Travel without partner or family, visited the country on two or more occasions; also women over the age of 35 years
Gehring (1998) [36]	Y	Y			Y	Y							Y	Large number of visits to the country and traveling to Thailand
Hawkes (1994) [26]								Y					Y	Paid for sex in last 5 years
Hawkes (1995) [25]	Y				Y			Previous visit to STI clinic						No regular partner
Mendelsohn (1996) [27]														MSM are more likely to have multiple sexual partners abroad
Mercer (2007) [44]			Y	16–24			Y	Y						White ethnic background, residence in London and paid for sex in last 5 years (male only)
Nemoto (2007) [37]											Y			No differences in casual sex and influence of alcohol/ drugs between home and abroad
Tveit (1994) [28]			Y								Y			Paid for sex in last 5 years

STI, Sexually transmitted infection; h/o, history of; MSM, men who have sex with men.

As a subgroup within those who have longer stays abroad we identified two studies relating to military personnel deployed overseas.[12,18] These studies agree in highlighting the high rates of casual sex with locals and sex with CSWs among the armed forces deployed abroad. These studies also highlight inconsistent condom use in this group. Characteristics identified as independently associated with paying for sex in this group are younger age and being single or divorced; however, those with inconsistent condom use are mainly older[12] or from a Hispanic ethnic background.[18]

3.9. Male travelers who have sex with men

A number of studies from mixed samples of men and women travelers identified MSM as being at increased risk of casual travel sex;[32–34,44] also two clinic studies found that MSM have a higher rate of casual travel sex than heterosexual men,[23,25] and another one that they are more likely to have multiple sexual partners abroad.[27] However, one study found that MSM are more likely to use condoms when they engage in casual travel sex.[28]

In addition, we identified two studies that focused on sexual behavior of MSM abroad.[19,20] The main characteristics associated with sexual relations while on holiday among MSM appear similar to those previously described for heterosexuals: traveling with companions, having a history of multiple sexual partners, and taking condoms;[19] while having multiple partners during the holiday, taking condoms, and 'gay social life and sex' motivation are independently associated with having penetrative anal sex. Generally, tourists who had sex with CSWs had knowledge of the routes of HIV and STI transmission, although only one third thought they were at risk of contracting HIV. The main reason why people did not see themselves at risk was that they perceived their activities as 'low risk'. The main services paid for were masturbation and oral sex. Penetrative sex was only practiced with CSWs in a small proportion of cases.[20]

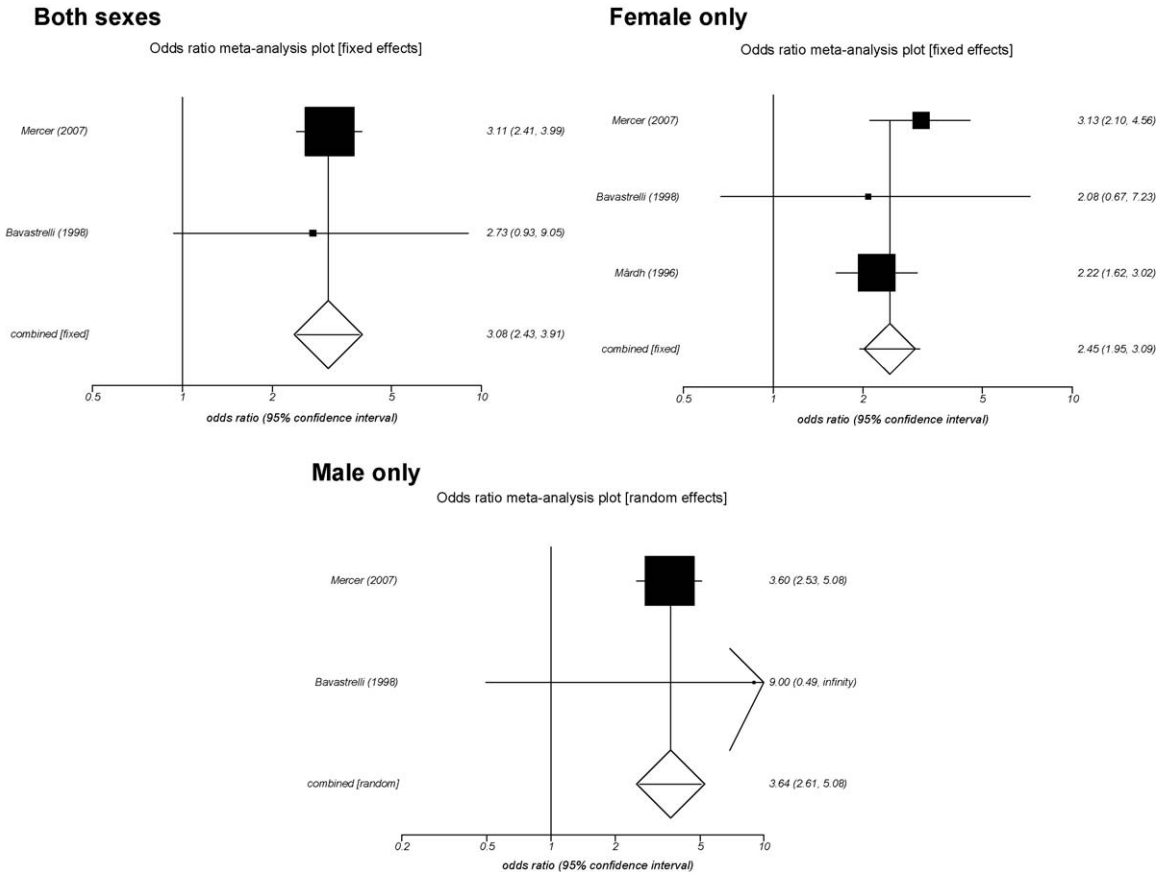

Figure 4. Risk of sexually transmitted infection associated with casual travel sex, by sex.

3.10. HIV-positive travelers

One study reported on the sexual behavior of HIV-positive people traveling internationally [21]. Despite their higher knowledge of the health risks associated with travel, a small proportion sought pre-travel advice, and of those on antiretroviral therapy (ART) about 30% discontinued this during their trip abroad. As with other studies of general international travelers, a quarter of HIV-positive travelers engaged in casual sex while abroad, but more worryingly, about 40% inconstantly used condoms with new sexual partners. The poor adherence to ART together with the risky sexual behavior poses a risk for the development of antiviral-resistant strains of HIV and their onward transmission.

3.11. Commercial sex work and tourists

A couple of studies have highlighted that those men who engage in casual travel sex are also more likely to have ever paid for sex.[26,44] While abroad, certain groups are more likely to seek commercial sex, particularly expatriates working overseas for longer periods,[14,15] military personnel,[12] and business men.[39,40] One qualitative study of Japanese tourist sexual behaviors associated with paying for sex in Bangkok suggests that the main drivers for this are a sense of freedom and anonymity, a sense of loneliness, and peer influence, coupled with the availability of inexpensive sexual services.[45]

3.12. Incidence of travel-related STIs

We identified five studies that estimated the rate of travel-related STIs. Only one assessed this at a population level, relying on self-reported diagnosis of STIs;[44] the others drew samples from clinics where STIs are diagnosed.[11,22,25,29]

Mercer et al. estimated the rate of STIs in people who had new sexual partners abroad over a five-year period to be 18.2% for women and 35.2% for men;[44] however, as the follow-up period was long it was not possible to ascertain how much was due to casual travel sex and what relates to high sexual risk in the home country. Also, Mårdh et al. estimated the lifetime prevalence of STIs in women who admitted to having had casual travel sex to be around 38%.[11] They found increased rates of *Chlamydia trachomatis*, *N. gonorrhoeae* and genital warts; however, after adjustment for age, number of partners, and age at first intercourse, only genital warts was significantly higher in those women with a history of casual travel sex. Again this figure was based on self-reported STIs over an undetermined period.

On the other hand, two clinic-based studies estimated the rate of travel-related STIs to be between 5% and 12%.[25,29] Moreover, Velasco et al. found up to 3.4% HIV infection in those who had unprotected casual travel sex among attendees to a tropical medicine clinic.[29]

Three studies provided enough information to estimate pooled unadjusted ORs to assess the risk of acquiring an STI associated with casual travel sex (Figure 4).[11,22,44] The pooled OR was 3.09 (95% CI 2.44–3.92). The risk was higher in men (OR 3.68, 95% CI 2.64–5.13) than in women (OR 2.45, 95% CI = 1.95–3110; I^2 8.6%). Bavastrelli et al.[22] also suggest that the risk of *C. trachomatis* infection associated with travel is higher in people with multiple sexual partners and aged 14–19 years (OR 10; 95% CI 1.86–30).

However, in most cases adjustment of the risk for pre-existing sexual behavior was not carried out.

3.13. Prevention

We were only able to identify two studies that had looked at health promotion information aimed at international travelers.[36,42] Gehring et al. displayed promotional information in the departure lounge of an international airport and asked returning passengers whether they recalled the material and about their sexual behavior while abroad.[36] This study did not find any differences in the sexual behavior of returning travelers; however, recall bias is likely. In the other study, Gagneux et al. allocated patients seeking pre-travel advice to receive a health leaflet, a leaflet about the risks of 'sex tourism', or none.[42] They also found no differences in sexual behavior. However, their sample was recruited from people who seek pre-travel advice and may therefore not be representative of most international travelers, as only those going to places where there are other perceived health risks may seek pre-travel advice. They may be generally more cautious about risks.

Interestingly, in the study by Croughs et al. of a sample recruited among people consulting for pre-travel advice, recall of reading a leaflet on STIs given at the clinic was independently associated with having casual travel sex; however, those who read the leaflet were also more likely to consistently use condoms.[41]

4. Discussion

To our knowledge this is the first systematic review of the literature on the sexual behavior associated with foreign travel and the implications for rates of STIs. We have also used meta-analysis to estimate the prevalence of casual travel sex and the rate of unprotected intercourse among those developing new sexual partnerships abroad. The current literature suggests that casual travel sex is relatively common, although variation exists according to country of residence, destination, and nature of travel. More importantly, about 50% of people engaging in new sexual relationships abroad inconsistently use condoms.

Although sexual partnership acquisition associated with foreign travel is relatively common, the studies shed little light on whether people's sexual behavior changes with foreign travel or whether it is predetermined. This is important, as preventive interventions would be different if sexual behavior abroad mirrored people's behavior while in their home countries or if foreign travel enhanced or changed sexual behavior. As most studies on this subject have been cross-sectional surveys, there is an inherent methodological inability to compare pre-existing sexual behavior with changes associated with travel; as a result, a prospective cohort study is needed that can assess changes with travel.

Although there is some evidence of transmission of sexual infections associated with foreign travel, this is in the main from self-reported rates of infection. Also, on most occasions these studies did not compare rates with similar groups who have not traveled abroad. In the few cases where estimates are from the diagnosis of STIs, the lack of adjustment for baseline sexual behavior makes it difficult to estimate the exact risk of infection associated with casual travel sex. Therefore, prospective studies using molecular techniques to ascertain the incidence of STIs and a control group who have not traveled are also needed to determine the true impact of casual travel sex on the incidence of STIs.

We could only identify two studies that assessed health promotion interventions aimed at reducing the risks associated with unprotected casual sex abroad.[36,42] Generally, although these provided some evidence of the likely effect of certain interventions, they suffered from a number of methodological limitations. They relied on recruiting from convenience samples, like people seeking pre-travel advice, or on recollection of whether they had seen the promotional advice. Both intervention studies lacked clear sampling frameworks and randomization to reduce the effect of bias. Further evaluation of preventive activities targeted at those most at risk is needed.

In particular, preventive information should be aimed at younger groups of people traveling together, such as those on package holidays or stag or hen night parties, and people traveling alone, whether on holiday, a gap year, or on business, who are at increased risk of engaging in casual sex. As most young people traveling alone or with friends may not come into contact with health professionals or book their holidays through the internet, innovative approaches to delivering health promotion messages are needed, perhaps using the internet as well.

Also, particular attention is needed for people working or staying abroad for prolonged periods of time. As most people in this group are generally working for commercial companies or volunteering they are better targeted through an occupational health approach, including a confidential sexual risk assessment and health promotion as part of their pre-employment assessment.

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