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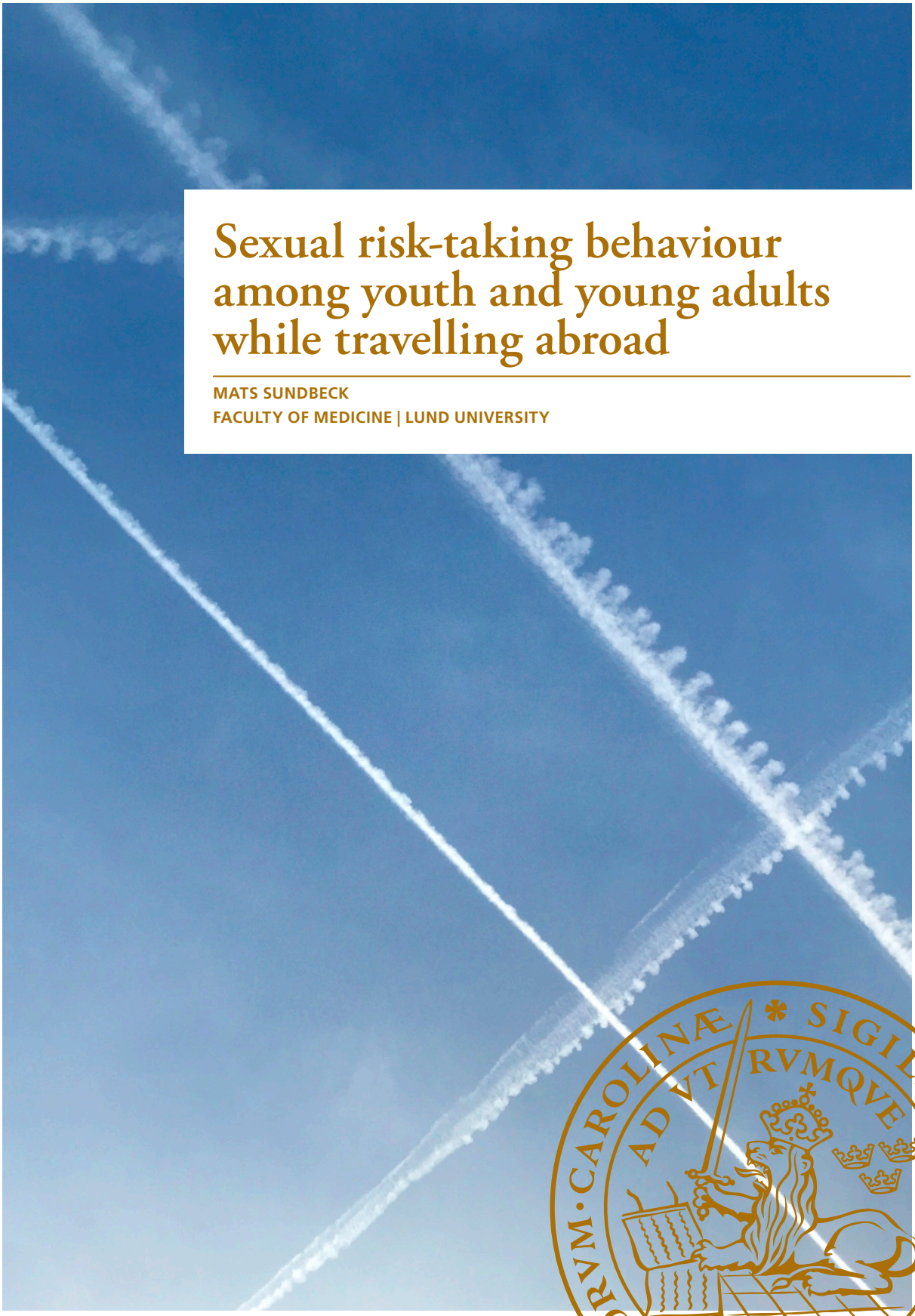

Sexual risk-taking behaviour among youth and young adults while travelling abroad

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FACULTY OF MEDICINE | LUND UNIVERSITY

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Mats Sundbeck

LUND
UNIVERSITY

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Over the last decade, the number of youth living in Sweden, who have been infected with sexually transmitted infections abroad has increased. In parallel, both foreign travels has increased, and youth, in general, have also changed their usual sexual behaviour and increased their sexual risks. The general objective of the thesis was to investigate to what extent youth (18 to 29 years of age) take sexual risks during travel abroad, in addition to analysing the mediating and potentially modifying effects of socio–demographic factors, psychological and lifestyle factors, and mental health. Specific objectives were also to investigate the risk factors that have a crucial link with sexual risk-taking abroad. The thesis also intended to analyse whether travellers increase their sexual risk when they go abroad compared to when in Sweden, as well as study the influence of personality traits on risk-taking. The risk outcomes used were casual sex, non-condom use with a casual partner, and multiple partners, alone or taken together. Another aim was to make a systematic review of quantitative studies about sexual risk-taking while abroad. Studies I–III were derived from a questionnaire that was sent to 7000 men and women (18-29 years of age) who were randomly selected from the population register and lived in Skåne on 1/1/13. Study IV was based on a literature review of quantitative studies (n = 49) published between 2000 and 2017 in peer-reviewed journals. The data in Studies I–III were analysed by logistic regressions, a case-crossover analysis, and a mediation analysis. In Study IV a proportional meta-analysis was carried out to estimate pooled proportions of sexual risk-taking. The results, in Studies I–III showed that men take greater sexual risks than women when it comes to casual partners or multiple partners during the trip. However, it is more common among women not to use a condom in casual sex. Significant associations between HED, use of drugs, long-term travelling, and younger age (18-24 years of age) and the different outcomes thus were find, confirming findings in previous studies. To these risk factors, Studies I and III could add poor mental health and parents with an immigrant background as risk factors. However, this applied only to men. Study III showed that personality traits also affected risk-taking. In some individuals, especially in women, the search for excitement and sensation is a driving force for sexual risk-taking. Sensation seeking in both genders also affected other risk-taking behaviours, e.g., intoxication and use of drugs, which in themselves have an impact on sexual risk-taking. Study II showed that youth, mostly short-term travellers, increased their sexual risks, defined by casual partners, up to five times while travelling abroad compare to Sweden. Women increased their risks to the same extent as men. The systematic review, (Study IV) revealed methodological differences across studies that made them difficult to compare. However, in the studies that were possible to compare, the predictors with highest adjusted odds ratios for casual sex were intentions to have sex, travelling alone or with friends, and being a single. The descriptive review showed a high degree of uniformity regarding risk factors, between the different studies but also with the findings in this thesis. Future studies should examine why women do not use condoms to a greater extent, the causal relationship between poor mental health and immigrant background, respectively, and sexual risk-taking, and youths who have sexual networks in different countries. It is also important to develop methods for reaching groups with low response rates.

Key words Sexual risk-taking, travelling, youth, condom, casual partner, multiple partner

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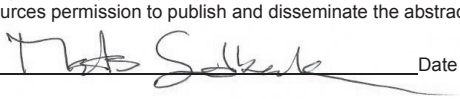
Signature  Date 180314

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To whom it may concern…

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Abbreviations

AOR	adjusted odds ratio
BSSS-4	Brief Sensation Seeking Scale-4
CI	confidence interval
CSW	commercial sex worker
HBM	The Health belief model
HED	heavy episodic drinking
HIV	human immunodeficiency virus
IRR	incidence rate ratio
IUD	intra-uterine device
MSM	men who have sex with men
MeSH	medical subject heading (a term for search engines that index articles)
OR	odds ratio
PHAoS	The Public Health Agency of Sweden
PRISMA	preferred reporting items for systematic reviews and meta-analysis. (a check list)
RCT	randomly controlled trial
RR	risk ratio
SBU	Swedish Agency for Health Technology Assessment and Assessment of Social Service
SD	standard deviation
STI	sexually transmitted infections
TIB	Triandi's theory of interpersonal behaviour
UN	United Nations
WHO	World Health Organization

Svensk sammanfattning

Under det senaste decenniet har antalet unga personer, hemmahörande i Sverige, som smittats utomlands med sexuellt överförbara infektioner (STI) ökat. Detta gäller framför allt gonorré och klamydia. Parallellt med detta har utlandsresandet ökat och ungdomar tillhör en av de grupper som reser mest utomlands. Under de senaste decennier har sexvanorna bland ungdomar i Sverige succesivt förändrats. Både bland unga män och kvinnor har antalet sexpartners ökat men också att det blivit vanligare med tillfälliga sexpartners. Framför allt är det unga kvinnor som förändrat sitt beteende i denna riktning över tid. Detta har inte lett till att kondomanvändningen ökat i samma utsträckning.

Som följd av detta, men också beroende på spridningen av HIV över världen, har forskningen fördjupats när det gäller sexuellt risktagande vid utlandsresor. Förvånansvärt lite forskning har dock genomförts i Sverige eller i skandinaviska länderna. Den största delen av undersökningarna har genomförts i sammanhang där man kan förvänta sig möta personer med ett högre risktagande än i den allmänna befolkningen, t.ex. bland backpackers, besökare på STI-kliniker, eller sommarjobbare på turistorter.

Resultaten från de olika studierna i varierande grupper visar ändå ett relativt samstämmigt resultat. Högt risktagande finner man hos män, yngre åldrar, ensamstående, långtidsresenärer, ensamresenärer samt de som har intentionen att ha sex på resan, och de som berusningsdricker eller använder droger.

Det övergripande syftet med denna avhandling har varit att undersöka i vilken utsträckning unga (18–29 år) tar sexuella risker när de reser eller bor utomlands samt att analysera om och hur t.ex. socio-demografiska-, psykologiska-, livsstils-, och mentala hälsofaktorer påverkar beteendet. En del i målsättning har varit att undersöka vilka konkreta riskfaktorer, i denna svenska grupp, som har ett avgörande samband med det sexuella risktagandet. Avhandlingen vill också analysera om resenärerna ökar sitt sexuella risktagande när de åker utomlands i jämförelse med Sverige, samt studera vilket inflytande personligheten har på risktagande och på andra orsaksfaktorer. Därtill har den haft syftet att göra en systematisk genomgång av kvantitativa studier som sexuellt risktagande i alla åldrar.

De tre första studierna bygger ett frågeformulär som skickades ut till 7000 män och kvinnor (18–29 år) som slumpvist valts ur från befolkningsregistret och som bodde i Skåne 2013-01-01. Frågeformuläret, innehöll 79 frågor som bl.a. rörde socio-demografiska bakgrundsfrågor, social kapital, hälsa, mental hälsa, sexualitet, och uppgifter om utlandsresor. Svarsfrekvensen uppgick till 46%. Den sista studien bygger på en litteraturgenomgång av kvantitativa studier som publicerats mellan år 2000 och 2017. De tre första studierna är s.k. observationsstudier och kan visa på kopplingar, men inte direkta orsakssamband, mellan orsaks och verkan.

Resultaten visar att det är en tämligen liten grupp som tar risker vid utlandsresor. Ungefär 5% uppger att de vid sin senaste utlandsresa hade ett oskyddat samlag med en tillfällig partner. Däremot ökar ungdomar sina sexuella risker, definierat som tillfällig partner, upp till fem gånger vid resa. Det är framför allt kort-tidsresenärerna som ökar sina risker mest och kvinnor ökar sina risker i samma utsträckning som män.

Män tar generellt större sexuella risker än kvinnor då det gäller tillfälliga partners eller att man har flera partners under resan. Däremot är det vanligare bland kvinnor att inte använda kondom vid samlag med en tillfällig partner utomlands. Studierna kan också bekräfta fynd i andra studier när det gäller riskfaktorer som berusningsdrickande, narkotikaanvändande, och långtidsresande som ökar risktagandet liksom det görs av de mellan 18–24 år. Till dessa upptäckter kan dessa studier lägga till sämre mental hälsa och föräldrar med invandrarbakgrund som riskfaktorer. Detta gäller dock bara män.

Även den personliga karaktären spelar in. Hos vissa personer, framförallt hos kvinnor, finns sökande efter spänning och sensationer som en drivkraft vilket leder till sexuellt risktagande. Det visar sig också att ’sensations-sökandet’, hos båda könen, också påverkar andra riskfaktorer t.ex. berusningsdrickande och narkotikaanvändning, som i sig själva också har en effekt på sexuellt risktagande. Effekten av ’sensations-sökande’, d.v.s. den personliga karaktären, har således ett bredare inflytande på sexuellt risktagande än vad som tidigare kunde antas.

I analysen av andra studier (49 st.) rörande sexuellt risktagande visar resultatet på så stora metodologiska skillnader att det är svårt att statistiskt jämföra dem. I de studier som kan jämföras framgår att intentionen att ha sex på resan, och att resa själv eller tillsammans med vänner är de viktigaste faktorerna för att individer kommer att ta sexuella risker. Den beskrivande delen visar på en stor överensstämmelse mellan de olika studierna men också på resultatet från denna avhandlingens observationsstudier d.v.s. de riskfaktorer som presenterats tidigare.

Fördjupade studier behövs då det gäller kvinnors kondomanvändning och varför psykisk ohälsa och immigrationsbakgrund ökar riskerna för sexuellt risk-tagande hos män. Fenomenet med personer som har många partners både i Sverige och utomlands behöver också studeras närmre. I framtida studier bör man beakta svårigheten att nå vissa grupper t.ex. yngre män och lågutbildade.

Redan idag bör man vidta åtgärder för att öka kondomanvändningen i allmänhet och synnerhet när det gäller unga kvinnor. På t.ex. ungdomsmottagningar och vaccinations centraler borde man redan idag kunna använda kunskapen från studie IV d.v.s. att intentionen, singlar, och ensamresande eller i grupp med vänner, har ett ökat sexuellt risktagande, och då kunna urskilja dessa besökare och ge extra information.

Original papers

This thesis is based on the following papers which are referenced by their roman numeral:

I. Sundbeck, M., Emmelin, A., Mannheimer, L., Miörner, H., Agardh, A. Sexual risk-taking during travel abroad - a cross-sectional survey among youth in Sweden.
Published in *Travel Medicine and Infectious Disease*, 2016, 14, 233-241.

II. Sundbeck, M., Agardh, A., Östergren, PO. Travel abroad increases sexual health risk-taking among Swedish youth: a population-based study using a case-crossover strategy.
Published in *Global Health Action*. 2017;10(1):1330511. doi: 10.1080/16549716.2017.1330511

III. Sundbeck, M., Miörner, H., Agardh A. Personality traits contribute to sexual risk-taking among Swedish youth travelling abroad: a population-based study.
Submitted to *Plos One*

IV. Svensson, P., Sundbeck, M., Stafström, M., Östergren, P-O., Persson, K.I., Mannheimer, L., Agardh, A. A systematic literature review and meta-analysis of the association between travel abroad and sexual risk-taking behaviour.
Accepted for publication in *Travel Medicine and Infectious Disease*, 3/11/18

Preface

This doctoral thesis had its beginning in the mid-1990s. As a midwife at the youth clinic in Lund, I saw that the appointment schedule was filled each autumn by troubled youth who were abroad and now came in for testing. What was surprising was that their knowledge about sexually transmitted diseases (STI), condoms and risks was very high, but for different reasons, they did not apply them. Knowledge of HIV was also surprisingly high. Above all, they knew that the disease could not be cured and that medicine had a questionable impact. Anxiety was high as most were aware that it could take several weeks before their test result came back.

Ten years later, when I was in charge of the city of Malmö's Sexual Health Program, I was given the opportunity to test a pilot project made possible by contributions from the Public Health Agency of Sweden's (PHAoS) state HIV funds. We closed the project prematurely when it failed to show any results. At that time, travellers were not a priority group for the government authorities. During these years, PHAoS occasionally conducted poster campaigns at strategic locations concerning the sexual risks of going abroad. At that time, bags with condoms and a leaflet describing different types of STIs that one could get abroad, were also distributed in railway stations.

A few years later, when I told my experiences to a friend who was the art director of a large Swedish food company, he shook his head and said:

"Either you do not know the target group or you have an item that they are not interested in. In this case, I think it's both."

Then he gave me a long lecture on how to go about launching a product. A company has to collect knowledge about the target group: Who buys similar goods: women, men, young people, workers, families with children? When do they shop? Where do they shop: big cities, rural areas, malls, shops? Once there is a profile on prospective customers, they are divided into groups, called segmentation. Youth will not accept the same information as adults. The rural population of Skåne does not read the same papers as those from Stockholm. Hipsters in the city want an ecological profile, etc. Once a product is launched, each segment has to be targeted through different media or by other channels. Sales efforts are followed up and are evaluated on a regular basis

He was right. Actually, we knew nothing about the target group other than that they were young. However, 'youth' can be divided into different subgroups, and into travellers. How big are these groups? Do they change sexual behaviour when they travel abroad? Among those who travels abroad, who take risks? Women, men, teens or globetrotters in their mid-twenties? What risks do they perceive? Perhaps

the biggest risk is not to meet any partner? Are there any common characteristics of a risk-taker?

When I started to review previous literature on the subject in the spring of 2013, I knew surprisingly little, considering that over 70% of youth in Sweden travel abroad every year and the World Health Organization (WHO) estimated the number of those infected with HIV at 70 million in addition to some 100 millions who were infected with other STIs. Only one quantitative study been carried out in Sweden by 2013 about risk-taking on trips abroad, and that study was then 17 years old. And so, my journey began . . .

Introduction

That foreign trips could lead to increased sexual risk-taking is hardly a matter for debate. Many would probably also say that this is so based on personal experience or hearsay.
The task of research is to investigate whether assumptions like these are true, or are likely to be the case. Furthermore, the results should have some form of predictive value, and be able to identify predictors that may be linked with risk-taking, thus providing a basis for preventive measures.
In the present introduction, a number of important elements are presented for understanding the studies and the results: A review of previous research, sexual lifestyles in Sweden among youth and young adults, statistics on foreign-infected STIs, youth travel habits, as well as a brief presentation of theories about risks.

Previously published results of sexual risk-taking during travel abroad

Up to the 1990s, few studies had been conducted regarding the relationship between travel and sexual risk-taking. Prior to the 1960s the travel group of interest were sailors diagnosed with syphilis and gonorrhoea, and to a certain extent, immigrants to the UK [1].

In line with the emerging global HIV epidemic and increasing travel, the number of studies has multiplied significantly within the field. The research is diversified both regarding various subgroups of travellers; men who have sex with men (MSM), backpackers, business travellers, women, students, and regarding the methods used.

Research has focused on finding links between socio-demographic and lifestyle factors, on the one hand, and sexual risk-taking, on the other, where the outcomes usually concern casual partners, the use of condoms, and multiple partners abroad. A smaller number of studies have used diagnosed STIs as an outcome. As the travel group is by nature volatile and temporary, it is difficult to do longitudinal studies. Consequently, the vast majority of studies that exist, are cross-sectional.

Although the various studies differ, their results are fairly consistent. Commonly described factors that can be associated with one or more types of sexual risk-taking on a trip abroad are: male gender [2-11], younger age [2, 5, 7, 9, 12-14], long-term travelling [2, 3, 5-7, 9-12, 15-18], illicit drug use [5, 14, 16, 18, 19], binge drinking

[5, 11, 12, 14, 16, 18-22], travelling alone [2-4, 15, 16, 21, 22], pre-travel intention to have sex [2, 6, 11, 19, 21, 23], and sexual risk-taking at home [5, 9, 10, 14, 15, 19, 22].

There is a lack of meta-analytical studies that summarize and compare the results of the different studies, thereby making it difficult to assess the strength of the various risk factors.

Some studies have also included other possible predictors. For example, Bloor et al. [11] found that young people in higher socio-economic classes (I/II) have significantly more partners abroad, compared to lower socio-economic classes. However, Mercer et al. [13] report a non-significant association for higher socio-economic class men while women in classes III-V showed a significant association with having casual partners abroad. Tanton et al. [14] and Mercer et al. reported that youths living in greater London more often have a new partner overseas compared to those residing elsewhere in England, which might indicate that urbanity plays a role in risk-taking. Kramer et al. [24] show that migrants who travel back to their homelands as tourists, constitute a risk group for unprotected intercourse with casual partners. Tanton et al. [14] and Bloor et al. [11] reported that clients of commercial sex partners in the previous 5 and 6 years showed an association with casual partners abroad. Tanton et al. [14] also show that youth who see themselves as greatly or considerably at risk of contracting HIV and STIs could be associated with casual partners abroad.

In the qualitative research field, which is sometimes a part of tourism research, the aim is explaining and examining people's intentions, perceptions, as well as feelings about sexuality abroad. A common source of information is provided by in-depth interviews and focus groups that may be analysed with, e.g. grounded theory [25, 26], symbolic interactionism [27], and analytic induction [28]. Issues that have been examined in research regarding sexual risk-taking are; choice of lifestyle abroad [27], sexual vulnerability [28], and strategies and barriers to use of condoms [29]. Another area of investigation focuses on pleasure as a driving force [26]. This has been thematised by considering the advantages of less social control and the stigmatisation of sexuality in the home environment, e.g., female sexuality freed from caretaking and social obligations that women are assigned by a gender-related power structure. It has been shown that this experience gives women a sense of freedom [26, 28], self-empowerment, and enhanced sexual self-awareness [30]. According to Thomas [28], ‘sun, sea, sand and sex’ are the keywords for the desirable holiday among female respondents. The theoretical framework of this study is based on the concept of “liminality”, originally is an anthropological term describing transgression between different phases or positions (see sections on Models of sexual risk-taking behaviour).

Thus, sexual risk-taking abroad is increasingly considered a risk area that merits attention. For example, PHAoS considers travelling abroad as an possible risk factor for contracting STI/HIV [31].

Sexual risk-taking behaviour among youth and young adults in Sweden

The reason for studying youth and young adults, i.e., those 18 to 29 years[1]old, is because that time is one of the most changing periods in a person's life. Youth are expected to free themselves from their partly regulated past lives and build their own future. This takes place during a relatively short period of time in parallel with major bodily changes. Testing one's limits is a normal part of development but it also has its risks and downsides. Youth and young adults are considered the biggest risk-takers in several areas; i.e., driving recklessly, criminality, addiction, extreme sports, and sexuality.

Youth and young adults also belong to one of the most sexually active age groups in the population and dominate the statistics regarding such STIs as gonorrhoea and chlamydia.

One problem with studying Swedish youth's sexual risk-taking is the lack of scientific research among the young general population. However, there are several national reports financed by PHAoS that together provide a reasonably coherent picture of sexual risk-taking among youths in Sweden (the description has been limited to the risk variables this dissertation deals with, i.e., multiple partners, casual partners, and non-condom use with casual partners).

Multiple partners

Regarding multiple partners, Hammarström et al. demonstrated that the number of sexual partners a person has is one of the most precise predictors of self-reported chlamydia for both young men and women [32]

The national Ungkab survey (2015) showed that, among the 20 to 24 year olds about 28% have had two or more partners in the past year. Among those 25 to 29, year old the number drops to 22%. Almost 3% of youths in these age groups had 10 or more partners in the last year. Multiple partners were more common for men (55 %), compared to women (43 %) [33].

From a survey repeated six times between 1989 and 2007, Herlitz & Forsberg showed that, among the 16 to 24 year olds, the number who had two or more sexual

[1] The term 'youth' is used as a statistical definition by the UN and refers to the age goup between 15 and 24 years. However, in its 'Convention on the Rights of the Child', UNHCR defines a person as a child up until 18 years. The term 'young adults' is used in several contexts but lacks a generally accepted definition. The PHAoS uses the term for the age group 20 to 29 years.

partners during each year increased by 60% among men and 80% among women over the period [34].

The national study MSM 2013 indicated that respondents, who had intercourse during the year, reported having an average of three partners during this time [35].

The use of condoms

Having many partners or casual partners need not be a risk if condoms are used consistently.

The national Ungkab survey of 2009 reported that 72% of the women and 66% of the men in the total sample[2], did not use a condom when they last had vaginal or anal intercourse. If only vaginal intercourse is tabulated, the use is further reduced. In that case 78% of women and 73% of men reported not using condoms. The most common reasons for not using condoms were that a) other contraceptives had been used, b) it was more pleasurable, and c) it increased intimacy. This was true in principle for both genders, although a higher proportion of men responded that it was more pleasurable without a condom and intimacy increased [36].

The national survey of 2015, inquired whether participants had had unprotected intercourse sometime during the year. Among the 16 to19 year olds, 36% reported unprotected intercourse; for 20 to 24 year olds, the figure was 64% and among those 25 to 29, was unprotected intercourse was reported by 75%.

About 90% of both women and men considered contraception essential to protect against pregnancy but also, if necessary, against STI. However, in the most recent reported intercourse of those who used contraceptives, 55% used a hormonal method or an intra-uterine device (IUD), and 25% consistently used a condom. About 15% used a condom just before ejaculation, relied on safe periods, or practiced coitus interruptus. A minor group used other contraceptives, e.g., p-computer [33].

In the MSM study, 40% reported having unprotected anal intercourse with at least one new casual partner during the year. This was more common among 15 to 25 year olds than among older groups [35].

In a study of non-condom use with a casual partner among female students, Tydén et al. found that 65% reported not using a condom during recent intercourse. The study was repeated in 1999, 2004, and 2009, and this behaviour increased over the decade by about 30 percentage points [37].

According to research conducted by Herlitz & Forsberg, non-condom use with casual partners increased by almost 40% among men and 100% among women between 1989 and 2007. The study also showed an increasing tolerance for liaisons

[2] The sample included people in regular- and casual relationships.

outside a stable relationship. Such increased tolerance was more common among young women than men. The authors relate this finding to a decline in adherence to 'the ideology of love': it may explain why safe sex behaviour has been challenging to encourage in the target group [34].

Ungkab (2009) stated that 50% of the women and 46% of the men surveyed, reported no use of condoms with a new partner. High alcohol consumption, the use of drugs and relationships with multiple partners during the year were common in this group of non-condom users. Such behaviour also applied to those who had previously been exposed to sex against their will [36].

In a compilation of regularly repeated surveys, PHAoS showed that 3% of 18 to19 year olds, 5% of 20 to 24 year olds, and 1% of the 25 to 34 year olds had unprotected intercourse with a casual partner overseas during the previous year.

Of those in the national study from 2015, who stated that they had had two or more partners during the year, 14% of the 16 to19 year olds had unprotected intercourse during the year. Corresponding figures for 20 to 24 year olds was 22% and 17% for those 25 to 29 [33].

According to Fridlund et al. over 60% of the visitors to a youth clinic for 15 to 30 year olds reported a discrepancy between expectations of condom use and the actual use of condoms with a casual partner. The difference was true for both anal and vaginal sex. The authors conclude that condom use must be mutually agreeable [38]. It may also indicate that while knowledge of prevention is adequate, the application is the problem.

In summary, with the limitations of low survey participation rates and the disadvantages of anonymous online surveys, overall results show that sexual risk has increased in recent decades:

Approximately 25% of those surveyed reports having multiple partners whereas 3% report having ten or more partners in the past year. Over a period of 20 years the practice of having multiple partners has increased by 60% for men and 80% for women. Several studies also indicate that non-condom use with a casual partner has also increased over time.

Although men take higher risks in absolute terms, the rate of young women's risk-taking has increased at a rapid rate in recent decades.

Theories of Risks

'Risk' is a key word in this thesis, as is often the case in discussions of public health and health prevention. Risk is usually defined as an adverse outcome that may or may not occur following a course of action or a decision. It often implies a warning

with regard to something that should be avoided, 'If you do X, then Y might happen'. In a scientific context, a risk is often defined as a probability of an adverse outcome.

A watershed in the theoretical discussion of risk, has been the difference between ‘objective’ and ‘subjective risk’. The former is a part of most scientific disciplines which presume that risks exist in reality (in *realia*) and are measurable, usually with extremely accuracy, e.g. in percentages, shares, or quotients. The answer, despite the exact results, is often only a probability assessment.

Subjective risks have traditionally been seen as the individual's interpretation of an objective risk. Nowadays the concept also includes an assessment of the severity of the risk and other factors [39]. Subjectivity has often been seen as a problem, since it involves individual feelings and a personal perception that can even question the putative objective risk.

The two extreme positions are upheld by ‘realists’ who believe risks are objective phenomena and measurable, and the so-called ‘strong social constructivists’. The latter argue that there are no objective risks; all are subjective assessments made by an individual [40].

> ’Nothing is a risk in itself: there is no risk in reality. But on the other hand, anything can be a risk; it all depends on how one analyzes the danger, considers the event.‘ Ewald p.199 [41]

The strong constructivists argue that an individual assessment of what is a risk depends on social determinants such as class, race, religion, gender, socio-cultural context, and power relations.

This approach may seem to be absurd, if one looks at the consequences of HIV, smoking, and drug use, but it challenges realism. For example, the consequence of realism means that experts ultimately interpret what is or is not a risk, and after that people are expected to make rational choices [40]. A consequence is that irrational choices may not be understood, and may simply be considered wrong. Thus, smokers, non-exercisers, and obese people are stigmatised because of choices they have made.

The realists, for their part, can address the problem of risks becoming relative. It is for example common to overestimate nearby but less severe risks but overlook more substantial threats later on. Or that ordinary but lower risks may be undervalued, while unusual and higher risks are overvalued. In this way, many people express great concern about HIV but disregard the risk of getting chlamydia. An investigation shows that gender and race affect views of risk. In particular, white men perceive many risks as significantly lower than the other groups [42].

Deborah Lupton, as the author of the book ‘Risks’, described a third position in the 'soft social constructivists' who acknowledge that there are 'objective risks' but they

are not persistent and can only be understood in a temporal and socio-cultural context.

> A risk, therefore, is not a static, objective phenomenon, but is constantly constructed and negotiated as part of the network of social interaction and the formation of meaning. ‘(Lupton p. 31[40])

Why then do people take risks when it is possible to show that risks exist and their possible consequences can be foreseen?

Theoretical decision-making works with ‘decision under risk’ where, in principle, the impact of the risk factors is fully known and ‘decision under uncertainty’, where the knowledge of consequences is only partly known and therefore difficult to calculate. The first category is only applicable to game theory as it applies to card game or dice. In real life, the great majority of risks are taken by ‘decisions under uncertainty’. In theory, it is possible to add a third category, ‘decision under ignorance’, i.e. one has no knowledge of whether there is a risk at all [39]. For example, in the gay community in New York City 1979, it would have been unusual to use condoms as protection from an incurable and fatal disease, as it was yet unknown knew that HIV circulated. It is possible to argue that completely unknown risks are not any risks at all. But the opposite can also be a reasonable position. In environmental science, the 'precautionary principle' means that until we know something about a phenomenon, we assume that it entails some risks.

Since almost all risks are handled as ‘decisions under uncertainty’, the crucial issue becomes how different individuals assess and evaluate risk and how they manage them. On the one hand, one has the perception of risk and on the other hand the management of risk. Should perception constitute the problem, it may be more a matter of lack of knowledge. Lack of understanding does not seem to be the case in Sweden where several studies show that young people are well aware of STIs and condoms. The key issues appear to be assessment and management of risks.

Models of sexual risk-taking behaviour

No single factor or set of factors adequately accounts for why youth take sexual risks. There are numerous factors at various levels having both biological and socio-cultural origins that exert different influences. Some of these factors are included in this thesis, while others are only mentioned in the reference literature.

What controls people's attitudes, beliefs, intentions and behaviours has been an ongoing pursuit, for decades, especially in the field of social psychology. A variety of different, and at times very similar, theories have, been proposed to explain risk-taking.

In the reference literature, one finds four main different theories that, from different perspectives, explain sexual risk taking: Triandi's theory of interpersonal behaviour (TIB) [43], the health belief model (HBM) [44], Zuckerman's theory of sensation-seeking [45], and Turner's theory of liminality [28, 46] . The theories are not mutually exclusive and can be said to add different pieces to the puzzle as to why people are prepared to take a risk.

Apart from Zuckerman's theory of sensation-seeking, which has empirical support, the theories of liminality, TIB, and HBM should be regarded more as descriptive models in this context than as actual theories. Due to their complexity, they are difficult to evaluate other than in limited part, and thus it is not easy to fulfill the requirements of a theory, i.e., that is has predictive power and is possible to falsify [47-49]. On the other hand, it has been shown that theory-based health interventions are more advantageous than non-theory-based ones [49].

The most straightforward, biological explanation for risk-taking is provided by Zuckerman's theory of sensation seeking. This theory assumes that some people have an essential personality trait that makes them risk-takers. These personality traits can be found, for example, among racing drivers, parachutists, and rock climbers but also among gamblers, criminals, addicts, and those who take sexual risks. The risk-in-itself does not drive these individuals, but they are willing to take a risk to experience positive emotions in reaching a goal. Several studies, in different populations and different cultures, have shown a connection between high scores on sensation-seeking scales and self-reported risk-taking in a variety of areas. Other studies have also shown links between risk-taking and certain biological markers, e.g., the dopaminergic system.

Triandi’s TIB regards a person's intention as the most crucial determinant of behaviour. The intention is emotionally controlled but is also regulated by social factors, such as norms, role patterns, and self-concept. However, it is determining the person's attitude that requires a more intuitive approach based on similar situations. However, in the TIB, behaviour is also regulated by habits, and by 'constrained or facilitating conditions' at the moment, e.g., access to condoms or intoxication. TIB is a precursor to the better known theory of planned behaviour [50].

The health belief model was created to explain why some people did not participate in the tuberculosis screening program in the United States in the 1950s [44]. Today the model is used more to identify the factors that are essential for a person to change their lifestyle. To improve a behaviour, a person must be brought to realise that their current way of life represents a risk. Underestimating a risk or not believing that one may be affected by it causes increased risks. Only, when the person perceives the risk and recognises the benefits of change is there the potential to take action. Thus,

the main factors are how a person perceives the risks and what factors they view as barriers to or facilitators of change.

If the three theories above looked at the individual's standpoint and readiness to change, liminality also applies to a time, place, or situation. Initially, liminality was an anthropological term with which one would explain a person's passage from one state to another in a ritual (*rite de passage*) [46]. The liminal phase stands for the threshold period (in Latin *limen*) between the different states. The term has subsequently been used to explain these transitional phases, for individuals, groups and societies, when traditions, rules, or norms are questioned or not applicable. A liminal phase, for example, can be the time after a divorce, the situation during a conflict, a coup d'état or the circumstances surrounding an irregular immigrant. An area of application has been in tourism research where both vacation and trip away can be seen as liminal states. The morals or norms that are commonplace at home may no longer apply abroad. Drugs or alcohol can strengthen the liminal phase as they further abolish behavioural norms.

> 'During this period of transition between statuses, individuals experience a loss of their previous identity and are temporarily physically separated from the rest of the society. Previously held social codes are suspended or inverted. (. . .) The holiday provides a particular setting where individuals can temporarily disregard status, responsibilities and patterns of behaviour carried by them in routine home life. And such freedom inevitably impacts on sexual relationships.' (Thomas [28], p. 572 and p. 581)

Findings from biological research, and to some extent, findings from social science research are not explicitly included in models cited, although these must be presumed to exist.

There are several factors derived from biological research that may affect sexual risk-taking. Genes have a considerable influence on sexuality, both in terms of gender differences in sexual behaviour, and differences within the same gender. Genes operate via intricate systems that interact with sex hormones and dopaminergic systems [51]. Hormone research in the field of sexuality has among other things focused on the sex hormone testosterone, which is found in both men and women, where it is a prerequisite for sexual activity. The level of testosterone can change sexual desire to varying degrees [52].

Brain research, another discipline in the biological field explains youth's risk-taking through the non-synchronous development of the parts of the brain that controls emotions towards emotional intensity and sensation-seeking, and the parts, especially in the pre-frontal sections, that regulate inhibitions. For some individuals, the system is coordinated first somewhere around the early 20s [53].

Social research shows that parenting [54-56], education [57], social norms [54, 56], friends [54, 56, 58], lifestyle factors [59], early sexual initiation, behavioural disinhibition, and being a victim of childhood sexual abuse [58] have a substantial impact on sexual risk-taking, in both a positive and a negative sense. However, the social factors should not be seen as the opposite of the biological elements. Genetic research has already noted the challenge of studying the interaction between genes and the environment [51].

STIs among Swedish youth and young adults

As shown in the tables below, incidence rates of chlamydia and gonorrhoea contracted abroad have increased among youth aged 18 to 29, who were resident in Sweden 2005 to 2016. There are several other STIs, but these two are the most common bacterial infections among youth that must be registered according to the Communicable Diseases Act from 2004.

Syphilis is unusual but has had an upward trend since 2000. In 2016, 20 to 29 year olds accounted for 24% of the 349 cases reported. Less than half of the total were infections contracted abroad [60]. Even in the case of HIV, the total number was low in 2016 (430 cases). Of these, about 80% were infected abroad. The age group 20 to 29 years accounted for about 20% of the total number of cases. [60, 61].

Because youths and young adults only account for small percentages of the less common diseases, only chlamydia and gonorrhoea are considered below.

In the case of foreign-infected chlamydia, an increase has mainly occurred among young women. But whether the difference between men and women is real or not, is difficult to determine since gender might influence care-seeking behaviour. For example, 70% of the total number of chlamydia tests in Sweden, in 2015, were done on women [62]. Part of the reason for this may be that women are regularly examined and offered testing when visiting a midwife or gynaecologist for the purpose of obtaining contraception. Many chlamydia infections are asymptomatic and are only detected during these screening examinations. To a certain extent, this has been compensated for by online testing. Half of those using online testing are men, which began in in Sweden during the first decade of the 2000s [63]. In a study about self-reported chlamydia among youth, Hammarström et al. demonstrated that the distribution was skewed, in that more than one-third of the cases, in both genders, were calculated to occur among one-tenth of the sample [32].

Spain, Australia, Greece, Turkey and the UK are the most common countries where women, regardless of age, become infected by chlamydia. For men, regardless of age, the most common countries are Spain, Thailand, Norway, Greece, and the US [64].

Gonorrhoea and chlamydia differ in epidemiology. Chlamydia is predominantly a domestic disease. In the year 2016, foreign infections represented about 8% of all chlamydia cases and the percentage has slowly increased in recent decades [64]. With regard to gonorrhoea, approximately 30% of all cases in Sweden are estimated to come from abroad. Foreign-infected gonorrhoea has decreased by five percentage points since 2005. Despite this, it is difficult to see a trend in the last decade since foreign-infected gonorrhoea has fluctuated around 30%. The rate of gonorrhoea in the EU has more than doubled between 2010 and 2014 [65]. Even more severe is the emergence of widespread resistance by the gonorrhoea bacteria, to several types of antibiotics

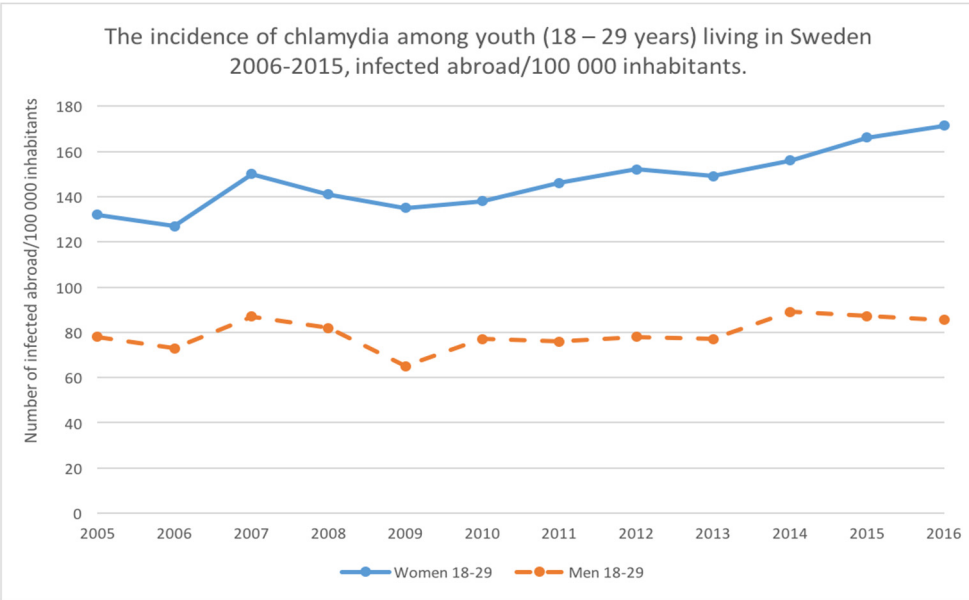


Fig 2.
Graph showing the incidence of chlamydia infected abroad among youth 18 - 29 years who lived in Sweden during 2005 - 2016. Cases with no country of infection reported or information not given, are not included.
(Statistics from The Public Health Agency of Sweden [66])

Whereas women account for the majority of chlamydia cases, it is 3.5 times more common for men to have gonorrhoea. Chlamydia is also predominantly spread among heterosexuals, while close to half of gonorrhoea cases among men were infections in the group of MSM [67].

There are also gender differences when it comes to the country of infection. Women have primarily been infected in Turkey and Spain. MSM have usually been infected in European countries, while heterosexual men are frequently infected in Thailand, the Philippines, and Spain [67].

The increase of foreign infections corresponds to an increasing number of foreign travellers in the last decade. However, for both diseases, the testing technique has been simplified through on-line testing. It is now possible to detect gonorrhoea in urinary tests in combination with chlamydia. Such technology has generated more tests and identifies more asymptomatic cases in both diseases. It may be a partial explanation of the general increase in infections. However, there is no reason to believe it would affect the proportion of diseases acquired domestically versus those acquired abroad.

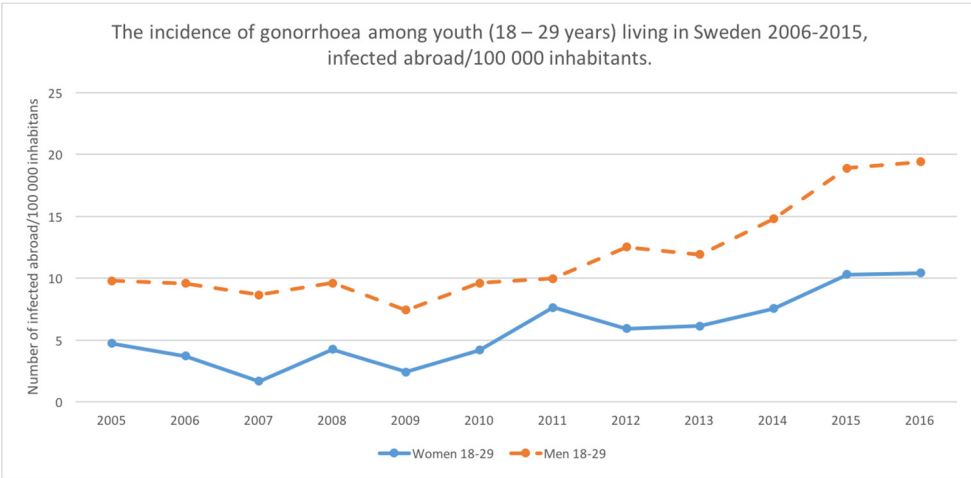


Fig 3.
The graph shows the incidence of gonorrhoea infected abroad among youth 18 - 29 who lived in Sweden during 2005 - 2016. Cases in which no country of infection is reported or if the information is not filled in, are not included. (Statistics from The Public Health Agency of Sweden [66]

A possible explanation for the increase in infections contracted abroad could be the increased migration during the mid-2010s. However, in the statistics from 2015, the year the immigration peaked, the infections contracted in the largest migrant countries: (Afghanistan, Iraq, Iran and Syria) constituted about 2.5% of foreign-infected chlamydia among youth and young adults 18 to 29. In the case of gonorrhoea, less than 1% were infected in those countries.

When it comes to chlamydia, between 5% and 10% of the total number of cases reported in Sweden have no information indicating whether the infection occurred in Sweden or abroad. In the case of gonorrhoea, the uncertainty is usually less than 1%. It is likely that there is an underestimation of foreign-infected chlamydia [66].

Travelling abroad

The total number of outbound passengers from Swedish airports has grown by more than 40% between 2006 and 2015 [68], and this increase is expected to continue. Holiday trips are the predominant purpose of the these journeys and is the type of travel that has risen the most in recent decades [69].

In a national study in 2007, almost 70% of all young people between the ages of 15 and 29 had travelled abroad in the past year. In that study, both men and women had travelled about the same amount. In comparison with the other age groups youths were among those who were the most frequent travellers [70].

Rationale

Just as foreign travel has increased in recent decades, analyses of travel patterns indicate that it will continue to grow in the future. Youth and young adults, as one of the groups who travel the most, are expected to extent that behaviour in years to come.
Sexual behaviours have changed in Sweden, such that a substantial number of youth have casual and multiple partners. These behaviours have not been matched by an increased use of condoms, especially in the case of young women. At the same time, foreign-transmitted cases of gonorrhoea and chlamydia among youth are increasing.

The combination of these factors should have merited heightened research in Sweden to address this situation and launch preventive efforts. That has not been the case. The Swedish government's pronouncement 2005 on the new national HIV/AIDS strategy draws attention to the lack of knowledge about foreign travellers. The decision concluded that behavioural and epidemiological analyses must be deepened by identifying risk patterns and patterns of distribution [71]. Since 2005, only a small number of qualitative studies have been conducted. There continues to be limited knowledge about the incidence of sexual risk-taking and the predictors that can be linked to risk-taking among young Swedish foreign travellers. Nor do we know if the risk-taking increases during travel abroad or if there is any difference between young men and women in risk-taking behaviour.

The present thesis seeks to fill some of these gaps, in the hope that it may lead to more effective interventions.

Objectives

General objective

The general objective of the thesis is to investigate to what extent youth (18 to 29 years of age) take sexual risks during travel or residence abroad, in addition to analysing the mediating and potentially modifying effects of socio–demographic factors, psychological and lifestyle factors, and mental health.

Specific objectives

The specific objectives were to:

- Examine sexual risks in a group of Swedish youths between 18 and 29 years of age during a travel abroad against the background of socio-demographic and life-style factors.
- Investigate whether travel or stay abroad increases sexual risk behaviour, and how this may be correlated with socio-demographic factors and type of travel.
- Weigh the influence of socio-demography, life-style factors such as alcohol consumption, illicit use of drugs, mental health, sensation-seeking, and type of travel on risk-taking during travel or stay abroad including possible mediating factors between predictive variables and risky sexual behaviour.
- Conduct a systematic review of quantitative studies that examined sexual risk-taking behaviour of youth during trips abroad and that have been published in peer-reviewed journals since 2000.

Material, aims, and methods

Aims

In Study I, the aim was to examine sexual risk-taking behaviour in a sample of Swedish youth who were sexually active while travelling abroad. A further aim was to examine possible associations between sexual risk-taking behaviour while travelling abroad and potentially relevant determinants such as socio-demographic background, selected life-style factors, and mental health.

Study II sought to assess whether Swedish youth increase their sexual risk-taking behaviour when travelling abroad with regards to having sex with a casual partner, and to examine possible factors that may be associated with such increased risk-taking behaviour abroad.

Study III sought to examine the role of personality traits in regard to youth's propensity to take sexual risk abroad by using the sensation-seeking scale on a sample taken from the general youth population. The study explores both the direct impact of sensation-seeking on sexual risk-taking abroad and its potentially indirect impact on the mediators represented by the duration of travel, heavy episodic drinking (HED), and use of illicit drugs.

Study IV undertook a systematic review and meta-analysis across published studies to examine the consistency of results with regards to factors related to engaging in risky sexual behaviour while travelling abroad, to identify knowledge gaps, and examine possibilities for targeted interventions.

Study setting

The data collection for Studies I–III was conducted in Skåne, Sweden's most southern region. The region is connected both by bridges and frequent ferries with Denmark, as well as by ferries to Germany and Poland. Copenhagen-Kastrup is the largest airport in the Nordic region. By its bridge connection, Copenhagen has become a workplace for youth in western Skåne, although the city has traditionally also always been a place for recreation and entertainment. About two-thirds of the municipalities in Skåne contain a large or medium-sized

city or are within a commuting distance from one. The other one-third of the municipalities are smaller agglomerated areas or largely rural municipalities [72]. In the 2013, the population in Skåne was accounted for just over 13% of Sweden's total population.

Study population

The study population was recruited among youths and young adults, ages 18 to 29 years who were resident in Skåne on 1 January 2013. In that year, the total number of individuals in this group was 206 000 representing about 16% of Skåne's total population – the same proportion as in the country as a whole. The sex ratio in Skåne then was 1:1 [73].

In 2013, approximately 29% of all 18 to 29 year olds had at least one parent born abroad. In Sweden, the corresponding group was 26%.

The level of education in Skåne is somewhat lower than the rest of Sweden.

Data collection

Studies I–III

In January 2013, a 79-item questionnaire was sent out to 7000 youths and young adults. The questionnaire contained items about socio-demography, social capital, physical violence, use of alcohol and illicit drugs, sexual harassment and abuse, commercial sex, sensation-seeking, general and mental health, stress, as well as issues of sexuality and international travel.

Participants were randomly selected from the National Swedish Population Register without any weighted recruitment. Data was collected between January and March 2013.
Potential participants received an introductory letter with information about the study, the voluntary nature of study participation, and a guarantee of anonymity. In addition to contact information for the responsible researcher, the letter referred to a midwife whom the respondent could consult about questions such as sexuality, alcohol, drugs, or other matters.

The letter included a link to a secure server that provided an opportunity to answer online. Three reminders were sent out, the last one including a printed version of the questionnaire that could be returned.

Respondents were included in the study if they had been sexually active (defined as engaging in vaginal or anal intercourse, or oral sex) in the last 12 months, in Sweden or abroad, and had travelled overseas during the same period. Others were excluded, as were those who did not specify their gender.

Study IV

Study IV is a systematic literature review and meta-analysis of published articles between 2000 and 2016 (updated in June 2017) on risk factors for the spread of STIs or HIV in connection with international travel. The articles were selected by literature searches in six databases (Embase, Pubmed, CINAHL, PsycINFO, Web of Science, and the Cochrane Database of Systematic Reviews). Peer-reviewed articles with a quantitative study design that included an analysis of risk factors of STIs or HIV transmission during travel abroad were considered for review. The search was conducted by employing MESH terms and keywords in different combinations.

Variables

Dependent variables

The dependent variables, in Studies I–III were chosen on the basis that, alone or together, are commonly used indicators of sexual risk-taking in this field of research.

The same question was asked regarding residence in Sweden during the last 12 months and during the recent stay abroad. Apart from multiple partners the question concerned only the last intercourse in Sweden and last intercourse during the most recent trip abroad.

Casual partner refers to the respondent's relationship to the partner she or he had intercourse with. The options were 'spouse/cohabitant/regular relationship', 'friend', 'former partner', 'someone you did not know before', 'someone you gave or received a gift, service or money from in exchange for sexual contact', or 'another person'. The answers were dichotomised into 'regular partner' if the response was spouse/cohabitant/regular relationship or 'casual partner' for the other alternatives.

Multiple partners. Respondents stated the number of sexual contacts from one to four or more partners. The answer was dichotomised into 'one', or 'two or more partners', the latter signifying multiple partners.

Use of condom. The question sought to establish whether the person, used a condom or not, on the occasion of their last sexual intercourse. It was registered as 'yes' or

'no'.

The literature review in Study IV included articles that linked the outcome incidence of STIs/HIV or proxies of transmission abroad to *non-condom use, inconsistent use of condoms, casual or new partner,* and *multiple partners*.[3] In the meta-analysis, only proportions of the adjusted quotas for casual travel and sex with new partner or non-condom use were used. Consequently, the meta-analyses were restricted to studies that used adjusted analyses.

Independent variables

Gender was dichotomised as men and women (Study I–III).

Age. Within the cohort, age was dichotomised as a younger group, 18 to 24 years of age, and an older group, 25 to 29 years of age (Studies I–III).

Parent's country of origin. The question intended to establish whether the respondent's parents were born in Sweden or not. It could be answered 'Yes, both', 'No, just one of them', or 'No, both of them were born outside Sweden'. Parent's country of origin was dichotomised as 'Both parents born in Sweden' and 'At least one parent born abroad' (Studies I–III).

Parental education. The question inquired into the highest educational level attained by at least one of the respondent's parents. Response alternatives were: '9-year compulsory school', '2 years of upper secondary school', '3–4 years of upper secondary school', 'other types of schools', and 'university'. The variable was dichotomised as 'High level of parental education' if at least one parent had a university degree and 'Low level of parental education' for all other alternatives. This variable was used instead of the respondent's level of education since many of participants in the study had not reached their highest level of education. A parent's educational level is a predictor of their child's likely level of education [74] (Study I).

Travel duration. In Study I, the options used were 1 to 8 days, 9 to 29 days, and 30 days or more. Studies II and III designated 1 to 29 days as 'short-term travellers' and 30 days or more as 'long-term travellers' (Studies I – III).

Heavy episodic drinking. HED was defined as the consumption on one occasion of four or more units of alcohol for women and five or more units for men (units of different kinds of alcohol in types of bottles or glasses were displayed to respondents in a picture). The alternatives for consumption of this amount of alcohol were:

[3] Various studies use different terms for the same phenomenon, e.g., 'new partner' and 'casual partner' designate the same relationship.

‘every day or nearly every day’, ‘every week’, ‘2-4 times/month’, ‘every month’, ‘less than once a month’ or ‘never’. A person drinking the amount quantified above more often than once a month was defined as HED and dichotomised as ‘Yes’ in the analysis. The other alternatives were categorised as ‘No’ (Studies I–III).

Illicit use of drugs. The question referred to all types of narcotics; examples were provided, i.e. marijuana, hashish, cocaine, and amphetamines. The respondent answered either ‘Yes’ or ‘No’(Studies I–III).

Mental health. The status of a respondent’s mental health was measured using the Hopkins Symptom Checklist (HSCL-25), which assesses symptoms of anxiety (10 items) and depression (15 items) during the preceding month, on a scale from 1 (‘not at all’) to 4 (‘extremely’). For each item, respondents were asked, ‘How much has this problem bothered or distressed you during the last month, counting today?’. Mean total mental health scores, as well as mean scores for depression and anxiety, were calculated by a respondent’s total scores for each of the measures and then divided by the number of items for which responses were received. The variable was dichotomised as ‘satisfactory self-rated mental health’, i.e., low HSCL symptom score and ‘poor self-rated mental health’, i.e., high HSCL symptom score, based on the median split of the frequency distributions of the measure in question (Studies I–III).

Sensation-seeking behaviour. The Brief Sensation Seeking Scale-4 (BSSS-4) is based on four questions: ‘I like to explore strange places.’, ‘I like to do things that are a little thrilling.’, ‘I like to have new and exciting sensations even if I have to break the rules to experience them’ and ‘I prefer friends who are excitingly unpredictable.’ The four questions are answered separately, and the answer is based on a five-item Likert scale: ‘Not agree’, ‘Partly agree’, ‘Neither agree or disagree’, ‘Agree’, ‘Fully agree’. A participant could accumulate 4 to 20 points. Participants were divided into two groups: ‘non-sensation seekers’ and ‘sensation-seekers’, based on their total individual score. Those who obtained at least 13 points were defined as sensation seekers. Those who answered 'Neither agree or disagree' and lower on all questions could achieve a maximum of 12 points and were defined as non-sensation seekers (Study III).

Ethical considerations

The participants were selected based on their national identification number by a statistician who was employed by the Region of Skåne. This data was stored in another department, separate from the responses to the questionnaire and was destroyed after the collection of data was completed.

The response data received via the internet was stored on a secure server that was not available to third parties.

The Regional Ethical Review Board in Lund, Sweden approved the study (Registration number 2012/353).

Methods

Overview of the thesis papers

Table 3. Overview of the thesis papers. Aim, study design, sample size, data source, and analytical approach.

Study	Aim	Study design	Sample size	Data source	Analytical approach
I	To assess sexual risk-taking behaviour in a sample of Swedish youth, who were sexually active while travelling abroad, and examine possible associations between sexual risk-taking behaviour while travelling abroad and potentially relevant characteristics such as socio-demographic background, selected life-style factors, and mental health.	Cross-sectional	768	Self-administered questionnaire	Prevalence analyses Logistic regression
II	To assess whether Swedish youth increase their sexual risk-taking behaviour when travelling abroad, regarding having sex with a casual partner, and to examine possible factors that may be associated with such increased risk-taking abroad.	Cross-sectional	2189	Self-administered questionnaire	Prevalence analyses Logistic regression Case-crossover analyses
III	To examine the role of sensation seeking regarding youth's propensity to take sexual risks abroad and examine both the direct impact of sensation seeking on sexual risk-taking abroad and its potentially indirect impact on the mediators represented by the duration of travel, HED, and use of illicit drugs.	Cross-sectional	2189	Self-administered questionnaire	Prevalence analyses Logistic regression Mediation analyses
IV	To identify knowledge gaps related to international spread of sexually transmitted infections by systematically collecting and reviewing evidence on determinants of travel-related sexual risk-taking, and estimate the strength of risk factors that can potentially inform targeted interventions	Systematic literature review and meta-analysis	49	Literature search	Qualitative assessment Heterogeneity test Pooled meta-analysis

Study I

The study was cross-sectional and included the 768 respondents who were sexually active while on a trip abroad – a subsample of the 2189 individuals who were eligible in the total sample.

The outcome variables were: a casual partner, non-use of condom with a casual partner, and multiple partners abroad. These outcomes are regularly used by comparable studies in this research area.

The independent variables were: age, parent's country of origin, parent's level of education, duration of travel, HED, illicit use of drugs, and low self-rated mental health. These variables were chosen because previous studies had shown a significant association or because one could not rule out a relationship, e.g., parent's country of origin.

Logistic regression and Chi-square analysis were carried out and independent variables were adjusted for one and another, towards the outcome variables. Due to apparent differences in behaviour by gender, men and women were analysed separately.

The number of participants with missing data was reported for each variable in the tables.

Study II

Study II included 2189 individuals. Risk behavior was defined as having a casual partner.

In the study, logistic regression analyses and the Chi-square test were used to assess possible predictors for casual partners in Sweden and abroad. Potential confounders represented by age, parent's country of origin, the duration of travel, HED, illicit use of drugs, and self-rated mental health were adjusted for each other, separately for both genders.

In order to test the main hypothesis of the study, a modified case-crossover design was used to analyse if the risks increased or not when traveling abroad. The advantage of the case-crossover design rests on the fact that each contributes to risk time both for exposure and non-exposure to the risky behaviour. In practice this means that there is no need for adjustment for any potential confounders in the analysis since the same individuals are used both for the exposed and the unexposed group.

The last time abroad constituted the 'exposure window', and time spent in Sweden during the same year was set as the 'reference window'. The cases in both windows were defined as having had sex with a casual partner. Person-time was pooled for all individuals for calculating the incidence of risk behaviour in the respective context. The risk was then determined as the ratio between those incidences, i.e., as an Incidence Rate Ratio (IRR).

In order to get more information regarding the possible influence of some background factors, additional analyses were applied, also in order to assess the influence of possible confounders. Here, the travellers were split into groups according to the time they spent abroad, and IRR was calculated for all groups, with separate analyses for women, men, and the entire sample.

The number of participants with missing data was reported for each variable in the tables.

Study III

This study used the BSSS-4, a validated instrument that measures the propensity for different types of risk behaviours. The results obtained on the BSSS-4 have been shown to have a biological underpinning. It should, therefore, be able to indicate that a risk is conditioned by factors beyond social and cultural contexts, which is the usual outcome in this area of research.

The outcome variables used in the logistic regression analyses, with SPSS ver. 23, the outcome variables were a casual partner, non-use of a condom with a casual partner, and having multiple partners abroad. The independent variables were age, parent's country of origin, parent's level of education, duration of travel, HED, illicit use of drugs, self-rated mental health, and sensation seeking. These were simultaneously adjusted for one another.

However, because sexual risk-taking depends on several factors, and sensation-seeking also affects some of these factors (HED, illicit use of drugs, and travel duration), we additionally did a mediation-analysis to see how much of the total effect of sensation seeking was mediated by these factors.

The method in brief is to obtain the standard deviation (SD) for the predictor (X), the outcome (Y), the mediator (M) and the covariance between X and M. Subsequently; three regression analyses yield coefficients and the standard error (SE) for the respective path: X→ M(a), M→Y controlling for X (b), X→Y (c), and X→Y adjusted for M (c') (see Figure 1). These are made comparable by multiplying each coefficient by the SD of the predictor variable in the equation and then dividing by the SD of the outcome variable. The result is presented in terms of the direct

effect (c'), the mediated effect (the indirect effect) (ab), and the total effect (ab + c'). The percentage of the effect mediated is expressed by the formula ab/c. The confidence interval for the RMediation is given by the formula $\widehat{a\,b} \pm 1.96 \times \mathrm{SD}(\widehat{a\,b})$. The calculations, were done using SPSS version 23, a specially designed sheet of Excel, and the RMediation instrument.

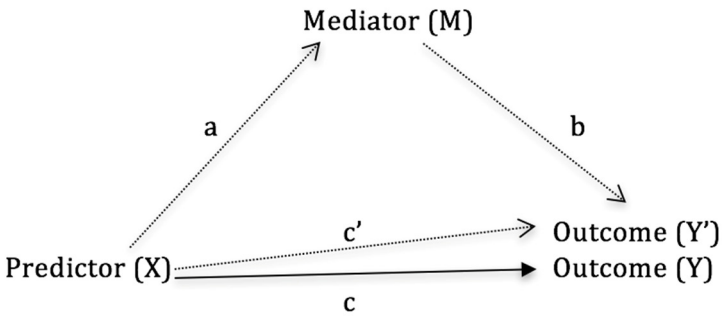


Figure 1
The Mediation model consists of the predictor X, and outcome Y, and the mediator M. a, b, c and c' are regression coefficients'. c is the total effect without the mediator. a is the effect of the predictor on M, and b is the effect of M on Y. Y' is the outcome after adjustment with b and c. c' is the regression coefficient after adjustment, i.e., the effect of X on Y controlling for M.

Study IV

The goal of this study was to do a systematic review and meta-analysis of the published studies concerning factors related to engaging in risky sexual behaviour while travelling abroad. The consistency of results across studies was a primary focus. The study also sought to identify gaps in knowledge in this area of research and examine possibilities for targeted interventions.

This review was carried out according to guidelines in the PRISMA checklist. The search strategy was based on the question 'What risk factors are associated with STI/HIV transmission or, alternatively, with sexual risk-taking behaviours that could increase the likelihood of STI/HIV transmission, among persons travelling abroad?'

The search was limited to articles in English, published in peer-reviewed journals between January 2000 and August 2016, and was updated in June 2017. Studies with a quantitative design that included an analysis of risk factors associated with STI/HIV transmission and international travel were considered. Outcomes were the

prevalence rates of STI/HIV, casual sex, multiple partners, and non-use or inconsistent use of condoms.

Manually screening of the literature, consulting researchers, and running test searches were performed to identify search terms. The primary search screened six databases using search terms that combined MeSH-terms and keywords. This resulted in 1460 individual journal articles. Titles were assessed for relevance against the inclusion criteria, resulting in 990 articles being excluded. Articles were then reassessed via their abstracts. Finally, 148 full texts were read and evaluated for eligibility. Studies showing effect measures as odds ratios (OR) or risk ratios (RR) or equivalent, with 95% confidence intervals (CI) were included; however, only studies that adjusted for confounders were incorporated in the pooled meta-analysis of risk factors. After further exclusion based on factors such as, study design and analysis, study population, and outcome measures, 49 studies remained in total for this review.

Study quality was assessed according to requirements by the Swedish Agency for Health Technology Assessment and Assessment of Social Service (SBU), taking into consideration the study design and the extent to which studies managed to minimise systematic biases relating to the overall process of selection, data collection/measurement/analysis, and reporting. When appropriate, attrition bias was assessed. Studies were given a score of low, medium or high, indicating how each category had been managed, and a summarizing score.

Proportional meta-analysis was carried out to estimate pooled proportions of casual sex/sex with a new partner and non-condom use related to international travel. Additionally, meta-analyses of independent risk factors associated with the outcomes were conducted when at least two studies were available were that were considered comparable and had adjusted ORs or the equivalent. Other effect measures were converted to fit the model when the prevalence of the outcome was below 20 %.

Main findings

Common to Studies I–III

Studies I–III have the same study population in common. To avoid repetition of background data in each study, social-demographic and life-style data are presented under this heading. Only where necessary for the results are data repeated for the actual study.

Of the 7000 invitations to participate in the study, 332 were returned unopened, mostly due to incorrect address information. Of the remaining 6668 individuals contacted, 2968 (46%) responded. Those individuals who had not travelled abroad, and who had not had vaginal, or anal intercourse, or oral sex during the previous 12 months or not stated their gender were excluded (n = 779), leaving a study cohort of 2189.

Of those responding, 82% answered electronically and 18% by postal mail.

As shown in Table 1 in the thesis, the study population consisted of 60% women, 60% between 18-24-years, and 60 % that had at least one parent with a university degree. Approximately 75% had both parents born in Sweden. All these distributions were similar for both genders.

Thirty-three percent of the men and 56% of the women rated their mental health as poor.
HED was more prevalent among men, both in Sweden and abroad, compared to women. The percentage of such drinkers was about the same abroad as in Sweden. However, men used illicit drugs to a much greater extent both in Sweden and abroad.

In 90% of all cases the trip abroad lasted less than a month.

One out of four characterised their last partner abroad as casual, a circumstance that was significantly more common among men. In Sweden, this behaviour was even more typical, again more so among men. About 30% of Swedish men reported having two or more sexual partners in the previous year. The corresponding level abroad was 10%. Multiple partners were more common among men than among women, both in Sweden and abroad. However, non-use of condoms was more common among women both in Sweden and abroad. Abroad, the use of condoms in men was far more prevalent than in women.

Table 1. Distribution of socio-demographic and background characteristics, including lifestyle, sensation seeking behaviour and sexual risk-taking among youth in Sweden who had travelled abroad during the last 12 months

	Demographic and life styles characteristics of the sample(n=2189)					
	All		**Men**		**Women**	
	n	**%**	**n**	**%**	**n**	**%**
Gender						
Number	2189	100	897	41	1292	59
Age						
18-24 years	1260	58	509	57	751	59
25-29 years	913	42	381	43	532	41
(Missing)	(16)		(7)		(9)	
Level of Parent's education						
University	1361	63	547	61	814	63
Less than university	814	37	344	39	470	37
(Missing)	(14)		(6)		(8)	
Parents' country of origin						
Both parents born in Sweden	1620	74	650	73	970	75
At least one parent born abroad	560	26	241	27	319	25
(Missing)	(9)		(6)		(3)	
Self-rated mental health						
Satisfactory mental health	1162	53	597	67	565	44
Poor mental health	1023	47	297	33	726	56
(Missing)	(4)		(3)		(1)	
Sensation seeking behaviour						
Non-sensation seekers	1516	72	503	58	1013	81
Sensation seekers	601	28	364	42	237	19
(Missing)	(72)		(30)		(42)	

	Stay in Sweden during <12 months			**Last trip abroad <12 months**		
	All	**Male**	**Female**	**All**	**Male**	**Female**

	n	%	n	%	n	%	n	%	n	%	n	%
Duration of most recent travel												
Short-term travelling (1-29 days)							1936	90	790	90	1146	90
Long-term travelling (≥ 30 days)							220	10	85	10	135	10
(Missing)							(33)		(22)		(11)	
Relation to the last sexual partner												
Regular partner	1517	70	549	62	968	76	678	75	245	69	433	80
Casual partner	639	30	332	38	307	24	222	25	112	31	110	20
(Missing)	(33)		(16)		(17)		(0)		(0)		(0)	
Use of condom with last casual sex partner												
Use of condom	266	42	155	47	111	36	104	48	63	57	41	38
Non-use of condom	371	58	176	53	195	64	113	52	47	43	66	62
(Missing)	(2)		(1)		(1)		(5)		(2)		(3)	
Number of sexual partners												
1 partner	1528	71	600	68	928	73	697	90	259	85	438	94
≥2 partners	626	29	277	32	349	27	77	10	47	15	30	6
(Missing)	(35)		(20)		(15)		(126)		(51)		(75)	
Heavy episodic drinking (HED)												
Non-HED	932	46	306	36	626	52	926	46	317	38	582	51
HED	1115	54	541	64	574	48	1100	54	518	62	609	49
(Missing)	(142)		(50)		(92)		(163)		(62)		(101)	
Use of illicit drugs												
No	1918	88	737	83	1181	92	2016	94	791	90	1225	96
Yes	263	12	154	17	109	8	139	6	87	10	52	4
(Missing)	(8)		(6)		(2)		(34)		(19)		(15)	

Study I

Of the 2189 individuals who travelled abroad during the previous year, 35% (n = 768) reported having intercourse abroad.

About 24% of them engaged with a casual partner in their last intercourse abroad and close to half of them did not use a condom with the casual partner. Having a casual partner abroad was more common among men (30%) compared to women (19%).
In the adjusted analyses, for men, having a casual partner for men was significantly associated with younger age, HED, illicit use of drugs and having immigrant parents. For women, younger age, HED, illicit use of drugs, and long-term travelling was found to be significantly linked to having a casual partner abroad.

About half (48%) of those who last had a casual partner abroad did not use a condom. The non-use of condoms was significantly more common among women where almost 60% did not use them. Among men, 37% had not used a condom with their most recent casual partner abroad.

In men, as shown in Study I, Table 1, the aforementioned behaviour significantly more common in those who self-rated their mental health as poor. Among women, shown in Study I, Table 2, the same behaviour was significantly more common among younger women.

Study I Table 1. Males. Crude and adjusted associations (odds ratio (OR) and 95% confidence interval (CI), p-value) of age, parental background, length of travel, heavy episodic drinking (HED), use of drugs, self-rated mental health, in relation to ≥2 partners, casual sex, and inconsistent use of condoms among males who have had sexual intercourse during last visit abroad in the last 12 months (n=304).

	Crude				Adjusted			
	OR	**(CI)**	**p**	**(Missing)**	**OR**	**(CI)**	**p**	**(Missing)**
				≥2 partners abroad				
18-24 years of age	1.52	(0.79 – 2.91)	0.201	(2)	1.43	(0.64 – 3.18)	0.382	(27)
Foreign born parent	2.31	(1.20 – 4.64)	**0.013**	(5)	1.70	(0.71 – 4.06)	0.230	
Low level of parental education.	0.88	(0.46 – 1.71)	**0.714**	(4)	1.32	(0.58 – 3.01)	0.507	
≥ One month of travel	8.65	(4.07 – 18.4)	**<0.001**	(7)	8.61	(3.41 – 21.7)	**<0.001**	
HED	5.58	(1.93 – 16.1)	**0.002**	(16)	6.00	(1.81 – 19.9)	**0.003**	
Use of drugs	4.41	(2.03 – 9.70)	**<0.001**	(5)	2.33	(0.80 – 6.81)	0.121	
Poor self-rated mental health	0.99	(0.50 – 1.97)	0.985	(3)	0.81	(0.34 – 1.96)	0.640	
				Casual sex abroad				
18-24 years of age	1.97	(1.19 – 3.29)	**0.008**	(4)	2.11	(1.18 – 3.78)	**0.012**	(26)
Foreign born parent	2.28	(1.33 – 3.89)	**0.003**	(4)	1.99	(1.03 – 3.86)	**0.040**	
Low level of parental education.	0.74	(0.44 – 1.24)	0.257	(3)	0.88	(0.49 – 1.6)	0.680	
≥ One month of travel	2.48	(1.30 – 4.71)	**0.006**	(6)	1.85	(0.83 – 4.15)	0.133	
HED	3.64	(1.89 – 7.0)	**<0.001**	(15)	3.30	(1.62 – 6.73)	**0.001**	
Use of drugs	3.96	(1.93 – 8.11)	**<0.001**	(4)	2.79	(1.15 – 6.75)	**0.023**	
Poor self-rated mental health	1.54	(0.91 – 2.59)	0.105	(2)	1.68	(0.91 – 3.09)	0.095	
				Inconsistent use of condom with casual partner				
18-24 years of age	0.52	(0.22 – 1.25)	0.519	(213)	0.39	(0.14 – 1.12)	0.080	(223)
Foreign born parent	0.53	(0.22 – 1.32)	0.173	(213)	0.35	(0.11 – 1.15)	0.084	
Low level of parental education.	1.53	(0.62 – 3.76)	0.355	(214)	1.34	(0.45 – 3.97)	0.597	
≥ One month of travel	1.29	(0.47 – 3.52)	0.617	(214)	1.37	(0.38 – 4.96)	0.634	
HED	1.04	(0.31 – 3.51)	0.947	(220)	1.44	(0.32 – 6.41)	0.635	
Use of drugs	1.32	(0.49 – 3.57)	0.584	(214)	1.79	(0.45 – 6.57)	0.379	
Poor self-rated mental health	3.08	(1.26 – 7.54)	**0.014**	(214)	4.90	(1.68 – 14.3)	**0.004**	

Study I Table 2. Females. Crude and adjusted associations (odds ratio (OR) and 95% confidence interval (CI), p-value) of age, parental background, length of travel, heavy episodic drinking (HED), use of drugs, self-rated mental health, in relation to ≥2 partners, casual sex, and inconsistent use of condoms among females who have had sexual intercourse during last visit abroad in the last 12 months (=464).

	Crude				Adjusted			
	OR	**(CI)**	**p**	**(Missing)**	**OR**	**(CI)**	**p**	**(Missing)**
				≥2 partners abroad				
18-24 years of age	2.71	(1.13 – 6.50)	**0.026**	(6)	1.84	(0.69 – 4.86)	0.221	(41)
Foreign born parent	0.64	(0.24 – 1.73)	0.381	(2)	0.63	(0.19 – 2.10)	0.449	
Low level of parental education.	0.64	(0.27 – 1.54)	0.322	(3)	0.71	(0.26 – 1.95)	0.508	
≥ One month of travel	7.53	(3.06 – 18.6)	**<0.001**	(2)	6.51	(2.35 – 18.0)	**<0.001**	
HED	2.62	(1.03 – 6.65)	**0.043**	(31)	2.17	(0.78 – 6.05)	0.137	
Use of drugs	4.05	(1.52 – 10.8)	**0.005**	(5)	2.66	(0.84 – 8.42)	0.097	
Poor self-rated mental health	1.82	(0.82 – 4.08)	0.143	(1)	1.52	(0.61 – 3.77	0.369	
				Casual sex abroad				
18-24 years of age	3.04	(1.82 – 5.14)	**<0.001**	(6)	3.27	(1.79 – 5.97)	**<0.001**	(41)
Foreign born parent	1.03	(0.6 – 1.77)	0.907	(2)	1.14	(0.59 – 2.2)	0.702	
Low level of parental education	0.63	(0.77 – 1.06)	0.081	(3)	0.65	(0.35 – 1.18)	0.158	
≥ One month of travel	3.69	(2.07 – 6.6)	**<0.001**	(2)	2.67	(1.34 – 5.33)	**0.005**	
HED	3.47	(1.98 – 6.09)	**0.001**	(30)	3.02	(1.16 – 5.60)	**<0.001**	
Use of drugs	5.68	(2.71 – 11.9)	**<0.001**	(5)	4.96	(2.13 – 11.6)	**<0.001**	
Poor self-rated mental health	1.37	(0.85 – 2.20)	0.194	(1)	1.21	(0.7 – 2.08)	0.503	
				Inconsistent use of condom with casual partner				
18-24 years of age	1.67	(0.63 – 4.43)	0.305	(378)	4.49	(1.17 – 17.3)	**0.029**	(384)
Foreign born parent	1.26	(0.46 – 3.4)	0.653	(375)	0.81	(0.21 – 3.06)	0.754	
Low level of parent education	0.76	(0.29 – 2.01)	0.582	(375)	0.71	(0.22 – 2.31)	0.567	
≥ One month of travel	0.20	(0.07 – 0.58)	**0.003**	(374)	0.12	(0.03 – 0.45)	**0.004**	
HED	1.01	(0.35 – 2.92)	0.995	(379)	0.62	(0.15 – 2.52)	0.506	
Use of drugs	1.27	(0.42 – 3.81)	0.675	(376)	3.19	(0.72 – 14.1)	0.126	
Poor mental health	1.09	(0.46 – 2.6)	0.847	(374)	0.93	(0.32 – 2.7)	0.895	

Ten percent, of those who reported having sex abroad, stated that they had multiple partners during their travel. Men were more than twice as likely to have two or more partners while abroad compared to women (15% and 6%, respectively). According to the regression analysis, among women only long-term travel could be associated with having multiple partners among women. In men, both HED and long-term travel were significant risk factors.

In conclusion, Study I showed that 35% of all travellers had intercourse abroad, and of them one-fourth had intercourse with a casual partner.

The study also showed that fewer women, than men report having casual partners or multiple partners. However, those women who had intercourse with a casual partner indicated that they used condoms to a lesser degree than men, and thus can be said to be exposed to a higher sexual risk than men.

The study also confirmed findings in previous investigations that HED, illicit use of drugs, younger age, and long-term travel have a significant impact on risk-taking behaviour. Findings not previously shown are that both poor-self rated mental health and an immigrant background can predict a risky sexual behaviour. These findings applied only to men.

Study II

About 25% of those who reported having sex abroad engaged with a casual partner. Nearly 30%, (n = 639), of the total sample, had a casual partner in Sweden. A regression analysis showed that it was almost twice as common for men to have a casual partner abroad than it was for women.

The regression analyses show that being 18 to 24 years of age, HED, and illicit use of drugs were significantly associated with having a casual partner in Sweden and abroad among both men and women. Long-time travel was also significantly associated with having a casual partner abroad. Among men, self-rated poor mental health was significantly associated with having a casual partner in Sweden but not abroad.

Study II, Table 1. Incidence Rate Ratio (IRR) of casual sex partner in a sample of Swedish youth (n=2189, missing n=33) who reported that they had travelled abroad during the past year. A modified case cross-over analysis of events of casual sex in Sweden and abroad in relation to median days spent in Sweden and median days in last travel abroad, during the last 12 months (95% Confidence Interval (CI), two-tailed p-value).

	Total number of individuals	**Median days in Sweden/Abroad[1]**		**Individuals who have had a casual sex partner**				**(IRR)**	**(CI)**	***p***
		Sweden	Abroad	Sweden	(m)[2]	Abroad	(m)			
Total	2156	738583	48357	626	(13)	221	(1)	5.37	(4.61 – 6.26)	<0.001
Men	875	300604	18771	320	(12)	111	(1)	5.53	(4.46 – 6.86)	<0.001
Women	1281	437979	29586	306	(1)	110		5.31	(4.27 – 6.6)	<0.001
Data regarding number of days spent in Sweden and abroad	1448	360	5	412		110		18.9	(15.4 – 23.4)	<0.001
	488	346	19	126		52		7.45	(5.41 – 10.3)	<0.001
	167	260	105	69		43		1.54	(1.05 – 2.26)	<0.036
	53	95	270	19		16		0.3	(0.15 – 0.58)	<0.001

[1] 1-8 days (median time 5 days), 9-29 days (median time 19 days), 1-6 months (median time 105 days) and more than 6 months (median time 270 days). The median days spent in Sweden are consequently: 360 days, 346 days, 260 days and 95 days.

[2] (m) = missing.

In Study II, Table 1 shows the relative risk of casual partner, in Sweden and abroad, expressed as IRR. The overall risk of having a casual partner abroad as opposed to in Sweden was five-fold, both among men and women. The result showed that travellers who spent a short time abroad had a higher risk, compared to when in Sweden, than those who travel for a long time.

The main finding of Study II indicates that travelling itself has a significant influence on sexual risk-taking for both men and women, suggesting that efforts should be directed towards youth travellers and not youth in general.

The study also demonstrates that it is short-term travellers who constitute the greatest at-risk group. The prevalence data shows that short-term travellers account for 90% of all travelling. As a consequence, research and preventive efforts should be primarily aimed at short-term travellers.

Study III

In total, 28% of those in the study cohort could be characterised as sensation seekers. This was twice as common among men than women (42% and 19%, respectively).

The adjusted regression analyses show that sensation seeking among women can be associated with having a casual partner abroad. This association does not apply to men. However, in both genders, sensation seeking behaviour is mediated by illicit use of drugs, HED, and long-term travelling.

Study III Table 1. Analysis of the mediated effect (the indirect effect) based on standardized regression coefficients of the direct effect, the mediated effect and the total effect. Confidence interval (CI) of the mediated effect accepted at 95 % and the percent of the mediated effect between sensations seeking and casual partner, sensation seeking and non-condom use with casual partner and sensation seeking and multiple partners among youths who travelled abroad in the last 12 months. All mediated by HED, illicit use of drugs and travel duration.

Predictor	Mediator	Outcome	Effects based on standardised regressions coefficients			CI	%
			Total effect	Direct effect	Mediated effect	CI of effect mediated	Percentage of effect Mediated
			ab+c'	*c'*	*ab*	$\widehat{ab} \pm 1.96 \times \mathrm{SD}(\widehat{ab})$	*ab/c*
			Men				
Sensation seeking	HED	Casual partner	0.155	0.138	0.017	0.000-0.041	11
-"-	Illicit use of drugs	-"-	0.177	0.113	0.063	0.023-0.113	41
-"-	Long-term travel	-"-	0.162	0.143	0.020	0.001-0.046	13
Sensation seeking		Non-condom use with casual partner[1]				Not applicable	
-"-	HED	≥2 partners	0.160	0.136	0.024	0.000-0.061	14
-"-	Illicit use of drugs	-"-	0.199	0.130	0.069	0.024-0.125	39
-"-	Long-term travel	-"-	0.218	0.174	0.044	0.002-0.092	25
			Women				
Sensation seeking	HED	Casual partner	0.207	0.165	0.042	0.018-0.073	21
-"-	Illicit use of drugs	-"-	0.226	0.198	0.029	0.010-0.057	14
-"-	Long-term travel	-"-	0.212	0.197	0.014	0.000-0.034	7
Sensation seeking		Non-condom use with casual partner				Not applicable	
-"-	HED	≥2 partners	0.202	0.173	0.031	0.004-0.073	13
-"-	Illicit use of drugs	-"-	0.237	0.218	0.019	0.000-0.048	8
-"-	Long-term travel	-"-	0.232	0.209	0.024	0.001-0.054	11

2

[1] The analysis is not applicable since the predictor variable is not significant in the crude analysis.

Sensation seeking was not associated with having multiple partners, either in women or men. However, multiple partners were affected by sensation-seeking behaviour via the mediators, namely, illicit use of drugs, HED, and long-term travelling among men and HED and long-term travel among women.

In the case of non-use of condoms with a casual partner abroad, there is no association with sensation seeking, neither in women or in men in the adjusted analyses. Consequently, there could also be no mediating variable.

In summary, Study III showed that personality traits affected sexual risk-taking on trips abroad. This was true with regard to women, where sensation-seeking had an effect on behaviour with a casual partner. However, personality traits also had an indirect impact on different forms of sexual risk-taking. For men, it was primarily the use of illicit drugs that showed associations with both casual partners and multiple partners. In women, risk-taking was primarily affected by HED.

Although the study showed that sensation-seeking should be included as a predictive factor in further analyses, it should nevertheless be noted that HED, use of illicit drugs, and long-term travel had independent and parallel effects on the risk-taking behaviour.

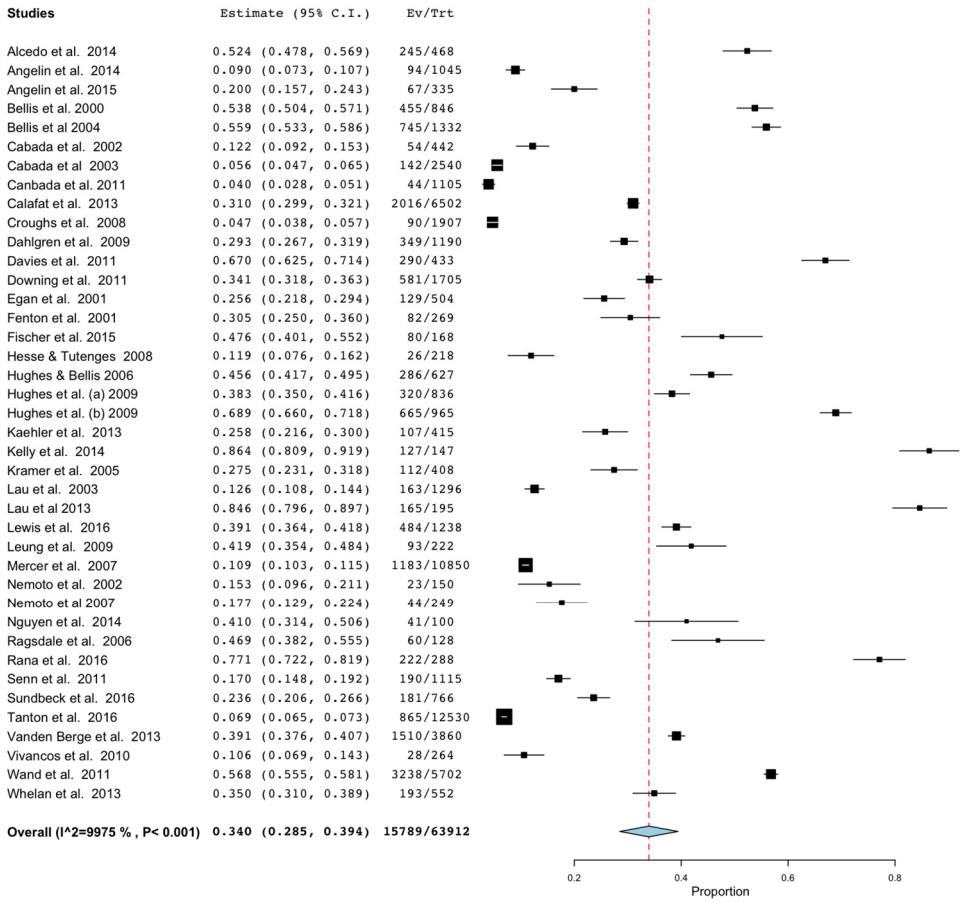
The study also showed that about 5% of the total sample could be characterised as risk-takers based on their not having used a condom with a casual partner.

Study IV

Forty-nine studies, of varying size, surveying a total of 222 049 international travellers were included in the literature review.

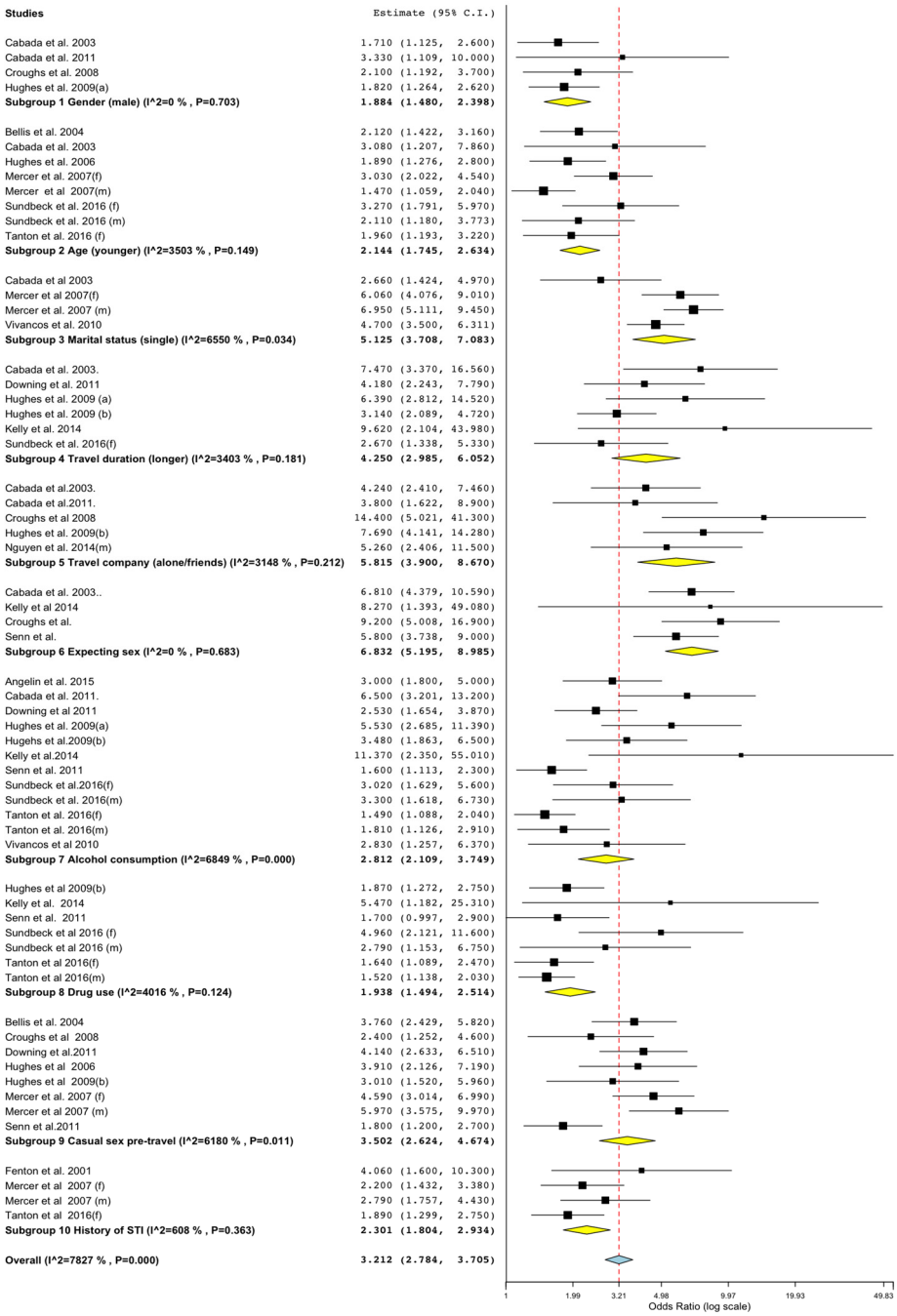
The studies exhibited major methodological differences in design, sampling, and analysis, which made them difficult to compare. Those studies that did not used adjusted analyses could not be included in the pooled analyses.

The pooled prevalence ORs of casual sex abroad in Study IV Figure 1(in text) showed considerable heterogeneity across the studies. The studies indicated a prevalence rate of casual sex between 4% and 86%. The pooled estimate was 34%.



Study IV, Figure 1
Forest plot illustrating the distribution across studies of the prevalence of having casual sex with a new partner when travelling abroad and a pooled estimate of all studies combined.

The forest plot in Figure 2 showed that male gender, younger age, long-term travelling, binge drinking, and use of drugs were all independently associated with casual sex/new partner abroad. However, the three predictors with highest adjusted odds ratios (AOR) for casual sex were intentions to have sex, travelling alone or together with friends, and being a single.

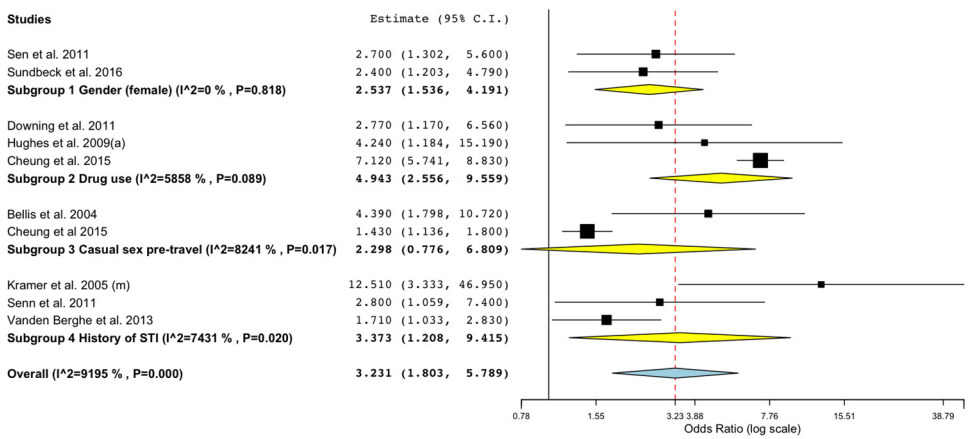


Study IV, Figure 2
Forest plot illustrating pooled estimates of risk factors associated with having casual sex abroad among studies qualifying for inclusion in meta-analyses, and the distribution across studies. Stratified results are marked with (m) and (f), indicating results for males and females, respectively.

Studies that assessed the non-use of condoms found a variety of predictors that have an impact on the outcome. Women, younger ages, previous experience of non-condom use with casual partners, experience of multiple casual sex, short- and long-term travellers, travellers who do not carry condoms, non-use of condoms during the last intercourse at home, users of illicit drugs, commercial sex worker-clients (CSW) – all had a higher proportion of individuals who do not use condoms abroad.

Studies about unprotected anal intercourse among men who have sex with men (MSM) also found some predictors for non-use of condoms, e.g., residing in small cities, an HIV positive status person, diagnosed with an STI in last 12 months, younger age, previous experience of casual sex, and lower education.

Regarding the prevalence of non-condom use abroad, the heterogeneity across the studies that were included was high, with a prevalence of 1% to 65%. The pooled estimate rate was 17% (Figure 3). The pooled OR (calculated only for the variables that were possible to pool) showed higher odds for females, users of illicit drugs, and individuals with a history of STIs.



Study IV, Figure 3
Forest plot illustrating pooled estimates of risk factors associated with non-condom use and inconsistent condom use when travelling abroad among studies qualifying for inclusion in meta-analyses, and the distribution across studies. Stratified result marked with (m) indicates that the result was significant for men only.

The study, to the best of our knowledge, is the first one of its kind to provide a meta-analysis that investigates the consistency of the findings across different studies. In conclusion, Study IV provides a composite picture of sexual risk-taking behaviour during travel abroad. It showed that there was a high degree of conformity in predictors, but the differences in methodology made it difficult to compare and evaluate the strengths of the individual factors. Despite this difficulty, the meta-

analysis in the case of casual sex showed that the intentions to have sex and to travel alone or together with friends were a more critical factors than the commonly proposed predictors, e.g., gender, age, alcohol, and illicit use of drugs. The study also revealed several knowledge gaps. For example, little is known about sexual risk-taking behaviours among middle-aged and older travellers, migrants who visit their home country, or persons residing in countries outside of Europe and North America.

Our results are more applicable to youth and young adults, as this group mostly dominates the data. Despite this, there are knowledge gaps, especially regarding youths in general, as there were few studies that examined samples from the general population, but rather the majority had collected data from convenience settings such as youth hostels and travel hubs, or among small subgroups such as backpackers.

Discussion

The general objective of this thesis was to investigate and to describe the extent to which youth, 18 to 29 years of age, take sexual risks during travel or residence abroad, and also to analyse mediating and possible modifying effects of socio-demographic, psychological, and life-style factors.

One of the specific objective was to provide a scientific overview of the evidence from the year 2000 and onwards pertaining to international travel and sexual risk taking.

One essential finding was that from Study II, indicating that sexual risk taking is increased when travelling abroad. This increase can be seen not only as a corollary of the results from Study IV but would also be in line with the results from several studies that show that a high proportion of youth who have intentions to have sex or anticipate having sex on the trip [2, 6, 9, 18, 19, 23, 75]. Another group consists of those who bring condoms on a trip abroad, where it is unclear whether they have a firm intention of engaging in sex, or if they are just are careful but ‘open to sexual contacts’ [4, 6, 21]. The meta-analysis in study IV’s showed that the 'expectation of sex' is the most reliable predictor of that sex with a casual partner while abroad.

These results are also supported to a great extent by several qualitative studies [26, 28, 30]. In them, travellers report that trips abroad entail less social control and thus provide greater opportunities for sexual freedom than they have at home. These results, which concern women only, may partly explain the findings, in Study II and Study IV, where women increased their risks to almost the same extent as that shown by men.

Thus, travelling abroad, implies for some persons a sexual opportunity that does not exist for them at home. One may conclude that in such cases the trip itself is the risk.

An important finding in Study II was that short-term travellers had a higher risk compared to long-term travellers. Qualitative research indicates 'time compression' as a possible explanation: short-term travellers must act faster to forge an encounter with a partner than those who travel for a longer time. This behaviour can lead to impulsive decisions that are detrimental, such as disregarding the use of condoms (28). Due to the fact that short-term travellers make up the vast majority of

travellers, shorter trips might entail more significant consequences for STIs dissemination than was assumed earlier.

Although Study II showed that the relative risk of casual sex increases with foreign travel, Studies I-III showed that casual sex, multiple partners and non-condom use with casual partners were more common in Sweden in absolute terms. It has previously been attested that youth with risk-taking behaviour in their home country have more often have same behaviour while travelling abroad [5, 9, 10, 14, 15, 19]. These individuals, especially if they have multiple partners in both places, can bridge these networks and facilitate the spread of STI between countries [76].

To not use a condom with a casual partner abroad probably entails the highest risk of contracting an STI. In the pooled results from Study IV, a majority of travellers reported casual sex without use of condoms. The high number was probably due to the fact that most of these studies were performed in convenience settings where one could not rule out major risk-taking might be very common. In the current study about 5% of the entire sample, equal to men and women, described their last partner as casual and did not use condoms in this intercourse (Study III). A similar result has previously been disclosed in a report from PHAoS also conducted among foreign travellers in the general youth population [77]. This is, of course, a very approximate estimate of a minimum risk-taking level among travellers that needs to be confirmed by future studies. Nevertheless, we see advantages in having an approximate perception of the size of the risk.

Men were identified as significant risk-takers in all analyses that concerned casual and multiple partners (Studies I–III). Men had more risk factors; namely, they were more often sensation seekers, heavy episodic drinkers, and illicit users of drugs both in Sweden (Study III) and abroad (Studies I–IV). On the other hand, it is women who are the greater risk-takers regarding non-condom use with casual partners at home (Study III) and away (Studies I–IV). Increased condom use by men while travelling might indicate a somewhat more cautious life-style (Study III). However, the overall low level of condom use, domestic and international, suggests barriers to improved condom use remain and that these probably are independent of whether one is travelling or not.

A traditional explanation has been that some men do not want to use condoms and women fail to negotiate their use. It is thought that men are viewed as being responsible for the decision, whereas women are relegated to having a role as negotiators if condoms are to used [78]. If so, the term ‘at risk’ is a better description than 'risk taking', as the latter can be interpreted as a more active approach.

Men are more often sexual risk-takers compared to women. However, sexual risk-taking behaviour among young women has changed rapidly in Sweden over the last few decades and has reached the level of men [34]. Although both young men and

women consider the use of condoms to be important, the implementation of their use is often lacking. To what extent this is a mutual decision or due to a man's more negative attitude toward condoms is unclear. Research in different countries confirms that both genders agree that it is a) difficult to propose or discuss the use of condoms [36, 79, 80], b) their perceptions of partner's STI status forms the basis for their use of condoms, or c) that they down-play the risk of an STI [81]. Intoxication usually has a crucial role in whether or not a condom is used [36, 78, 82, 83].There are several reasons why men do not use condoms, including fear of losing their erection [84], or they may delegate prevention responsibility to the woman [85]. However, women also report reasons for not wanting to use condoms, e.g., reduced intimacy and spontaneity or the disruption of a romantic mood [36, 81, 86], fear of being considered promiscuous [86], or being 'swept away in the heat of the moment' [80].

That women are more sensation seeking than men when it comes to casual sex may seem a strange finding, since men characterised themselves to a greater extent as sensations seekers (Study III). However, it may indicate that casual sex not is restricted to men who define themselves as sensational-seekers, whereas the majority of women who have casual sex, are self-described sensation seekers. Travelling abroad appears to be a more important prerequisite for women who seek freedom from social constraints or a judgmental setting at home. As described in the qualitative literature, the possibility of finding casual partners on holiday can be a liberating and empowering opportunity that impels women with sensation-seeking behaviour to take action [28, 30]. The mediation analyses, in Study III, showed that a sensation-seeking behaviour was associated with several risk determinants, such as HED, and the illicit use of drugs. It has been demonstrated that sensation seeking is a personality trait for which there are biological causes. Since personality traits can be regarded as primary determinants of behaviour, one could describe some individuals as risky persons. This might explain why a group of youths, despite adequate preventive interventions, continue exposing themselves to risks. Deeper personality traits are more difficult to influence, and this is something that must be considered when designing future interventions to reduce sexual risk-taking.

Other findings, which we do not believe have been presented previously, showed that the 'poor mental health' was associated with an increase in casual sex and non-use of condom with casual partner abroad (Studies I–III). Having parents who were born in another country was also more commonly found among those who have casual sex abroad (Study I). Both results applied only to men.

In the case of mental health, the question was based on a screening instrument that covers 25 different items. Consequently, we cannot specify the kinds of problems that affect the outcome. It has previously been shown that poor mental health can be associated with casual sex but this study did not concern travel abroad [87].

Considering that approximately every third male reported poor mental health in our study, there would be reason to do detailed studies of what kind of illness was at issue, and consider what support these individuals need.

We have not been able to explain the increased risk-taking among men whose parents were born abroad. However, since just over every fourth man in this survey has an immigrant background, there may be a risk dimension that should be explored in future research. Migrants who return to their country of origin have been shown to have increased risk of casual sex [24, 88]. However, in the case of the current study, we do not know whether the individuals returned to their parents' country of origin or travelled to other destinations.

Methodological aspects of Studies I–III

Studies I–III are based on retrospective and self-reported information that in some cases reached back one year in time. As a result, recall bias cannot be ruled out. There is also a risk that individuals may over- or underreport on sensitive issues such as alcohol consumption, illicit use of drugs, mental health, and sexual activity. The questions inquired into the respondent's last trip abroad and the latest sexual partner during this journey. It is possible that an individual acted differently on this particular trip or with this partner than otherwise. However, we believe that individuals tend to behave similarly under conditions that are close to the same, and that the last partner might be seen as representative of other trips and partners The alternative, which would be to include more questions about several trips and other partners, is likely to have cause other disadvantages. Specifically, the risk of recall bias increases when the person can mix up or forget about details. It can also increase the number of non-responses because this is to a certain extent proportional to the number of questions posed.

The internal validity consists in part of how and in what way a questionnaire was designed. The present survey was made up of validated instruments and questions. Otherwise, the questions used were standard ones as commonly employed in this scientific field. The questionnaire was also discussed with a large group of experienced researchers and tested by a group of youths before final distribution.

Those who responded to the questionnaire and who stated their address received a cinema ticket as compensation. Remuneration for increasing the number of participants can lead to a response bias. In this case, we considered that the low value of the remuneration was not encourage any particular group to respond more than other groups.

Study I and III are cross-sectional. The advantage of the cross-sectional design is primarily economy and simplicity, but also the ability to direct many questions to a large number of participants.

One of the disadvantages of a cross-sectional study is that it is not possible to determine a causal link between the independent variables and the outcome, and one can only describe associations.

However, in studying a group of foreign travellers, other types of study design are more difficult to apply. One option is a case-crossover design where individuals become their own controls (see above). A cohort study with a longitudinal design would be challenging to implement when people who travel abroad, usually go infrequently and irregularly. This would appear to apply especially to young adults whose lives are most in flux during this period.

Confounding

A confounder is defined as a variable that affects the outcome and is non-causally correlated to the main exposure variable. In Study I and III (and in some of the analyses in Study II) confounding was controlled by adjustments in the regression analyses. In the main analysis of Study II, confounding was controlled by utilizing the modified case-cross over design. Study III also analyses how variables can mediate the effect on the outcome.

Rate of response

Our relatively low response rate (46%) is a problem that we share with other studies in several research areas and a number of countries [89, 90]. This low rate of response applies in particular to the last three most recent studies on sexuality in youth groups in Sweden which have had a response rate about 25%. The most common reasons for non-responses are that respondents believe the questionnaire will take too much time; they are busy; or they are not interested [90]. Apart from the general trend of declining response rates, this survey may have limitations that could have influenced response rates and generalisability. For example, the size of the questionnaire may have been too extensive for some individuals. The survey was only available in Swedish and thus may have been a barrier for those who are not fluent in the language. Similarly, the survey's character exploring several sensitive topics such as alcohol, illicit use of drugs, mental health, sexual abuse and personal sexuality might also have been an obstacle. The sensivity also applies to groups in which there are significant taboos regarding these topics. Also, lacking access to a personal computer may have been a barrier. Furthermore, it is very difficult to speculate about whether there might have been any differences in possible underreporting of risky sexual behavior in the group who travelled abroad compared with those who did not. Hence we do not find any convincing reasons to

assume that there would be a great degree of selection bias caused be the above mentioned circumstances.

Neverthless, a low response rate can reduce precision in the result as the random errors are likely to increase.

Generalizability

In terms of this study, there is no indication that sexual behaviour would be different in the study population compared to the young general population as a whole. Nor does the experience of international travel seem to distinguish this study population from youth in general [70]. A comparison with the population of Skåne shows that women dominate the study sample and individuals with at least one parent born in another country are somewhat underrepresented. An estimation of parental educational level compared to the same age group in the general population, indicates that a more significant number in the study sample had at least one parent with a university degree. These findings are consistent with participation pattern in epidemiological studies [89]. Results were analysed in gender-separated groups and gender has less significance except for the combined results. However, it is not clear to what extent parent's education or immigration background would affect sexual risk taking in youths, and thus the generalizability. Possible effects should of course be taken into account in specific issues.

Specific methodological aspects of Studies I–III

Study II compares casual partners in Sweden and abroad with a case-crossover approach. That one event (casual sex) was examined during a longer time period (while in Sweden), and another event during a short time abroad can be seen as incomparable quantities. The ideal had been to include all events in Sweden throughout the stay in Sweden in comparison with all events abroad during total time abroad. However, the study did not look at the number of partners a individual had, but merely compared the last occasion of sex abroad versus the last occasion of sex at home, and whether it was with a casual partner or not. This might not reflect the total of all events during the period at home or abroad. However, we think it is reasonable to consider the latest intercourse as representative of other intercourse during the same period. We therefore assume that it is realistic to conclude that sexual risk-taking is increasing during foreign travel, especially for short-term travellers.

Study III compares sensation-seeking with non-sensations-seeking behaviour based on the validated BSSS-4 instrument. Four questions are posed separately, and each

answer is based on a five-item Likert scale. There is no established cut-off score between sensation seeking and non-sensation seeking, and various definitions have been used across studies. The result can be affected by choice of cut-off point, which also makes it difficult to compare the result in different studies.

Methodological aspects of Study IV

A literature review could be affected by 'reporting bias' that has consequences in for the meta-analysis. 'Reporting bias' can imply that the results of the study affect the ability or the willingness of the authors to publish it. Significant outcomes are more likely to lead to multiple publications and consequently more citations. Results from significant findings are more commonly published in English-speaking journals than in other European language journals. Major databases index studies from, e.g., low-income countries to a lesser extent. Journals with a higher impact factor are cited more often than lower ranked journals, although the quality of the studies may be equal to those in more esteemed publications. [91].

In order to initially obtain as many relevant articles as possible, a broad literature search was carried out by a library specialist at Lund University. It included different types of sexual behaviour that may have resulted in contracting an STI/HIV in connection with a foreign trip. The search was conducted among English-language articles in six major databases. This brought with it the risk of both a language bias and a database bias.

Search terms were identified after manually screening the literature, consulting researchers, using reference lists from an earlier literature survey and running test searches. Despite this, there was the possible risk that frequently cited articles had a more significant impact compared to rarely cited articles. This in turn can influence the extent to which they are included in reference lists. One person conducted this part of the study – a disadvantage since there is a potential risk of personal opinions unknowingly affecting the selection process. However, to make the most of a structured and transparent inclusion process, which also reduces the risk of arbitrary decisions, the review was conducted following PRISMA guidelines. In the final step, the articles were read in their entirety and excluded according to clearly defined criteria that were adopted to reduce the risk of bias. The reading was conducted together or in consultation with the co-authors. In the interest of full transparency, the search history and reasons for exclusion are available from the corresponding author.

In meta-analysis is the evaluation of the consistency of the results across the studies included is, an important task. Without this knowledge, it is difficult to generalise the results of the findings. A meta-analysis based on a small number of studies, has a high heterogeneity and less consistent results and thus is more difficult to use as a basis upon which to generalise. Both regarding condom use and casual sex, there was a high heterogeneity among the studies involved.

Since a main objective of this study was to identify gaps in current research a high level of heterogeneity between studies indicates that future investigations should place more emphasis on appropriate methodology.

Unresolved questions

An issue requiring further study is why young women do not use condoms more frequently than they do, and why they do not significantly increase their condom use when travelling abroad. Presumably, lack of condom usage is not due to any absence of risk perception, but rather it appears as if the problem may have its origin in risk management. Although 'female use of condoms' is a well explored theme in the literature, the underlying factors for non-usage are still not apparent. Have women become more active risk-takers confident that they are secure in the use of other contraceptives or that STIs are treatable, among other factors? Or do traditional gender roles still exert considerable influence and women are subordinated? Hypothetically, one can assume that both trends exist in parallel and have their background in social determinants. However, the factors influencing condom use among young women need to be studied further in order to design more 'tailor-made' interventions.

Although youth increase their sexual risk-taking during their travel abroad, it appears that sexual risk-taking is more common, in Sweden during the year. However, it is unknown to what extent these groups may overlap with each other, i.e. whether risk takers in Sweden are also at risk when travelling abroad. If a person has many sexual contacts both in Sweden and abroad, this could increase the risk of larger and more rapid dissemination of STI in both places.

The results indicated that young men with immigrant background more often had casual partners abroad compared to young men whose both parents were born in Sweden. Since youths who have immigrant background represent more than 25% of the population and this number is likely to increase, it is reasonable to explore whether they have differing underlying behaviours and determinants compared to those with Swedish-born parents. The literature review also shows that migrants per se could constitute a particular risk group as they travel between different cultures.

We found that poor mental health was relevant for sexual risk-taking in men. Since 30% of the men surveyed reported poor mental health, it would be highly desirable to obtain more knowledge about the kind of mental problems facing such individuals. However, it also requires finding ways to identify and treat those individuals. Since mental health is also a great problem for young women, understanding apparent gender differences regarding the impact of poor mental health on sexual risk-taking requires further study.

The literature review shows that a majority of studies report almost the same panorama of factors associated with sexual risk-taking abroad such as male gender, alcohol, drug use, and long-term travel. Considerably fewer studies investigate how social determinants, such as level of education, socio-economic background, ethnicity, occupational status, and mental health affect sexual risk-taking. It is very likely that these factors have a substantial impact on sexual behaviour. However, this needs to be confirmed in further research.

A remaining challenge concerning knowledge gaps is the low response rate within specific groups. Within this as well as in other studies, it appears that, e.g., men and lower-educated tend to respond to surveys to a lesser extent regarding public health issues. We have therefore probably less knowledge about the sexual behaviour of lower-educated and men compared to other groups. It is, therefore, necessary, in forthcoming studies to find other ways to recruit these individuals.

Conclusions and public health implications of the findings

A small proportion of Swedish youth take sexual risks when travelling abroad. Nevertheless, these individuals increase their risk when they go abroad compared to when at home. This increase applies in particular to short-time travellers who are the vast majority of travellers. In this study, they constitute 90 % of all travellers. Sexual risk-taking among youth abroad, in combination with an assumed increase in travel, where short-term travellers dominate strongly, may represent a growing public health problem that should be taken into account in future studies. However, youth travellers should also be given priority when it comes to STI prevention efforts

Future studies should also consider whether risk-taking behaviour while on the trip abroad might represent the individuals' usual behaviour at home and not behaviour caused by the travel itself Youth who have a high risk-taking behaviour in all settings may bridge sexual networks in different countries and increase the dissemination of STIs.

It is more common among Swedish men, compared to women, to have a casual partner abroad. On the other hand, it is more common for women not to use a condom with the casual partner. As the consequences of an STI are worse for women compared to men, it is even more relevant to increase condom use among women. Although more research is needed to determine why women use condoms to a lesser extent than men, the results show that women may need to be strengthened in their ability to request that condoms be used.

The thesis can also confirm the findings from other studies that younger aged persons, long-term travellers, binge drinkers, and illicit users of drugs take greater sexual risks than others. In addition to these risk factors, we can now add those represented by immigrant background and poor mental health, albeit these factors applied only to men. Also, it appears that the search for excitement and sensation seeking in some individuals may be a factor that promotes risk-taking and especially among women. Since sensation seeking is a personality trait, this could explain why some individuals, despite optimal information and insight into the risks still do not change their behaviour.

The meta-analysis in Study IV revealed a high degree of conformity across studies, in that the strongest predictors of sexual risk-taking were the intention to have sex on the trip, being single, and travelling alone or in a group with friends. Awareness about this could potentially be used by providers at e.g. youth-clinics, STI-clinics, and vaccination centers to discern potential risk-takers.

Future studies should consider low response rates in general and among low-educated and men in particular, and supplement dispatched questionnaire with data collection conducted in physical places, among query panels or on various websites where there is a possibility to reach groups that may be less likely to respond via the traditional method of data collection.

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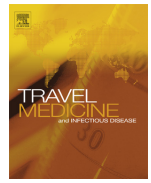

Sexual risk-taking during travel abroad – a cross-sectional survey among youth in Sweden

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Travel;
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Summary *Background:* The aim was to assess sexual risk-taking behaviour in a sample of Swedish youth who were sexually active while travelling abroad and to examine possible associations with sexual risk-taking behaviour during such travel.
Methods: From a population-based sample of 2189 Swedes 18–29 years, 768 who were sexually active while abroad, were assessed by a questionnaire concerning socio-demographic background, life-style, travel duration, sexuality, mental health, heavy episodic drinking (HED) and drug-use.
Results: Approximately 1/4 reported intercourse with a casual partner abroad. Casual sex was associated with HED, 18–24 years, and drug use in both sexes, and for women, also with ≥one month of travel. Among youth with casual partners, 48% reported non-condom use. Non-condom use with a casual partner was associated with 18–24 years, ≥one month of travel for women, and poor self-rated mental health for men. About 10% had ≥2 partners abroad. Having ≥2 partners abroad was associated with ≥one month of travel, and for men also with HED.
Conclusion: Male sex, 18–24 years of age, ≥1 month of travel, HED, and drug use were significantly associated with sexual risk-taking during travel abroad. Poor self-rated mental health and foreign-born parentage might also constitute risk factors for men.

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1. Introduction

Due to the rising incidence of sexually transmitted infections (STI) worldwide [1], sexual risk-taking during travel abroad is an area of increasing public health concern [2]. In high-income countries, youth, defined as 15–24 years [3], represent the age group with the highest prevalence of STI [4]. In Sweden youth are also those who are the most avid foreign travellers [5]. Thus, youth are an important group to consider when examining sexual risk-taking during travel abroad [6]. However, only a limited number of studies have focused on sexual risk-taking among youth while travelling abroad.

To our knowledge only two studies concerning sexual behaviour while travelling abroad have been carried out in a general youth population, and both were conducted in the UK. The two studies showed that 10% and 23% of youth had a new sexual partner while travelling abroad [6,7] and one of them reported that 25% had inconsistent- or non-use of condom use with a new partner [7]. According to a report issued by the Public Health Agency in Sweden, 9% of persons aged 20–24 years had casual sex during travel abroad and about half of them did not use a condom [8].

Studies made in convenience samples (e.g. backpackers at hostels or in STI-clinics, travellers in departure halls at airports or visitors and casual workers at tourist resorts) showed that 25–80% had a new sexual partner and about 30–55% had $\geq$2 partners while abroad. Between 35% and 65% reported inconsistent- or non-use of condom [9–13]. Two studies reported that about 50% of the men and 10–24% of the women intended pre-travel to engage in casual sex on the trip [10,14].

Sex with a new or casual partner, inconsistent- or non-use of condom and multiple sex partners are commonly used in previous studies, either singly or taken together, as indicators of risky sexual behaviours [6,7,9–13,15–18]. They can in turn be seen as proxies for the risk of STI. Few studies of youth travellers have included a diagnosed STI as an outcome [13,15,19].

Factors that have been shown to be associated with sexual risk-taking behaviour among youth while abroad are male gender, single status or travelling alone, long-stay travel, pre-travel expectations of sex, excessive alcohol consumption, use of drugs and same-sex behaviour among men [6,7,9,10,13,14,16–18].

Of all chlamydia-infected in the age group 18–29 years in Sweden 2014, about 8% of women and 7% of men were infected abroad, according to statistics from the Public Health Agency of Sweden. Ten percent of all chlamydia cases had no identified country of origin of infection; thus, these figures may be underestimated. With regard to gonorrhoea in the same age group, about 26% were infected abroad (personal communication: I Velicko, Public Health Agency of Sweden, 27/02/15). Thailand, Spain, Greece and the UK are among the most common countries where Swedes acquire these two infections [20]. These countries are also among the major tourist destinations for Swedes. More than half (57%) of those who were diagnosed with syphilis [21]and the majority (83%) of those who acquired HIV during 2014 had been infected abroad [22]. Those affected were mostly persons who were infected in their country of origin and came to Sweden as a refugee or immigrant family member. About 20% of those who became HIV infected abroad were living in Sweden and were primarily infected in Thailand and Western European cities [20].

In recent decades sexual risk-taking has increased among youths in Sweden. Both the number of partners and casual sex with inconsistent condom use has increased, particularly among young women [23,24]. To have a regular relationship does not necessarily mean that the risk of STI ceases. In a group of Swedish youth aged 15–29 in a regular relationship in 2009, 11% of women and 10% of men stated that they have had sexual partners outside the relationship [25].

Travel patterns have also changed. To travel for pleasure is the most common reason for youth in Sweden to go abroad, but for today's youth, the world is also a place of work, study and social meetings [26]. Travelling has also become a "rite of passage". Young Swedes often make a long, low budget trip, e.g. after graduation, before a more established adulthood starts.

Thus far, no systematic studies have been conducted among youth in the general population in Sweden that focus on sexual risk-taking while travelling abroad. According to our knowledge, only one study in a convenience setting [19] and two qualitative studies had included youth [27,28]. More research is needed concerning youth's sexual risk-taking while travelling abroad and the factors that might influence this behaviour.

The aim of this study was to assess sexual risk-taking behaviour in a sample of Swedish youth, who were sexually active while travelling abroad. A further aim was to examine possible associations between sexual risk-taking behaviour while travelling abroad and potentially relevant characteristics such as socio-demographic background, selected lifestyle factors, and mental health.

2. Method

2.1. Study design

The study design was cross-sectional and based on a questionnaire that was developed from pre-validated questions [25,29–33]. Data collection took place between January and March 2013.

2.2. Study setting and participants

Skåne is the southernmost administrative region in Sweden with about 1.3 million inhabitants, among which 206 000 are between 18 and 29 years of age.

The invitation to participate was sent to 7000 persons, 18–29 years of age and permanently residing in Skåne 1 January 2013. The subjects were randomly drawn from the Swedish Central Population Registry. Potential participants received an introductory letter with information about the study, information about the voluntary nature of study participation and a guarantee of anonymity. The letter included a link to a server that provided an opportunity to answer on-line. Three reminders were sent out, and the last one also included a printed version of the questionnaire. After completing the questionnaire, the respondents

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received one cinema ticket as compensation for their time spent on filling in the questionnaire.

2.3. Inclusion and exclusion criteria for participants

In order to examine potentially risky sexual behaviour among persons who engage in sexual encounters while abroad, participants in the present study were included if they had been abroad for the last 12-month period and had been sexually active (defined as vaginal or anal intercourse or oral sex) during the last trip. Consequently, subjects were excluded if they had not been abroad during the last 12 months or had not been sexually active during the past stay abroad. Also, as males and females may differ in sexual risk taking, those with missing information about gender were excluded.

2.4. Independent variables

2.4.1. Age

Age was dichotomised as two groups 18–24 years and 25–29 years of age, based on the assumption that younger persons seem to be inclined to take more sexual risks compared to youth who are older [6,7,18].

2.4.2. Sex

Sex was classified as male or female.

2.4.3. Level of parents' education

Level of parents' education was used as an indicator of social position since younger persons might not have finished their education or might lack employment or income. Parental education is often used as a predictor of youth occupational outcome [34]. Response alternatives were: "9-year compulsory school", "2-years of upper secondary school", "3–4-years of upper secondary school", "other types of schools" and "university". This variable was then dichotomised as "high level of education" if at least one parent had a university degree, and "low level of education" for all other alternatives.

2.4.4. Immigration

Parental country of birth was used to identify youth with an immigrant background, as experience of and attitude to sexuality can vary with cultural background [32]. The options were: both parents born in Sweden, one of the parents born abroad, and both parents born abroad. The answers were dichotomised as "Swedish background" or "foreign-born background", i.e. if at least one parent was born abroad.

2.4.5. Duration of the last trip abroad during which sexual activity occurred

For the analysis, the duration of the trip was divided into three categories: 1–8 days, 9–29 days and $\geq$30 days. A trip abroad was defined as having left Sweden for a visit to another country, regardless of duration and destination.

2.4.6. Mental health

status was measured using the Hopkins Symptom Checklist (HSCL-25), which assesses symptoms of anxiety (10 items) and depression (15 items) during the preceding month, on a scale from 1 ("not at all") to 4 ("extremely"). For each item respondents were asked, "How much has this problem bothered or distressed you during the last month, counting today?" Mean total mental health scores, as well as mean scores for depression and anxiety, were calculated on the basis of a respondent's total scores for each of the items and then divided by the number of items for which responses were received [29]. We dichotomised the scores into "satisfactory self-rated mental health ", i.e., low HSCL symptom score and "poor self-rated mental health ", i.e. high HSCL symptom score, based on the median split of the frequency distributions of the measure in question. Due to technical error, the item "thoughts of ending one's life" was not included in the paper version of the questionnaire. Consequently, about 1/5 of the respondents did not have access to this particular item, and therefore, this one item was excluded for all respondents.

Lifestyle variables included heavy episodic drinking (HED) and drug use when travelling, both of which have been shown to be associated with sexual risk-taking [16,18].

2.4.7. HED last time abroad

HED last time abroad was defined as consumption of four or more units of alcohol for women and five or more units for men, at the same occasion. The alternatives for consumption of this amount of alcohol were: "every day or nearly every day", "every week", "2–4 times/month", "every month", "less than once a month" or "never". The third to the fifth response alternatives were only relevant for trips of more than one month's duration and that limitation was also described in the questionnaire. A person drinking the amount quantified above more often than once a month was defined as HED and was categorised as "Yes" in the dichotomised analysis. The other alternatives were categorised as "No" [30].

2.4.8. Drug use last time abroad

Drug use last time abroad included use of all types of narcotics and examples were provided, i.e. marijuana, hashish, cocaine, and amphetamine. The respondent answered "Yes" or "No".

2.5. Dependent variables

2.5.1. The number of sexual partners last time abroad

The number of sexual partners last time abroad was dichotomised as "1 partner" or "$\geq$2 partners" in accordance with United Nations General Assembly Special Session on HIV/AIDS [31].

2.5.2. The use of condom during last intercourse last time abroad

The response alternatives were "Yes" coded as "use of condom" or "No" coded as "non-use of condom".

2.5.3. The relation to sexual partner at the last occasion of intercourse while abroad

The response alternatives were dichotomised by classifying married, living together or another steady relationship as

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"regular sex partner" and previous partner, friend, casual contact, commercial sex partner or other non-regular partner as "casual sex partner". A "casual sex partner" is thus one whose current STI-status is unknown. That the respondent might have had some previous acquaintanceship with the casual sex partner (e.g. friend or former partner) does not reduce the risk of STI transmission. "Casual sex" is defined, as having sexual intercourse during the first encounter with a person whose current STI-status is unknown.

For the purpose of the analyses, sexual risk-taking was defined as having $\geq$2 partners, casual sex and non-use of condom with last casual partner while abroad.

The Regional Ethical Review Board in Lund, Sweden has approved the study.

2.6. Statistical analysis

Statistical analysis was performed using SPSS version 22. Associations between the outcome variables and the independent factors were examined by Chi-2 tests. Associations were examined in relation to the potential confounders represented by age, immigration, parental education, duration of travel, mental health, HED, and use of drugs, when simultaneously adjusted for one another (see tables) using logistic regression, with results presented in terms of odds ratios (OR) and 95% confidence intervals (CI). Statistical significance was accepted at $p \leq 0.05$. Since men and women have different tendencies to engage in sexual risk behaviour, the results were analysed separately by gender.

3. Results

Of the 7000 letters of invitation sent, 332 letters came back by return post, mostly due to incorrect address information. A total of 2968 persons responded to the questionnaire, representing 45% of the final number of recipients (n = 6668). Of the respondents, 82% answered electronically and 18% answered by mail.

Among the 2968 persons who responded to the questionnaire, 779 were excluded due to lack of information about gender, no sexual activity last 12 months (defined as vaginal or anal intercourse or oral sex) or no travel abroad during the last 12 months. Of the remaining 2189 participants, 1421 participants (65%) were excluded due to not having had intercourse while abroad (see Fig. 1). The final sample consisted of 768 persons.

Table 1 presents the distribution of socio-demographic and background variables in the sample of persons who had intercourse during their last stay abroad (n = 768). More than half were females (60%). About 75% had parents born in Sweden and 65% had parents with an academic degree. Regarding duration of the last trip abroad, 55% made a trip of up to 8 days and 17% made a trip longer than a month.

Almost twice as many women compared to men had poor mental health status, i.e. 57% and 31%, respectively. Heavy episodic drinking abroad was more frequent among males (67%) compared to females (57%).

Nine percent used drugs during their last trip abroad. Drug usage was more common among men (12%) compared to women to (7%).

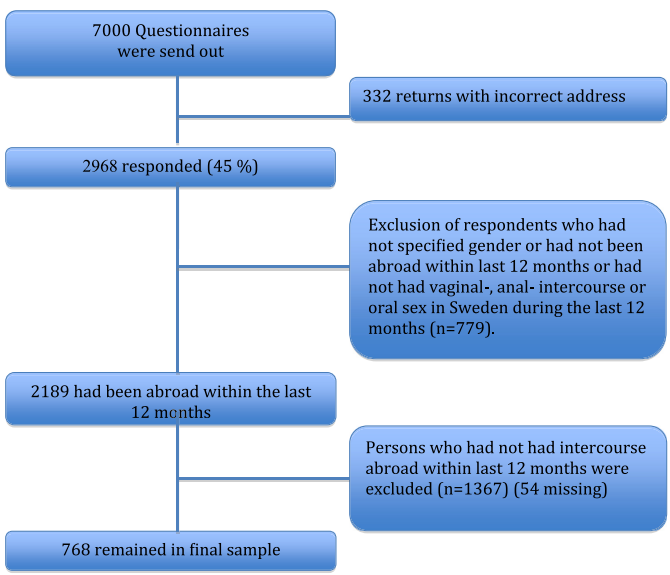

Figure 1 Flow chart of eligible participants.

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Table 1 Distribution of socio-demographic factors, length of travel, mental health, heavy episodic drinking, use of drugs, sexual partner and sexual behaviour among young people in Sweden who have had sexual intercourse during last visit abroad in the last 12 months (n = 768).

	All		Male		Female		*p*
	n	%	n	%	n	%	
Sex							
Male	304	40					
Female	464	60					
Age							0.421
18–24 year of age	400	53	153	51	247	54	
25–29 year of age	360	47	148	49	212	46	
(Missing)	(8)		(3)		(5)		
Level of Parents education							0.092
High	498	65	186	62	312	68	
Low	266	35	116	38	150	32	
(Missing)	(4)		(2)		(2)		
Immigration							0.457
Both parents born in Sweden	572	75	221	73	351	76	
At least one parent has immigrated	192	25	80	27	112	24	
(Missing)	(4)		(3)		(1)		
Duration of most recent travel							0.864
1–8 days	417	55	160	54	257	55	
9–29 days	216	28	87	29	129	28	
≥30 days	129	17	52	17	77	17	
(Missing)	(6)		(5)		(1)		
Mental Health							**<0.001**
Satisfactory self-rated mental health	408	53	209	69	199	43	
Poor self-rated mental health	359	47	94	31	265	57	
(Missing)	(1)		(1)				
Heavy episodic drinking last time abroad.							**0.006**
No	281	39	95	33	186	43	
Yes	443	61	195	67	248	57	
(Missing)	(44)		(14)		(30)		
Used drugs last time abroad.							**0.018**
No	693	91	265	88	428	93	
Yes	68	9	36	12	32	7	
(Missing)	(7)		(3)		(4)		
Number of sexual partners last time abroad.							**<0.001**
1	690	90	257	85	433	94	
≥2 partners	75	10	45	15	30	6	
(Missing)	(3)		(2)		(1)		
Casual sex last time abroad							**0.001**
No	585	76	212	70	373	81	
Yes	181	24	91	30	90	19	
(Missing)	(2)		(1)		(1)		
Use of condom in casual sex last time abroad.							**0.004**
Use of condom	94	52	57	63	37	41	
Non-use of condom	87	48	34	37	53	59	
(Missing)	(578)		(210)		(377)		

In terms of sexual risk-taking abroad, 10% had ≥2 partners and 24% had casual sex; both types of sexual risk-taking were significantly more frequent among men compared to women (multiple partners p = <0.001; casual sex p = 0.001). About half of the sample (48%) did not use a condom during casual sex abroad, with non-usage significantly more frequent among females (p = 0.004).

Table 2a for males (n = 304) and 2b for females (n = 464) shows the crude and adjusted results for the logistic regression analyses concerning the associations between age, foreign-born parent, low parental education, ≥one month of travel, HED, use of drugs, poor self-rated mental health and the outcome measures represented by ≥ 2 partners, casual sex, and non-use of condom with

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Table 2a Males. Crude and adjusted[a] associations (odds ratio (OR) and 95% confidence interval (CI), p-value) of age, parental background, length of travel, heavy episodic drinking (HED), use of drugs, self-rated mental health, in relation to ≥2 partners, casual sex, and non-use of condom in casual sex among males who have had sexual intercourse during last visit abroad in the last 12 months (n = 304).

	Crude				Adjusted			
	OR	(CI)	p	(Missing)	OR	(CI)	p	(Missing)
≥2 partners abroad								
18–24 years of age	1.52	(0.79–2.91)	0.201	(2)	1.43	(0.64–3.18)	0.382	(27)
Foreign born parent	2.31	(1.20–4.64)	**0.013**	(5)	1.70	(0.71–4.06)	0.230	
Low level of parental education.	0.88	(0.46–1.71)	0.714	(4)	1.32	(0.58–3.01)	0.507	
≥One month of travel	8.65	(4.07–18.4)	**<0.001**	(7)	8.61	(3.41–21.7)	**<0.001**	
HED	5.58	(1.93–16.1)	**0.002**	(16)	6.00	(1.81–19.9)	**0.003**	
Use of drugs	4.41	(2.03–9.70)	**<0.001**	(5)	2.33	(0.80–6.81)	0.121	
Poor self-rated mental health	0.99	(0.50–1.97)	0.985	(3)	0.81	(0.34–1.96)	0.640	
Casual sex abroad								
18–24 years of age	1.97	(1.19–3.29)	**0.008**	(4)	2.11	(1.18–3.78)	**0.012**	(26)
Foreign born parent	2.28	(1.33–3.89)	**0.003**	(4)	1.99	(1.03–3.86)	**0.040**	
Low level of parental education.	0.74	(0.44–1.24)	0.257	(3)	0.88	(0.49–1.6)	0.680	
≥One month of travel	2.48	(1.30–4.71)	**0.006**	(6)	1.85	(0.83–4.15)	0.133	
HED	3.64	(1.89–7.0)	**<0.001**	(15)	3.30	(1.62–6.73)	**0.001**	
Use of drugs	3.96	(1.93–8.11)	**<0.001**	(4)	2.79	(1.15–6.75)	**0.023**	
Poor self-rated mental health	1.54	(0.91–2.59)	0.105	(2)	1.68	(0.91–3.09)	0.095	
Non-use of condom in casual sex abroad								
18–24 years of age	0.52	(0.22–1.25)	0.519	(213)	0.39	(0.14–1.12)	0.080	(223)
Foreign born parent	0.53	(0.22–1.32)	0.173	(213)	0.35	(0.11–1.15)	0.084	
Low level of parental education.	1.53	(0.62–3.76)	0.355	(214)	1.34	(0.45–3.97)	0.597	
≥One month of travel	1.29	(0.47–3.52)	0.617	(214)	1.37	(0.38–4.96)	0.634	
HED	1.04	(0.31–3.51)	0.947	(220)	1.44	(0.32–6.41)	0.635	
Use of drugs	1.32	(0.49–3.57)	0.584	(214)	1.79	(0.45–6.57)	0.379	
Poor self-rated mental health	3.08	(1.26–7.54)	**0.014**	(214)	4.9	(1.68–14.3)	**0.004**	

[a] All variables were simultaneously adjusted for one another.

casual partner abroad. In the fully adjusted models, all variables were simultaneously adjusted for one another.

A fully adjusted model, with gender as a variable, showed that men took significantly more sexual risks compared to women, i.e. non-condom use during casual sex (OR 1.82, CI 1.21–2.73, p 0.004) and ≥2 partners (OR 3.20, CI 1.73–5.93, p < 0.001). However, non-condom use during casual sex was more common among women (OR 2.4, CI 1.20–4.79, p 0.004) (Comparisons by gender not shown in tables). In general, in the fully adjusted models, the factors that were significantly related to the respective outcome measures were almost similar in males and females with regard to having multiple partner and casual sex. For males ≥ one month of travel (OR 8.61, CI 3.41–21.7, p < 0.001) and HED (OR 6.00, CI 1.81–19.9, p = 0.003) were significantly related to having ≥2 partners. For females, solely ≥one month of travel was significantly related (OR 6.51, CI 2.35–18.0, p < 0.001) to having ≥2 partners.

Among males, casual sex was significantly related to 18–24 years of age (OR 2.11, CI 1.18–3.78, p = 0.012), foreign-born parents (OR 1.99, CI 1.03–3.86, p = 0.040), HED (OR 3.30, CI 1.62–6.73, p = 0.001), and use of drugs (OR 2.79, CI 1.15–6.75, p = 0.023). Among females, significant associations were similarly found between casual sex and 18–24 years of age (OR 3.27, CI 1.79–5.97 p = <0.001), ≥one month of travel (OR 2.67, CI 1.34–5.33, p = 0.005), HED (OR 3.02, CI 1.16–5.60, p = <0.001) and use of drugs (OR 4.94, CI 2.13–11.6, p = <0.001).

Regarding non-condom use during casual sex, the pattern of association differs among males and females. For women, non-condom use was significantly related to 18–24 years of age (OR 4.49, CI 1.17–17.3, p = 0.029) but non-condom use was significantly less frequent among those with ≥one month of travel (OR 0.12, CI 0.03–0.45, p = 0.004). For men non-condom use during casual sex was significantly related to poor self-rated mental health (OR 4.9, CI 1.68–14.3, p = 0.004).

4. Discussion

Our findings showed that 3/4 of youths do not engage in sexual risk-taking behaviour abroad, based on the notion that their last sexual encounter was with a regular sex-partner. However, a minority did take sexual risks, in that the remaining 1/4 reported that their last sexual encounter was with a casual sex partner. That the sexual risk-takers overseas were a minority corroborates results from other studies in general youth populations but even in convenience samples [6,7,17]. However, the current findings contradict the results of other studies conducted in convenience samples where the proportion of casual sex has been shown to be larger [9–12]. The most likely

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Table 2b Females. Crude and adjusted[a] associations (odds ratio (OR) and 95% confidence interval (CI), p-value) of age, parental background, length of travel, heavy episodic drinking (HED), use of drugs, self-rated mental health, in relation to ≥2 partners, casual sex, and inconsistent use of condoms in casual sex among females who have had sexual intercourse during last visit abroad in the last 12 months (=464).

	Crude				Adjusted			
	OR	(CI)	p	(Missing)	OR	(CI)	p	(Missing)
≥2 partners abroad								
18–24 years of age	2.71	(1.13–6.50)	**0.026**	(6)	1.84	(0.69–4.86)	0.221	(41)
Foreign born parent	0.64	(0.24–1.73)	0.381	(2)	0.63	(0.19–2.10)	0.449	
Low level of parental education.	0.64	(0.27–1.54)	0.322	(3)	0.71	(0.26–1.95)	0.508	
≥One month of travel	7.53	(3.06–18.6)	**<0.001**	(2)	6.51	(2.35–18.0)	**<0.001**	
HED	2.62	(1.03–6.65)	**0.043**	(31)	2.17	(0.78–6.05)	0.137	
Use of drugs	4.05	(1.52–10.8)	**0.005**	(5)	2.66	(0.84–8.42)	0.097	
Poor self-rated mental health	1.82	(0.82–4.08)	0.143	(1)	1.52	(0.61 – 3.77	0.369	
Casual sex abroad								
18–24 years of age	3.04	(1.82–5.14)	**<0.001**	(6)	3.27	(1.79–5.97)	**<0.001**	(41)
Foreign born parent	1.03	(0.6–1.77)	0.907	(2)	1.14	(0.59–2.2)	0.702	
Low level of parental education.	0.63	(0.77–1.06)	0.081	(3)	0.65	(0.35–1.18)	0.158	
≥One month of travel	3.69	(2.07–6.6)	**<0.001**	(2)	2.67	(1.34–5.33)	**0.005**	
HED	3.47	(1.98–6.09)	**0.001**	(30)	3.02	(1.16–5.60)	**<0.001**	
Use of drugs	5.68	(2.71–11.9)	**<0.001**	(5)	4.96	(2.13–11.6)	**<0.001**	
Poor self-rated mental health	1.37	(0.85–2.20)	0.194	(1)	1.21	(0.7–2.08)	0.503	
Non-use of condom in casual sex abroad								
18–24 years of age	1.67	(0.63–4.43)	0.305	(378)	4.49	(1.17–17.3)	**0.029**	(384)
Foreign born parent	1.26	(0.46–3.4)	0.653	(375)	0.81	(0.21–3.06)	0.754	
Low level of parental education.	0.76	(0.29–2.01)	0.582	(375)	0.71	(0.22–2.31)	0.567	
≥One month of travel	0.20	(0.07–0.58)	**0.003**	(374)	0.12	(0.03–0.45)	**0.004**	
HED	1.01	(0.35–2.92)	0.995	(379)	0.62	(0.15–2.52)	0.506	
Use of drugs	1.27	(0.42–3.81)	0.675	(376)	3.19	(0.72–14.1)	0.126	
Poor self-rated mental health	1.09	(0.46–2.6)	0.847	(374)	0.93	(0.32–2.7)	0.895	

[a] All variables were simultaneously adjusted for one another.

explanation for the latter difference is that these studies were conducted in contexts where one would expect an increased risk propensity, such as resorts that are attractive to young people, hostels for backpackers or among temporarily employed bar and nightclub staff [9–12]. A contributing explanation for the lower rates of sexual risk-taking found in the current sample may be the predominance of female participants. In several other studies the majority of the participants were men [9–12]. Men are more inclined to take sexual risks, which can affect the overall outcome when results for males and females are presented in aggregated form [9,10,12,35].

Our findings that male gender, HED, use of drugs, younger age, and ≥1 month of travel (females) was associated with casual sex corroborate previous findings [6,7,9,10,12,13,17]. That among men, having foreign-born parents was associated with casual sex abroad has not been found in previous studies.

The proportion of those who used condoms when engaging in sex with a casual partner was nearly the same as in Bellis et al. [9] and Egan [10], lower in comparison to Bloor et al. [7] and Cabada et al. [17], but higher in comparison to Hughes et al. [12] and McNulty et al. [13]. These differences across studies may be attributable to differences in the precise formulation of the question regarding condom use. In the present study, as in Egan's study, the question concerned specifically "the last intercourse" abroad [10]. In contrast, Bloor et al. asked about "unprotected intercourse with last partner abroad" [7], Cabada et al. [17], Bellis et al. [9], and Hughes et al. [12] asked about "consistently use of condom during stay abroad", and McNulty et al. [13] asked about "condom use last three months" of the trip.

In the present study, it was more common for females compared to males, to not use a condom during casual sex. To our knowledge, this has previously been found solely in one other study [10]. Moreover, this does not mean that women choose to take risks. Although the concept "risk-taking" in itself might implicate the notion of voluntary choice, this is probably applicable for most men but not always for women who can be at a disadvantage with regard to decisions about condom use [36]. In this case it may be more correct to speak of "risk exposure".

In the analysis performed separately for males, non-condom use during casual sex was solely associated with poor self - rated mental health. A systematic review has shown that severe mental illness can lead to increased sexual risk-taking [37]. However, the instrument used for the assessment of mental health in the present study, i.e. the HSCL-25, cannot be used to determine the presence of severe mental illness or to determine any specific clinical diagnosis. Further research using different methodology would be needed to explore this finding. To our knowledge,

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previous studies concerning sexual risk-taking abroad have not included questions concerning mental health.

In the present study being male (compared to female) was significantly associated with multiple partners. This result corroborates previous findings [9–12,18] but is also contradicted by Bloor et al. [7]. In males separately, HED was significantly associated with multiple partners. In both sexes, ≥1 month of travel was significantly associated with multiple partners. Both of these results have previously been found by McNulty et al. [13].

4.1. Methodological considerations

The cross-sectional design of our study does not allow for the identification of causal determinants in the associations found regarding sexual risk-taking abroad.

The data used in the study were obtained by retrospective self-reporting. Thus, the possibility of recall bias or random over- or underreporting cannot be entirely excluded. The relatively low response rate (45%) could give rise to a selection bias, and caution is warranted in the interpretation of the findings. A declining response rate in health surveys is a well-known phenomenon. However, the preponderance of persons who responded electronically indicates that the development of future surveys for Internet can have some inherent potential for increasing response readiness.

Unfortunately, no demographic information was available concerning the non-respondents.

A possible limitation is that the results of the study primarily concern the last intercourse abroad (except in the case of multiple partners). The study does not examine encounter involving sexual intercourse at other times, during the trip, or whether a condom was used during such other encounters. The last intercourse was however, intentionally selected to reduce the risk of recall bias.

In the present study, men and youth 18–24 year of age were under-represented and persons having parents with higher education were over-represented. These findings are common and consistent with participation patterns in epidemiologic studies [38]. Based on the low general participation rate and the potential lack of representativeness especially for males and persons of younger age, the overall results might represent an underestimation of risk-taking among travellers abroad.

Regarding the mental health assessment, due to the accidental omission of one HSCL-25 questionnaire item (out of 25 items) for about 1/5 of the participants, this particular item was not analysed for any person in the sample. Since the individual's mean symptom score is based on an average of the total number of items answered, and the median split was determined in relation to the distribution of all individuals' mean scores, we considered that the exclusion of this one item would not change the overall pattern of the results.

Remuneration to increase participation rate can lead to selection bias. Nevertheless, a cinema ticket presumably has today so low value for most young people in Sweden that no particular group would feel more tempted to participate than other groups.

The strengths of the study are its size and that it is one of the few that has focused on youths in a general population sample. It is also the first study of its kind in Scandinavia.

The results are generalisable to youth in other regions in Sweden who are sexually active during travel abroad, with the reservation that the group of foreign-born in Skåne is about 20% higher than in the rest of Sweden [39].

4.2. Conclusion and future recommendations

The current study, in similarity with comparable studies, found that sexual risk-taking during travel abroad was associated with male sex, 18–24 years of age, ≥1 month of travel, HED, and use of drugs. The results also indicated that foreign-born parents and poor self-rated mental health might constitute risk factors for men. It may be important in future studies to consider differences between men and women's possibilities to neutralise sexual risks, e.g. differing opportunities to influence the use of condoms.

Future studies should also consider whether risk-taking behaviour while on a trip abroad might represent the individual's usual behaviour and not behaviour caused by the geographic relocation. People who have high risk-taking behaviour in all settings may link sexual networks in different countries together and thus may increase the spread of infections.

Author's contribution statement

MS and AA were involved in the study design, development of the study, data collection, data analysis and preparation of the manuscript. HM and AE was involved in the development of the study and the data analysis. LM was involved in the study design and the development of the study. All authors read and approved the final manuscript.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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Travel abroad increases sexual health risk-taking among Swedish youth: a population-based study using a case-crossover strategy

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ABSTRACT

Background: The fact that youth take sexual risks when they are abroad have been shown in previous studies. However, it is not known if they increased their sexual risk-taking when travelling abroad, compared to the stay in their homeland.

Objective: To assess whether Swedish youth increased their individual sexual risk behaviour, defined as having a casual sex partner, when travelling abroad and to examine possible factors that may be associated with increased risk-taking abroad.

Design: In 2013, a population-based sample of 2189 Swedes, 18-29 years, was assessed by a questionnaire (45% response rate). Sexuality, duration of travel, parents' country of origin, mental health, heavy episodic drinking (HED), use of illicit drugs, and socio-demographic background were assessed. Increased risk of casual sex in relation to time spent abroad vs. time spent in Sweden was analysed by a variant of case-crossover design. Factors that could be associated with increased risk of casual sex in Sweden and abroad, separately, were analysed by logistic regression.

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Background

Several studies have shown that travellers take sexual health risks when going abroad [1], which entails an increased risk of acquiring sexually transmitted infections (STIs) [2–5]. In the Swedish population, the incidence of chlamydia infections acquired abroad increased by 46% between 2006 and 2015. The incidence of gonorrhoea acquired abroad, in the population, increased by 110% between 2006 and 2015. A majority of those infected were youth between 15 and 29 years of age. Of the prevalent HIV cases, 11% were infected abroad [6,7].

About 70% of Swedish youth 15–29 years of age reported in 2008 that they were abroad at least once during the previous year [8]. Considering the proportion of STIs acquired abroad, this makes youth a particularly relevant group for targeted interventions against increased sexual health risks while abroad.

Having a casual partner [9–14], or multiple partners [9–17], or not using or inconsistently using a condom [9–11,13,14,16,17] are commonly used indicators of risky sexual behaviours. Behaviours such as indulging in heavy episodic drinking (HED), using illicit drugs, making long-time journeys, having same-sex relations, and having characteristics such as male sex, single marital status, or belonging to the age group 'youth' (defined by the World Health Organization (WHO) as 15–24 years of age [18]) have all been associated with sexual risk-taking abroad [9,10,12–14,16,17,19]. The majority of these studies have used convenience sampling [10,13,16,17,19], performed at e.g. a STI-clinic [17], back-packer hostels [10,13], or popular destinations for youth [16,19].

In a previous study, we found, only among men, that parents born abroad were associated with having a casual partner abroad and that poor mental health was associated with non-use of condoms with casual partner abroad [14].

Although several studies have shown similar patterns of sexual risk-taking at home and during a trip abroad [9–11,15,16], only one of them [13] compared the outcomes in relation to the length of time spent at home and abroad, respectively. Thus, empirical knowledge about whether youth in general *change* their individual sexual risk-taking when travelling abroad and whether the increase of acquired infection is mostly a spin-off effect of travel duration is very sparse. Improving this knowledge is essential for designing appropriate interventions for individuals travelling abroad. If the increasingly high number of young individuals who acquire STIs abroad is due to behavioural change or a higher risk of infection due to contextual factors (e.g. higher prevalence of the infections in question) and not only a reflection of

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the fact that they spend more time abroad, this would require different intervention strategies than those already applied for the domestic scene.

Being abroad could be a proxy for many circumstances that could affect sexual risk-taking, such as availability of new partners and/or contextual circumstances that facilitate or restrain sexual contact or that interact with individual determinants of sexual behaviour (e.g. gender attitudes, attitudes regarding same-sex relations). These factors could theoretically either increase or decrease sexual risk-taking. Moreover, the effect could be very different depending on age, gender, sexual orientation, type of travel abroad, and the cultural and socioeconomic context in the travel destination. However, a first step towards gaining more knowledge regarding sexual risk-taking when travelling abroad would be to confirm or refute the assumption that individuals actually change their sexual risk-taking when abroad and to investigate whether such a change could be related to basic characteristics such as gender, age, and type of travel. Therefore, studies are needed that take time spent abroad into consideration, when analysing whether being abroad is associated with a higher level of sexual risk-taking together with the same set of determinants as when at home.

The case-crossover design, first described by Maclure in 1991, was developed to study whether certain exposures of comparatively short duration increased the risk of acute onset of disease, e.g. whether sexual intercourse increased the risk of having an acute myocardial infarction [20]. In this design, each individual serves as his/her own control, in that the risk of having onset of the outcome during time units spent when not exposed to the risk factor is compared to the risk of having the same outcome during time units spent when actually being exposed to the particular risk factor. For a study population, the number of events when being exposed or being unexposed, respectively, are divided by the pooled time during which the included individuals were exposed to the risk factor or not, respectively [21]. The basic principle of comparing the risk for a certain event for one particular individual in one context (e.g. being in one's native country) to the risk for the same type of event in another context (e.g. being abroad) can therefore justify the use of a case-crossover design for studying change in sexual risk-taking when travelling abroad.

The aim of this study was to assess whether Swedish youth increase their sexual risk-taking behaviour when travelling abroad, in terms of having sex with a casual partner, and to examine possible factors that may be associated with such increased risk-taking abroad.

Methods

Study setting

The study was performed in Skåne, the southernmost county in Sweden with 1.3 million inhabitants, among whom approximately 206,000 were 18–29 years of age in 2013. Southern Sweden borders on Denmark, and an interconnecting bridge provides easy access to entertainment on both sides of the border and also increased employment opportunities within commuting distance for Swedish youth.

Participants, instrument and data collection

The potential participants were randomly drawn from the Swedish Central Population Registry and consisted of 7000 individuals between the ages of 18 and 29 years with permanent residence in Skåne on 1 January 2013.

The selected individuals were asked to respond to a 79-item self-report questionnaire, which focused on sexuality, lifestyle, and health. The questionnaire contained pre-validated questions about socio-demographic factors, social capital, general health, mental health, experiences of sexual coercion, use of drugs and alcohol, and sensation-seeking behaviour.

Data collection took place between January and March 2013. All invited participants received an introductory letter with information about the study, the voluntary nature of participation, and a guarantee of anonymity. The letter also included a link to the online questionnaire. Three reminders were sent out, and the last one included a printed version of the questionnaire. After completing the questionnaire, the respondents received a cinema ticket as compensation.

Since the study aimed to examine the possible increased sexual risks when travelling abroad, we excluded all respondents who reported that they had not been abroad (n = 504) or those who had not been sexually active (defined as vaginal or anal intercourse or oral sex) during the last 12 months (n = 331), and those who did not state their gender (n = 23). These groups overlapped to some extent, and all in all, 779 persons were excluded and consequently 2189 remained for further analysis.

Independent variables

Gender was classified as men or women.

Age was dichotomised as 18–24 years and 25–29 years of age, motivated by previous findings that younger individuals take more sexual health risks [9,12,16].

Level of parents' education was used as an indicator of socioeconomic status since younger persons might

not have finished their education or might lack regular employment or income. Parental education can be used as a predictor of youth occupational outcome [22]. The response alternatives were: '9-year compulsory school', '2-years of upper secondary school', '3–4-years of upper secondary school', 'other types of schools', and 'university'. This variable was then dichotomised as 'University' if a parent had a university degree, and 'Less than university' for all other alternatives.

Parents' country of origin was used to identify youth with an immigrant background, as experience of and attitude to sexuality can vary with cultural background [14]. The alternatives were: 'Both parents born in Sweden', 'One of the parents born abroad', or 'Both parents born abroad'. The answers were dichotomised as 'Both parents born in Sweden' or 'At least one parent born abroad'.

Self-rated mental health

Poor mental health has previously been shown to be associated with sexual risk-taking [23]. Mental health status was measured using the Hopkins Symptom Checklist (HSCL-25) [24], a self-reporting instrument that assesses symptoms of anxiety (10 items) and depression (15 items) on a scale from 1 ('not at all') to 4 ('extremely'). The HSCL-25 has been used and validated in different cultural settings including Sweden [25]. For each item, respondents were asked, 'How much has this problem bothered or distressed you during the last month, counting today?'. Mean total mental health scores, as well as mean scores for depression and anxiety, were calculated on the basis of a respondent's total scores. The scores were summed up and divided by the number of answered items to generate a symptom mean score ranging from 1 to 4. The mean scores were dichotomised as 'satisfactory self-rated mental health', i.e. 'low HSCL symptom score', and 'poor self-rated mental health', i.e. 'high HSCL symptom score', based on the median split of the frequency distributions of the respondents' individual mean mental health scores. Due to a technical error, the item 'thoughts of ending one's life' was not included in the paper version of the questionnaire. Consequently, about one-fifth of the respondents did not have access to this question and the question was excluded from all analyses.

Travelling abroad

The question was: 'Have you been abroad during the last 12 months?'. The alternatives were 'Yes, not counting Denmark', 'Yes, only in Denmark', and 'No'. Responses were dichotomised as 'Yes' if the respondent had been in any foreign country, including Denmark, and 'No' if the respondent had not travelled abroad at all during the previous year.

Duration of most recent travel

The question was 'How long a time did you spend abroad during your last stay abroad during the last 12 months?' We considered this representative of travels abroad for each individual, since asking for the most recent travel is a random selection mechanism. Response alternatives for the stay abroad were: 1 day, 2–6 days, 7–8 days, 9–29 days, 1–6 months, and more than 6 months. The six travel time intervals were reduced and categorised as four intervals using the median day for each response category: 5 days, 19 days, 105 days, and 270 days, respectively, as an approximation of the actual time spent abroad. A dichotomous outcome was also constructed for this variable; individuals who had spent = 29 days abroad were classified as short-time travellers and those with longer stay as long-time travellers.

Time spent in Sweden was calculated as 365 days minus the approximation of the actual time spent abroad (see earlier) for a particular individual, i.e. resulting in 360 days, 346 days, 260 days, or 95 days. Since we only collected information regarding the most recent travel abroad, we lacked information about the accumulated time spent abroad during the last year. However, since long stays were rather unusual in the study sample, we considered this to be a minor potential source of bias.

Heavy episodic drinking (HED) was defined by the question, 'How often did you consume at least five (if you are a man) or four (if you are a woman) "glasses" at the same occasion during the last 12 months?' One unit is 1.5 fl. oz. or 4.4 cl of 40% alcohol or an equivalent amount of alcohol in beer or wine [26]. The response alternatives were 'every day or nearly every day', 'every week', '2–4 times/month', 'every month', and 'less than once a month', or 'never'. Individuals who reported high consumption (the three first mentioned frequencies) were categorised as 'HED' and the others were categorised as 'non-HED'. The question was posed separately regarding while in Sweden or while travelling abroad. HED has been shown to be associated with sexual risk-taking abroad [16].

Use of illicit drugs

This item was based on the question, 'Have you during the last 12 months used illicit drugs?' Examples were given such as cannabis, cocaine, and amphetamine. Illicit drug use has been shown to be associated with increased sexual risk-taking [16]. The response alternatives were 'Yes' or 'No'. The question was posed separately regarding while in Sweden or while travelling abroad.

Dependent variables

The relation to the last sexual partner

The question was, 'What relation do/did you have to the last person you had sexual intercourse with?' The response alternatives were dichotomised by classifying the response alternatives 'married, living together or in a steady relationship' as 'regular partner' and 'previous partner', 'friend', 'casual contact', 'commercial sex partner', or 'another non-regular partner' as 'casual partner'. The question was posed separately regarding while in Sweden or while travelling abroad.

Statistical analysis

As a first step, the relationships between the outcomes 'casual partner in Sweden' and 'casual partner abroad' and the independent factors were examined by binary regression analyses and chi-square tests. Associations were examined, for both genders separately, in relation to the potential confounders represented by age, parents' country of origin, duration of most recent travel, HED, use of illicit drugs, and mental health when simultaneously adjusted for one another, with results presented in terms of odds ratios (OR) and 95% confidence intervals (CI).

A case-crossover design was then applied. The last time abroad during the last 12 months constituted the 'exposure window', and time spent in Sweden during the same year was set as the 'reference window'. The outcome ('cases') in both windows was an occasion of having a casual partner. The time spent in the exposure window (abroad) and reference window (Sweden), respectively, was pooled as the person-time constituting the denominator for calculating the incidence of risk behaviour in the respective context. The risk was then determined as the ratio between those incidences, i.e. as an Incidence Rate Ratio (IRR). Furthermore, the travellers were split into four 'travel-time groups' according to the time they spent abroad, and IRRs were calculated for all travel-time groups, with separate analyses for women, men, and for the entire sample. Calculations were made using OpenEpi version 3.03a [27] and SPSS version 22. Statistical significance was accepted at $p = 0.05$.

Results

Of the 7000 letters of invitation sent, 332 letters came back by return post, mostly due to incorrect address information. A total of 2968 persons responded to the questionnaire, representing 45% of the entire number of recipients. Of the respondents, 82% answered electronically and 18% by mail. As mentioned earlier, only individuals who reported that they had travelled abroad and who had been sexually active were retained in the analyses, which rendered a final sample of 2189 individuals.

Table 1 shows the distribution of socio-demographic and background characteristics of the sample. The majority were women (59%), 18–24 years of age (58%), and had spent = 29 days (short-time travellers) abroad (90%).

Thirty-three percent of the men and 56% of the women rated their mental health as poor. HED when travelling abroad was more common among men compared to women (62% and 51%, respectively). Men were twice as likely to use illicit drugs compared to women, both in Sweden (17% and 8%, respectively) and abroad (10% and 4%, respectively).

One out of four individuals who had sex during their last stay abroad (n = 900) reported that their last sexual partner abroad was casual (n = 222). Nearly 30% (n = 639) of the total sample (n = 2189) reported that their last partner in Sweden was casual. Casual partners were more common among men than among women, both when in Sweden and when travelling abroad.

First, we performed logistic regression to examine factors associated with having a casual partner in Sweden and when abroad. Having a casual partner abroad was more common in men compared to women (OR 1.80, CI 1.33–2.44) (not shown in tables). Therefore, the analyses were split by gender to investigate whether the behavioural determinants differed between the two genders.

Tables 2 and 3 show that the following variables were significantly associated with having a casual partner in Sweden, among both men and women: younger age (18–24 years), HED, and illicit use of drugs. However, poor mental health was associated with casual sex in Sweden solely among men. The same factors were also associated with having a casual partner abroad, except that poor mental health was no longer significantly associated with having a casual partner among men. Moreover, long-time travellers (men and women) were significantly more likely to have casual partners when abroad, when travel duration was dichotomised.

We then applied the modified case-crossover design to further explore the risk of having a casual partner abroad, using more detailed information concerning duration of travel.

Table 4 shows the relative risk expressed as IRRs in the case-crossover analyses, of sex with a casual partner in four different 'travel-time groups' by the median days spent in Sweden and during the latest trip abroad. Overall, the risk of having a casual partner while abroad compared to while in Sweden was fivefold increased (IRR 5.37, CI 4.61–6.26). Men and women had a similar level of increased risk for having a casual partner when abroad. All groups that spent the majority of their

Table 1. Distribution of socio-demographic and background characteristics, including lifestyle and sexual risk-taking, among youth in Sweden who had travelled abroad during the last 12 months (n = 2189).

	Sweden = 12 months						Last trip abroad = 12 months					
	All		Men		Women		All		Male		Female	
	n	%	n	%	n	%	n	%	n	%	n	%
Gender												
Number	2189		897	41	1292	59						
Age												
18–24 years of age	1260	58	509	57	751	59						
25–29 years of age	913	42	381	43	532	41						
(Missing)	(16)		(7)		(9)							
Level of parents' education												
University	1361	63	547	61	814	63						
Less than university	814	37	344	39	470	37						
(Missing)	(14)		(6)		(8)							
Parents' country of origin												
Both parents born in Sweden	1620	74	650	73	970	75						
At least one parent born abroad	560	26	241	27	319	25						
(Missing)	(9)		(6)		(3)							
Self-rated mental health												
Satisfactory mental health	1162	53	597	67	565	44						
Poor mental health	1023	47	297	33	726	56						
(Missing)	(4)		(3)		(1)							
Duration of most recent travel												
1–8 days							1448	67	581	66	867	68
9–29 days							488	23	209	24	279	22
1–6 months							167	8	67	8	100	8
= 6 months							53	2	18	2	35	2
(Missing)							(33)		(22)		(11)	
Relation to the last sexual partner												
Regular partner	1517	70	549	62	968	76	678	75	245	69	433	80
Casual partner	639	30	332	38	307	24	222	25	112	31	110	20
(Missing)	(33)		(16)		(17)		(0)		(0)		(0)	
Heavy episodic drinking (HED)												
Non-HED	932	46	306	36	626	52	926	46	317	38	609	51
HED	1115	54	541	64	574	48	1100	54	518	62	582	49
(Missing)	(142)		(50)		(92)		(163)		(62)		(101)	
Use of illicit drugs												
No	1918	88	737	83	1181	92	2016	94	791	90	1225	96
Yes	263	12	154	17	109	8	139	6	87	10	52	4
(Missing)	(8)		(6)		(2)		(34)		(19)		(15)	

days in Sweden had an increased risk of sex with a casual partner abroad. In contrast, those with a median of 270 days abroad and 95 days in Sweden had a decreased risk of sex with a casual partner abroad (IRR 0.3, CI 0.15–0.58).

Discussion

The main findings in this study are that the risk of having sex with a casual partner while abroad increased about fivefold for both genders in a general population sample of youths in southern Sweden. However, the time spent abroad had a strong modifying effect on the risk of having a casual partner. Thus, those who had spent a very short time (around 5 days) abroad had an almost 20-fold increased risk of having had sex with a casual partner abroad per time unit.

The main focus of this study was to test the hypothesis that travelling abroad increases the tendency to engage in riskier sexual behaviour. Previous studies have supported this notion, and it seems that an increasing proportion of the most common forms of STIs diagnosed among Swedish youth is acquired abroad. However, previous studies have not been designed to determine whether individuals who already practised risky sexual behaviour in their usual environment continued to do so while abroad and thus acquired STIs more often because of their higher prevalence in foreign sexual partners than in sexual partners in Sweden, or alternatively, whether being abroad changed the individual's behaviour in a riskier direction, e.g. because of less social control or a higher presence of triggering factors.

Therefore, this study applied a modified case-crossover study design. This approach was developed for studying risk factors for acute disease that are of short duration, e.g. to see if anger triggers myocardial infarction [21]. The general idea is that the individual serves as his/her own control, in that the occurrence

Table 2. Men (n = 897). Crude and adjusted* associations (odds ratio [OR], 95% confidence interval [CI]) for men whose last sex partner in *Sweden* during the past year was casual (n = 332) and men whose last sex partner *abroad* during the past year was casual (n = 112) in relation to age, parents' country of origin, duration of travel, heavy episodic drinking (HED), use of illicit drugs, and self-rated mental health.

	Men who have had casual sex partner in Sweden						Men who have had casual sex partner abroad					
	Crude			Adjusted			Crude			Adjusted		
	OR	CI	(m)	OR	CI	(m)	OR	CI	(m)	OR	CI	(m)
Age			(23)			(79)			(5)			(29)
25–29 years	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
18–24 years	**2.42**	**1.81–3.23**		**2.45**	**1.8–3.33**		**2.08**	**1.31–3.30**		**2.40**	**1.43–4.02**	
Parents' country of origin			(22)						(3)			
Both parents born in Sweden	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
At least one parent born abroad	1.26	0.93–1.71		1.36	0.96–1.93		**1.89**	**1.16–3.08**		1.49	0.83–2.67	
Duration of most recent travel									(5)			
Long-time travel							**2.69**	**1.51–4.80**		**2.32**	**1.18–4.56**	
Short-time travel							Ref. 1			Ref. 1		
Heavy episodic drinking			(65)						(17)			
Non-HED	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
HED	**2.13**	**1.56–2.90**		**1.96**	**1.42–2.72**		**2.52**	**1.46–4.35**		**2.23**	**1.25–3.98**	
Use of illicit drugs			(21)						(3)			
No	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
Yes	**2.39**	**1.67–3.40**		**1.92**	**1.3–2.83**		**3.71**	**1.87–7.35**		**2.38**	**1.10–5.16**	
Self-rated mental health			(19)						(1)			
Satisfactory mental health	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
Poor mental health	**1.59**	**1.15–2.12**		**1.49**	**1.09–2.05**		1.30	0.81–2.1		1.41	0.81–2.44	

Notes: *All variables are simultaneously adjusted for one another.
(m) = missing.

Table 3. Women (n = 1292). Crude and adjusted* associations (odds ratio [OR], 95% confidence interval [CI]) for women whose last sex partner in *Sweden* during the past year was casual (n = 307) and women whose last sex partner *abroad* during the past year was casual (n = 110) in relation to age, parents' country of origin, duration of travel, heavy episodic drinking (HED), illicit use of drugs, and self-rated mental health.

	Women who have had casual sex partner in Sweden						Women who have had casual sex partner abroad					
	OR	CI	(m)	OR	CI	(m)	OR	CI	(m)	OR	CI	(m)
	Crude			Adjusted			Crude			Adjusted		
Age			(26)			(117)			(6)			(55)
25–29 years	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
18–24 years	**2.15**	**1.63–2.84**		**2.42**	**1.81–2.59**		**3.14**	**1.95–5.05**		**2.99**	**1.75–5.10**	
Parents' country of origin			(20)						(1)			
Both parents born in Sweden	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
At least one parent born abroad	0.83	0.61–1.12		0.87	0.62–1.22		0.78	0.47–1.29		1.04	0.58–1.87	
Duration of most recent travel									(2)			
Long-time travel							**2.73**	**1.64–4.55**		**1.87**	**1.01–3.45**	
Short-time travel							Ref. 1			Ref. 1		
Heavy episodic drinking			(106)						(44)			
Non-HED	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
HED	**3.17**	**2.40–4.19**		**2.71**	**2.03–3.62**		**3.78**	**2.27–6.30**		**3.31**	**1.91–5.72**	
Use of illicit drugs			(19)						(4)			
No	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
Yes	**3.19**	**2.14–4.78**		**2.11**	**1.37–3.25**		**5.19**	**2.55–10.5**		**4.81**	**2.14–10.8**	
Self-rated mental health			(18)						(1)			
Satisfactory mental health	Ref. 1			Ref. 1			Ref. 1			Ref. 1		
Poor mental health	**1.33**	**1.02–1.73**		1.15	0.88–1.53		1.38	0.9–2.12		1.19	0.73–1.94	

Notes: *All variables are simultaneously adjusted for one another.
(m) = missing.

of the acute event is allocated to the time spent in the risky behaviour or time spent when not in the risky behaviour. Since we lacked information about the actual number of events in each exposure window, the single recorded event in the two windows should be regarded as a measure of the probability of the risky behaviour (i.e. having a casual sex partner vs. a regular one on the most recent occasion of sexual intercourse). However, taking person-time into consideration is still very relevant since the majority of the individuals did not report a risk event in either of the two contexts (Sweden vs. abroad).

The advantage of the case-crossover design rests in the fact that each individual contributes with risk time for both exposure and non-exposure to the risky behaviour. In practice this means that there is no need for adjustment for any potential confounders in the analysis, since the same individuals are used for

Table 4. Incidence Rate Ratios (IRR) of casual sex partner in a sample of Swedish youth (n = 2189, missing n = 33) who reported that they had travelled abroad during the past year. A modified case-crossover analysis of events of casual sex in Sweden and abroad in relation to median days spent in Sweden and median days in last travel abroad, during the last 12 months (95% confidence interval [CI], two-tailed *p*-value).

		Median days in Sweden/ abroad[1]		Individuals who have had a casual sex partner						
	Total number of individuals	Sweden	Abroad	Sweden	(m)[2]	Abroad	(m)	IRR	(CI)	*p*
Total	2156	738,583	48,357	626	(13)	221	(1)	5.37	(4.61–6.26)	< 0.001
Men	875	300,604	18,771	320	(12)	111	(1)	5.53	(4.46–6.86)	< 0.001
Women	1281	437,979	29,586	306	(1)	110		5.31	(4.27–6.6)	< 0.001
Data regarding	1448	360	5	412		110		18.9	(15.4–23.4)	< 0.001
number of days	488	346	19	126		52		7.45	(5.41–10.3)	< 0.001
spent in Sweden	167	260	105	69		43		1.54	(1.05–2.26)	< 0.036
and abroad	53	95	270	19		16		0.3	(0.15–0.58)	< 0.001

Notes: [1]1–8 days (median time 5 days), 9–29 days (median time 19 days), 1–6 months (median time 105 days), and more than 6 months (median time 270 days). The median days spent in Sweden are consequently: 360 days, 346 days, 260 days, and 95 days.
[2](m) = Missing.

assessing risk time for both the exposed and the unexposed group. Thus, in theory, the increased risk depends solely on the studied exposure (here: being abroad). This study design therefore has the potential to separate the two different possible causal mechanisms behind the increased incidence of STIs among young Swedes who have been abroad, i.e. change in behaviour while abroad or change in risk of getting infected because of environmental factors (i.e. no significant behaviour change).

Our findings provide strong support for the first of those two hypotheses, i.e. being abroad actually seems to have a very strong impact on a particular individual's propensity to engage in risky sexual behaviour. Previous studies [10,28] have also shown that youth going abroad frequently have an expectation of having casual sex while abroad. The extent to which the amount of time spent abroad modified the effect of travel could be interpreted in several ways. One reasonable interpretation could be that length of stay may be a proxy for different types of trips abroad. For example, it cannot be discounted that some of the shorter trips in fact are made with the intention to engage in sex with a new partner.

The fact that the individuals in our study with the longest time spent abroad actually had lower odds of having a casual partner compared with being in Sweden could imply very different reasons for being abroad, e.g. work, or a family situation that might serve as barriers for engaging in casual sex. The bottom line of all these scenarios is that being abroad indeed affects the individual's behaviour, although in different ways depending on the purpose of the travel/stay abroad. The results suggest that interventions aiming at reducing the increasing proportion of STIs among young Swedes acquired abroad should not primarily focus on factors that affect risky behaviour while in Sweden. Furthermore, when designing such interventions, the departure point should be that being abroad seems to change youths' behaviour depending on the specific type of travel/stay abroad, and in most cases, such that risky sexual behaviour increases. Supplementary qualitative studies could shed more light on the specific mechanisms behind our findings.

Our findings that lower age, HED, and use of illicit drugs, in both men and women, could be associated with sexual risk-taking both at home and abroad, are consistent with findings in previous studies [9,11–13,16,17]. Both HED and illicit use of drugs may increase while travelling abroad and thus interact in our major findings – so that the trip itself has the effect of increasing the risk. But both at home and abroad, HED as well as use of illicit drugs are significantly more common among those who have a casual partner. This applies to both men and women (see Tables 2 and 3). In order to adequately assess the extent to which individuals may increase their consumption of alcohol and illicit drugs while travelling, a different and a much more detailed study of consumption habits is needed both in Sweden and abroad. Future studies should take this into account.

Methodological considerations

The information used in this study was obtained by retrospective self-reporting. The possibility of recall bias or non-dependent under- or over-reporting cannot be entirely excluded. This could lead to overestimations of the shown associations as well as to underestimations. The relatively low response rate (45%) could give rise to a selection bias, which also could bias our findings in any direction. In the present study, men and youth 18–24 years of age were underrepresented and persons having parents with higher education were overrepresented. An underrepresentation of youth aged 18–24 years can presumably give rise to an underestimation of sexual risk-taking abroad. These findings are consistent with participation patterns in epidemiological studies [29]. Remuneration to increase the participation rate can lead to selection bias. Nevertheless, a cinema ticket presumably has such low value today for most young people in Sweden that no particular group

would feel more tempted to participate than other groups.

Another possible limitation is that the results solely concern the last intercourse in Sweden and last time abroad. Thus, the duration of the last trip is used to represent the time spent abroad during the previous year. This choice was prompted by the need to reduce recall bias regarding sexual risk-taking. We argue that, in a population perspective, the last travel abroad and the last occasion of sexual intercourse were reasonably representative of all occasions. However, it will cause a systematic misclassification of the estimated time spent abroad, i.e. an underestimation of this time. This bias is proportionate to the duration of the reported most recent travel abroad. Therefore, those risk estimates are likely to be somewhat inflated which warrants some caution regarding the steepness of the found gradient. However, we judge it very improbable that the gradient could be explained solely by this factor. Another limitation is that information was lacking concerning the travel purpose, which prevents any closer examination of why shorter trips (five days) were associated with the very greatest risks.

The case-crossover method, using the individual as both case and control, reduces confounders as the individual characteristics are constant throughout the observation period. The modification of this study design, i.e. including all individuals who had spent time abroad to contribute in order not to reduce the sample and thus reduce statistical power to a critical extent, could have re-introduced some confounding in our results, but sensitivity analysis indicated that this probably was a minor source of bias.

The strengths of the study are its size, that it is one of the few that has focused on youth in a general population sample, and that it is the first of its kind in Scandinavia. The results are deemed generalisable to youth in other regions in Sweden and in similar countries who are sexually active during travel abroad.

Conclusion and future recommendations

Both women and men showed an increased risk of having casual sex while travelling abroad compared to while staying in Sweden. Future research should examine the underlying reasons that contribute to this increased risk, in order to be able to design appropriate interventions for young travellers. Both the increasing popularity of travel abroad among today's youth and the high level of sexual activity in this age group in general indicate that interventions are needed to address this growing public health challenge.

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Author contributions

All authors (MS, AA, POO) were equally involved in preparing the study design. MS and AA were responsible for data collection. All authors were equally involved in the analysis of results and the development of the article. All authors have read and approved the final manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Ethics and consent

The Regional Ethical Review Board in Lund, Sweden approved the study (Registration number 2012/353).

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Paper context

That youth take sexual risks when going abroad is shown in several studies. However, it is not known whether youth are increasing or decreasing their risk-taking when they go abroad. By using a variant of a case-crossover method, and taking time into consideration, we show that Swedish youth increase their sexual risk-taking while abroad and that the travel abroad in itself increases sexual risk-taking. This knowledge is important in the design of intervention strategies.

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