
2021

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Recommended Citation

McKenna, Stephen; Pohrebyannyk, Anna; O' Regan, Cathal; and Mayer, Claudia (2021) "The Knowledge, Prevalence and Perception of Sexually Transmitted Infections (STIs) among the Third-level Student Population in Cork, Ireland," *International Undergraduate Journal of Health Sciences*: Vol. 1 : Iss. 2 , Article 3.

Available at: <https://sword.cit.ie/iujhs/vol1/iss2/3>

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Cover Page Footnote

We would like to thank Dr Annmarie Burns, MTU and Dr Brigid Lucey, MTU for their guidance and intellectual support offered in constructing this paper and survey. We would also like to thank Dr Sean Lacey, MTU for his assistance in statistical analysis of the results obtained from the survey. No funding was received for this research study. Address correspondence to Stephen McKenna (stevemckenna2010@gmail.com).

The Knowledge, Prevalence and Perception of Sexually Transmitted Infections (STIs) among the Third-level Student Population in Cork, Ireland

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ABSTRACT

Background: Sexually transmitted infections (STIs) are transmitted through sexual contact with an infected person and these infections are capable of causing health problems such as infertility. In Ireland, the majority of STIs have been on the increase since the early 2000s, particularly among young people aged 15-24 years old.

Aims: The aims of this study were to investigate the knowledge, prevalence and perception of third-level students in Cork, Ireland regarding STIs.

Methodology: The survey created using Google Forms™ was distributed to registered students of University College Cork (UCC) and Munster Technological University, Cork (MTU). The questions were constructed based on similar surveys included in peer-reviewed papers. Ethical approval was received prior to commencing this survey. The collected data was statistically analysed via Microsoft Excel.

Results: A total of 709 anonymous, valid and voluntary responses were collected. Eighty-five percent of respondents had received sexual health education at secondary school. Of 709 respondents, 673 (94.9%) believed that unprotected sexual activity could lead to acquiring STIs. Over half (56.1%) of sexually active respondents were unaware of free STI testing available on both university campuses.

Conclusion: The majority of third-level students felt that their sexual health education was limited. The respondents lacked ample knowledge on the topic of STIs and were incapable of correctly answering all of the survey's questions.

INTRODUCTION

Sexually transmitted infections (STIs), as defined by the Health Service Executive (HSE) (n.d.), are infections passed on through sexual contact with someone who is infected. As reported by the World Health Organisation (WHO), more than thirty different bacteria, parasites and viruses are known to be transmitted through sexual contact, the majority of which cause asymptomatic infection (WHO 2019). Furthermore, female and male reproductive tract morbidities such as infertility are attributable to untreated STIs (Tsevat *et al.*, 2017). Chlamydia and gonorrhoea are the most common STIs in Ireland, both of which can cause infertility if left untreated (HPSC 2021).

In Ireland, there has been a trending increase in STI notification rates for chlamydia, gonorrhoea and genital herpes since the early 2000s (HSPC 2019). Young people under 25 years of age constitute a significant proportion of new STI diagnoses and are an area of focus when it comes to reducing STI

transmission (Department of Health and Healthy Ireland 2019). According to a UNESCO study (2015), comprehensive sexual health education has the ability to contribute to the reduction of STIs.

Furthermore, a study conducted by Lally *et al.*, (2015) concluded that young people in Ireland possess insufficient knowledge on the prevention, transmission and treatments of STIs. Our study sought to investigate the knowledge, prevalence and perception of third-level students in Cork, Ireland regarding STIs. There was an additional focus on whether or not the knowledge of students had improved since the publication of Lally *et al's.*, report from 2015.

METHODOLOGY

Study Design

Peer-reviewed papers, such as Lally *et al.*, (2015), were consulted to assist in the construction of the survey. Google Forms™ administration software was applied in creating the survey. The survey contained a total of twenty-five questions. Closed and open-ended questions relating to participant demographics, sexual activity and knowledge of sexually transmitted infections (STIs) were asked. The Likert scale was applied where appropriate within the survey as a means of psychometric analysis of the respondents on certain issues relating to STIs.

A focus group study was conducted whereby the survey was distributed to twenty-four third-level students of Munster Technological University (MTU) and University College Cork (UCC). The suggestions obtained from this focus group study were incorporated into the final survey. The comments and responses were not included in the final findings.

Ethics

Ethical approval had been sought and received from the coordinators of the BIOL8024: Research and Professionalism module who acted on behalf of the MTU Research Ethics Committee (REC). The nature of participation was voluntary and informed consent was obtained from participants at the beginning of the survey. Responses were anonymous and kept confidential. Acquired data was downloaded and stored on password-protected electronic devices only accessible to the authors of this paper. The data will be deleted within five years.

Survey Population

Students of UCC and MTU were chosen as the target population for this study. These are the two largest third-level institutions in Cork, Ireland, which ensured that a large proportion of third-level students in County Cork would be reached. It was estimated that approximately 22,500 students received the survey via email. Students from Post Leaving Certificate (PLC) colleges in Cork were excluded as there was no point of contact in these colleges to enable distribution of the survey.

Survey Distribution and Implementation

The finalised survey was distributed via UCC's survey service, surveys@ucc.ucc.ie to registered and subscribed students of University College Cork, Ireland on 2 March 2021. The survey was made available to registered students of MTU, Cork to complete through academic staff who forwarded the survey to their class groups. The survey was also shared with several undergraduate class representatives from different College Departments of UCC who were asked to distribute the survey to their class group-chats via WhatsApp, Snapchat and Facebook Messenger. Informed consent was sought from participants at the beginning of the survey and those who did not consent had their responses invalidated. Anonymous and confidential responses were submitted. The survey was closed on 21 March 2021.

Data Analysis

Participant responses were analysed using Google Forms™ and the responses automatically recorded in the attached Google Sheets. The responses in Google Sheets were downloaded in a format accessible to Microsoft Excel which was subsequently used for statistical analysis. In Microsoft Excel, the collected data was analysed using the “Analysis Toolpak” add-in under the “Data” tab. By using this feature, pivot tables, frequency tables and pivot charts were constructed. Close-ended questions were displayed in figures and tables using the graph function in Excel for clear presentation of results. Open-ended questions were analysed by reading through the answers individually to find similarities and were discussed in-text.

RESULTS

Respondent Demographics

The survey was completed by 713 respondents of which 4 responses were invalidated as the participants either did not consent to their participation in the survey or did not answer questions appropriately and thus were excluded from analysis. Of the 709 valid responses, 489 (69.0%) were female, 205 (28.9%) were male, 13 (1.8%) were non-binary, and the remaining 2 (0.3%) responses did not indicate their gender. A total of 606 (85.5%) respondents were within the ages of 18-24 years old, 49 (6.9%) were aged 25-29 years old, and 54 (7.6%) were older than 30 years old. Students in Science, Engineering and Food Science represented the largest portion of respondents, at 223 (31.5%) students. Two hundred and three (28.6%) students were in Arts, Celtic Studies and Social Sciences, 150 (21.2%) students were in Medicine and Health, 114 (16.1%) students were in Business and Law, with the remaining 19 (2.7%) students in Education. All respondents were registered students of UCC or MTU, Cork. Five hundred and fifteen of the 709 respondents (72.6%) indicated that they were sexually active.

Sexual Health Knowledge

The large majority (85%) of respondents had received sexual health education at secondary school or in some other form. Furthermore 529 (87.3%) students aged 18-24 years old, and 42 (85.7%) students aged 25-29 years old had received sex education compared to only 32 (59.3%) students aged over 30 years old. Of those who had received sexual health education 456 (75.6%) felt they had an average to very poor understanding of STIs, while only 147 (24.4%) respondents felt they had very good or good knowledge regarding STIs.

In Figure 1 are the seven options presented to the participants, from which they were asked to identify which activities can transmit STIs. Vaginal sex, anal sex, oral sex, sharing sex toys, kissing and skin-to-skin contact were the options provided that are capable of transmitting STIs, while use of shared bathrooms was an activity through which they could not acquire an STI. Of the 709 respondents, 707 (99.7%) could identify at least one activity through which STIs are transmitted. However, only 106 (15%) respondents correctly identified all activities through which someone can acquire an STI.

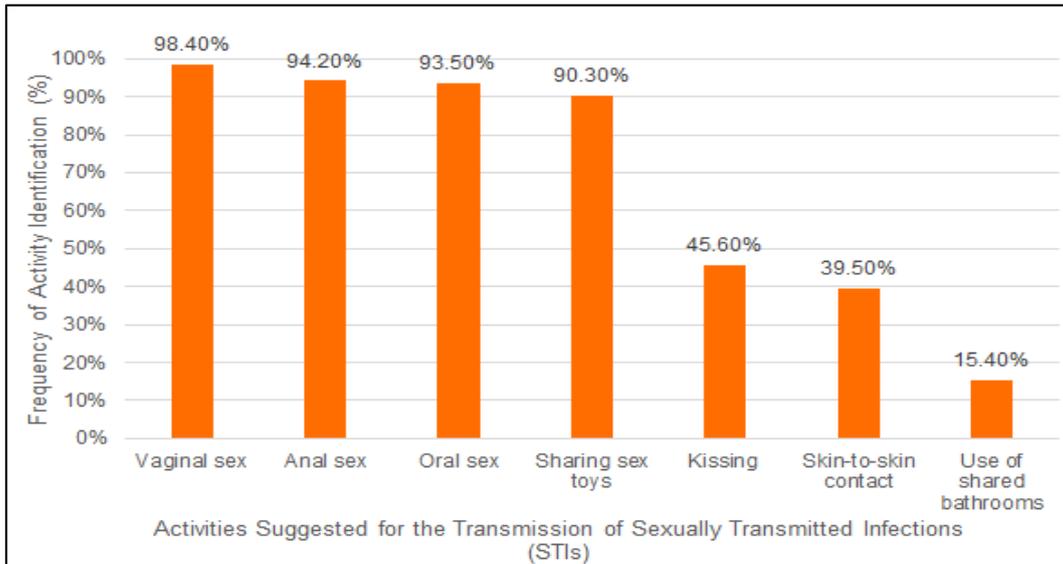


Figure 1: Suggested STI transmitting activities and the percentage of respondents that believed these activities were capable of transmission.

When asked to choose methods that prevent transmission of STIs, 675 (95.2%) respondents chose condoms, 550 (77.6%) chose abstinence, 310 (43.7%) chose dental dams, 164 (23.1%) chose vaccination and 159 (22.4%) chose pre-exposure prophylaxis (PrEP). Thirty-six (5.1%) respondents incorrectly identified the oral contraceptive pill, IUD/Implant or tubal ligation/vasectomy as a method to prevent transmission.

Figure 2 highlights the responses from the 709 participants relating to which STIs they think can be treated with antibiotics. Only 198 (27.93%) could correctly identify the three STIs in the list which have antibiotic treatments. Six hundred and thirty-five (89.56%) of the respondents chose a combination of STIs in which at least one is treatable by antibiotics and 34 (4.8%) believed that HIV was an STI which could be treated by antibiotics. Seventy (46.6%) Medicine and Health Science students correctly identified the three STIs treated with antibiotics, while less than 27% in the other University Departments correctly identified the three STIs treated with antibiotics.

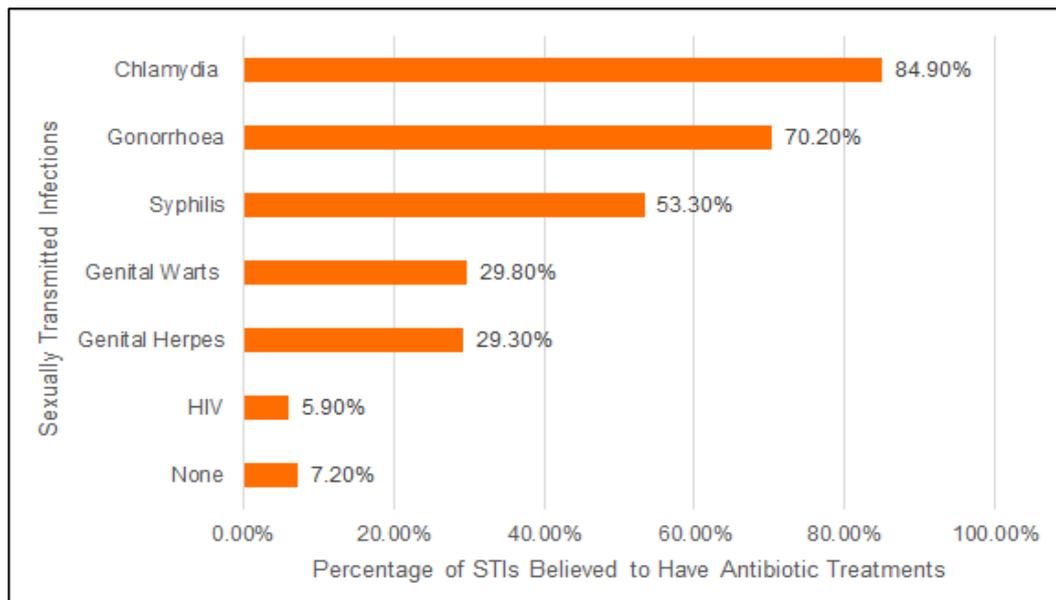


Figure 2: The percentage of respondents who thought STIs could be treated with antibiotics.

Following this, 125 (17.6%) of those asked correctly identified all the STIs which are manageable but have no cures and are lifelong. Six hundred and sixty-one (93.2%) respondents of the 709 who answered the question asking whether STIs always produce symptoms correctly identified that symptoms are not always present.

Of the 515 sexually active respondents, 289 (56.1%) were not aware of free STI testing on the university campuses. Only 226 (43.9%) of the sexually active students were aware of free STI testing on both campuses.

Prevalence of Sexually Transmitted Infections (STIs)

Of the 709 respondents, 243 (34.3%) at one point had an STI test. Furthermore, 224 (43.5%) sexually active respondents seek STI tests, while only 19 (9.8%) sexually inactive respondents would. As displayed in figure 3, of the 243 respondents who had an STI test, 76 (31.3%) had been diagnosed with one or more STIs. The majority of respondents had been diagnosed with chlamydia (59.2%). This was followed by genital herpes (21.1%) and genital warts (14.5%). Five respondents (6.6%) indicated other reported STIs such as human papillomavirus (HPV), molluscum contagiosum, pubic lice and trichomoniasis. The incidence of STIs among the total population of 709 respondents is 10.7%.

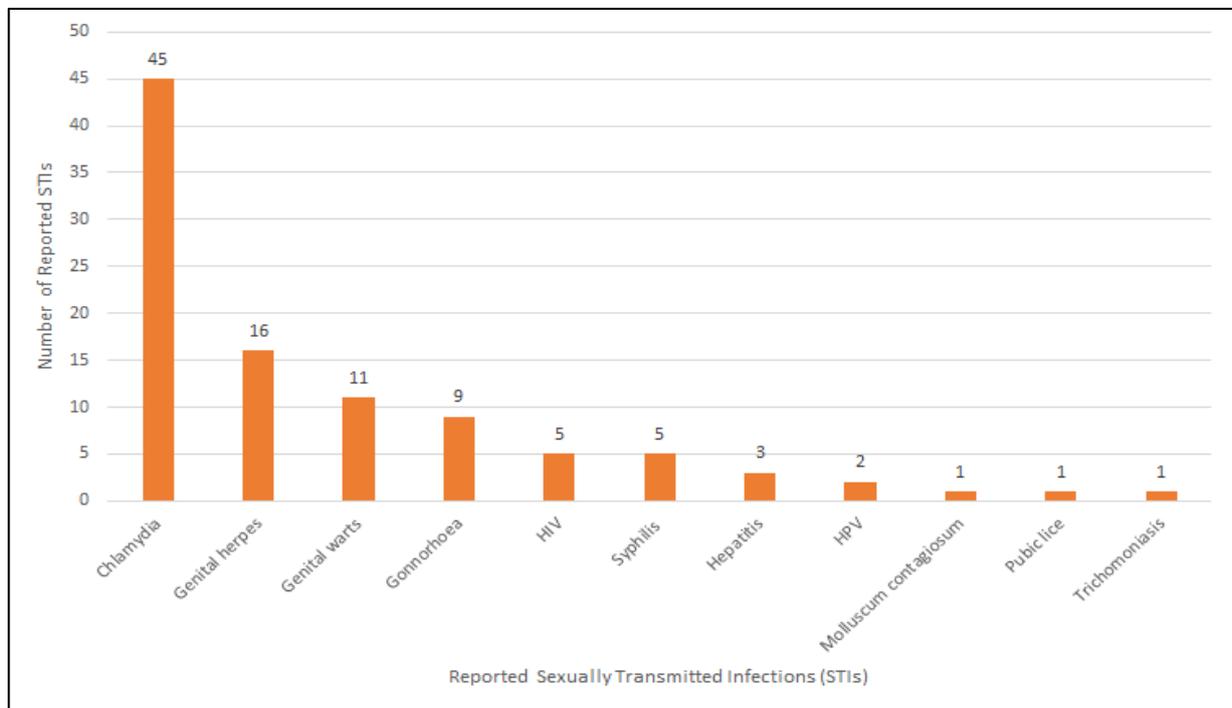


Figure 3: The number of reported sexually transmitted infections (STIs) among the respondents who had positively tested for one or more STIs

Four hundred and eighty (93.2%) sexually active respondents admitted to having used contraceptives of some type when sexually active. Where these respondents could choose more than one option, of 480 responses this was mainly to prevent pregnancy (91.7%), to prevent STIs (48.8%), for medical reasons (9.4%), or at the request of a partner (5.4%).

Where sexually active respondents used contraceptives of one form, condoms followed by the oral contraceptive pill were most common. These were followed by contraceptive implants and the withdrawal method. Where a combination of contraceptives were used by respondents, condoms and the oral contraceptive pill were most popular, with 91 of 480 respondents using both forms.

Six hundred and seventy-three (94.9%) of 709 respondents believed that unprotected sexual activity could lead to the contraction of STIs. The majority (60.4%) of the 515 sexually active respondents would always, frequently or sometimes discuss their sexual health status with sexual partners.

Perception of STIs

When asked where the respondents acquired their information on STIs, a wide variety of responses were obtained, the most prevalent answer being the internet, of which 574 respondents (81%) chose as a method of acquiring information on STIs. Of the 709 respondents, 109 of them (15.4%) chose the internet as their sole source of acquiring information. Other popular responses included friends (46.3%), school sex education (46.1%), healthcare professionals (34.1%), books/magazines (18.6%) and family (12%). Other, less common sources disclosed included TV programmes, college course content, scientific journals and by experience.

When the respondents were asked about STI testing, 389 (57%) would seek an STI test upon experiencing symptoms with 149 of respondents stating this as their sole reason for seeking an STI test. Two hundred and sixty-four (38.7%) respondents would seek an STI test after changing a sexual partner. Other responses as summarised in figure 4 included after engaging in unprotected sex (35.7%), regular check-ups (24.8%) and after each sexual encounter (3.8%). Thirty-seven respondents (5.4%) disclosed they would never seek an STI test.

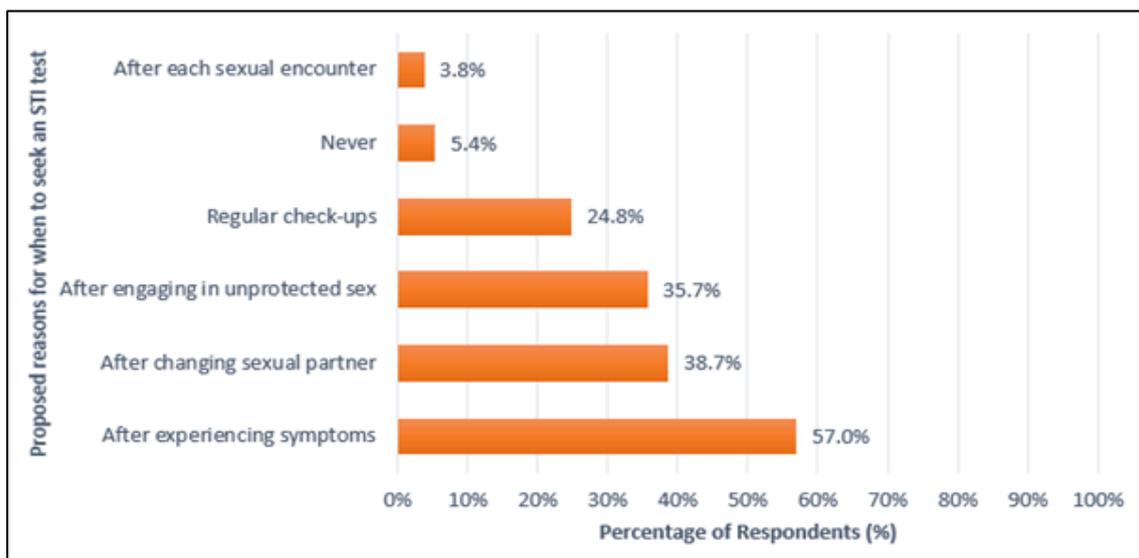


Figure 4: Percentage of respondents and reasons for seeking an STI test.

DISCUSSION

The current study was inspired by a previous investigation conducted by Lally *et al.*, (2015) into female and male Irish university students' awareness and knowledge of sexual health and STIs. According to McBride *et al.*, (2010), the median age of Irish women's first sexual encounter is 18 and Irish men's first sexual encounter is 17, which suggests a significant proportion have not yet engaged in sexual behaviour when entering third-level education. This emphasises the importance of assessing whether third-level students are equipped with adequate knowledge to practice safe sex.

The majority of respondents (85%) had received sexual health education in secondary school, with one interesting finding being that 87.3% of students aged 18-24 years old had received sexual health education compared to 59.3% of students older than 30 years old. Overall, the percentage of people who received sexual health education in secondary school has increased from 74.2% in 2015 to 85% in

2021 (Lally *et al.*, 2015). During the same period there was increased recognition of condoms as being preventative against STI acquisition. A possible explanation for the disparity in education between younger and older students may be the publishing of the relationship and sexuality education (RSE) Framework in 2000 and 2011 (Keating *et al.*, 2018). However, the effective implementation of RSE at second-level education varies among secondary schools (Keating *et al.*, 2018).

The quality of the education received varied among the respondents, with most students (75.6%) who received sexual health education at secondary school level feeling their education was only average or below when it came to an understanding of STIs. This finding highlighted the students' recognition of their lack of knowledge regarding STIs, which is reflected in the incidence of STIs in this study being 10.7% and is relatively consistent with the 10.3% reported in a previous study of university students in Ireland (Lally *et al.*, 2015). Students' descriptions of their education detailed the lack of depth, an emphasis on reproduction, and an absence of LGBTQ+ topics. In fact, this education did not reflect young people's priorities with them seeking information from the internet on sexual pleasure, STIs, communication skills with partners, and pregnancy (McCarthy *et al.*, 2012). This suggests a failure of secondary school sexual health education to not only meet the priorities of students but to also provide a comprehensive education regarding STIs.

Fact-based questions surrounding treatment of STIs were asked to assess how much third-level students knew about common and circulating STIs. Only 198 (27.93%) could correctly identify the three STIs in the list which have antibiotic treatments. This highlighted that the majority of students are unaware of the treatment options for common STIs. Six hundred and thirty-five (89.6%) students could however identify at least one antibiotic treatable STI, with chlamydia being chosen the most frequently (84.9%). Medicine and Health Science students were the most likely to correctly identify which three STIs are treated with antibiotics, with 70 (46.6%) choosing correctly compared to less than 27% in the other University Departments. This finding is consistent with a previous study involving the STI knowledge of students aged 17-20 in Pulau Pinang, Malaysia, which found that science students were more knowledgeable on the topic of STIs than Arts Department students (Anwar *et al.*, 2010). This finding was expected as students in Medical and Health Science courses are taught about STIs and potential treatments as part of their field of study, while other University Departments are not.

To further test their knowledge on STIs, the respondents were asked which STIs from a list were manageable but not curable. Six hundred and eighty-six respondents could correctly choose at least one STI from the list which fit these criteria, however only 17.6% could correctly identify all three, suggesting that most respondents were not fully aware of the life-long consequences of common STIs in Ireland. The questions asked throughout the study were chosen to assess how much knowledge third-level students have regarding STIs. This study revealed that the majority of students do not have a substantial amount of sexual health and STI knowledge. This finding is worrying as the information regarding which STIs are the most prevalent, their symptoms and treatments are imperative in controlling STIs (HSE, 2018).

It was determined that 515 (72.6%) participants of 709 were sexually active with 480 of those using contraceptives of some form. The primary reason for contraceptive use by the majority of respondents was for avoiding inadvertent pregnancy rather than for the prevention of STIs. However, when asked, the majority of total respondents believed that unprotected sex could result in an STI. According to the HSE's 'Your Guide to Sexually Transmitted Infections (STIs)' (n.d.), barrier methods such as condoms, including female internal condoms and male external condoms, can reduce the risk of contracting STIs significantly when correctly applied. Moreover, the Centres for Disease Control and Prevention (CDC) states that while hormonal or long-acting reversible methods and sterilisation are effective at avoiding conception, they neither prevent nor protect from STIs during sexual activities (CDC 2020). However, when asked which contraceptive methods can reduce STI contraction and transmission, only 36 (5.1%) of total respondents answered incorrectly by choosing the oral contraceptive pill, implanted contraceptive and/or tubal ligation/vasectomy. This demonstrates that respondents are aware of which contraceptives do not reduce the risk of acquiring STIs.

To investigate the prevalence of STIs among third-level students, participants were asked whether they had an STI test at some point in the past, in which only 224 (43.5%) of 515 sexually active respondents had one. This implies that the majority of respondents who are sexually active do not seek STI tests. However, when asked whether respondents discuss their sexual health status with sexual partners, the majority (60.4%) of the 515 sexually active respondents would always, frequently or sometimes do so.

Chlamydia, genital herpes, genital warts and/or gonorrhoea were commonly reported in those who had positively tested for one or more STIs following a test. This finding was similar to the Health Protection Surveillance Centre's annual report on STIs in Ireland from 2020 where chlamydia was reported as the most common STI (HPSC 2021). However, where genital herpes was the second most reported STI in this study, it was gonorrhoea that was the second most reported nationally in 2020 (HPSC 2021). It seems that although the majority of third-level students are aware of STIs and take the necessary precautions to prevent contraction and transmission, the burden of STIs falls most heavily on young people, with people less than 30 years of age accounting for 63.4% of new STI diagnoses in 2020 (HPSC 2021).

Another important but worrying finding was that over half (56.1%) of sexually active respondents were not aware of free STI testing available on both campuses. This finding was discouraging and highlighted the need for improved advertising on campuses in relation to their free STI testing services. When asked what would encourage students to avail of STI testing, most respondents suggested that the stigma associated with STIs needed to be reduced. This is consistent with a previous investigation carried out in 2020 by Vaughan *et al.*, in which a qualitative study was conducted on the experiences of stigma in healthcare settings by people living with HIV in Ireland.

This study highlighted the overall poor perception that third-level students in Cork have on STIs. The large majority of respondents admitted using the internet and/or their peers as sources of information for STIs. This can lead to false information about STIs as the internet is not always a reliable source of information. Only a minority (34.1%) of respondents disclosed acquiring their information from healthcare professionals. These results reflect those of Lally *et al.*, (2015) in which it was reported that the majority of respondents seek their sexual health information from the internet followed by their peers and subsequently healthcare professionals at only 31% of respondents.

Of 661 respondents that think a person infected with an STI does not always show signs and/or symptoms, 149 of them said they would only seek an STI test upon experiencing symptoms. There are similarities between the attitudes expressed by these respondents in this study and those described by Balfe and Brugha (2009) in which many respondents delayed seeking testing. Reasons outlined by Balfe and Brugha included respondents' concerns about stigma and that they would be judged by healthcare professionals, and also feelings of vulnerability.

LIMITATIONS

These findings may be somewhat limited in their representation of the third-level student population in Cork, Ireland as 709 responses do not fully represent the entire student population of over 37,000 students in Cork City (MTU 2021; UCC 2021).

CONCLUSION

The sexual health education that the respondents received throughout their lives was insufficient, and as a consequence of this, they had an inadequate amount of knowledge on the topic of STIs. Although there have been better efforts made in educating students at second-level over recent years, the incidence

of STIs among third-level students remains relatively high. This merits further investigation as to the failed implementation of knowledge by third-level students.

Further work should focus on investigating the knowledge of STIs nationally across Ireland in the third-level student population. Third-level institutions in Cork have an opportunity to encourage and improve awareness of students about STIs and the available resources, such as through increased availability of sexual health workshops.

ACKNOWLEDGEMENTS

We would like to thank Dr Annmarie Burns, MTU and Dr Brigid Lucey, MTU for their guidance and intellectual support offered in constructing this paper and survey. We would also like to thank Dr Sean Lacey, MTU for his assistance in statistical analysis of the results obtained from the survey.

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