New Approaches to Developing & Evaluating Sexual Health Promotion for Young People

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Summary

The sexual health of young people in Australia is of considerable concern due to the high prevalence of sexually transmitted infections (STIs), together with common behavioural risk factors such as multiple sexual partners and inconsistent condom use.

Traditionally sexual health promotion for young people has been delivered through institutional-based sex education programs, peer education and mass media campaigns. These approaches are generally resource-intensive, and evidence of effectiveness is mixed. Communication technologies including mobile phone text messages (SMS) and online social networking sites offer a novel means of reaching large numbers of young people, who are the greatest and most frequent users of these technologies. However little is known about how best to utilise these technologies for sexual health promotion to young people, and how to appropriately evaluate such interventions.

This thesis presents three different approaches to delivering sexual health promotion for young people in Australia – mass media, text messages and social networking sites. Throughout the thesis, novel evaluation designs and tools are employed to evaluate the interventions developed.

The limited observed impact of the ‘You never know who you’ll meet’ campaign highlights the limitation of using mass media for sexual health promotion. This is in contrast to the two sexual health SMS interventions developed which had demonstrated positive outcomes. The evaluation of the first intervention (SMS 2008) found that SMS were a feasible, popular and effective method of sexual health promotion for young people, with a significant increase in sexual health knowledge (p<0.01) and STI testing (p<0.05) observed over time. Qualitative evaluation of this intervention identified the key elements of message style, content and language that contributed to the acceptability and utility of the messages. The second SMS intervention (S²) was the first trial of mobile advertising (advertising on mobile phones) to deliver health related SMS to a large number of young people. Despite difficulties experienced during implementation, the intervention again showed positive impacts on sexual health related outcomes among those targeted.

Online social networking sites offer another potential means of delivering sexual health promotion messages to young people, particularly due to their interactive functions and rapidly growing popularity. A critical examination of the use of social networking sites for sexual health promotion to date revealed the extent to which these sites are currently being used, finding a focus on organisational promotion in high income countries, with great...
diversity in site popularity and activity. This is followed by a discussion of the implementation of “The FaceSpace Project”, one of the first sexual health interventions delivered via social networking sites. Recommendations from this project regard the design and implementation of interventions using social networking sites should directly inform future development of interventions in this setting.

In summary, text messages and social networking sites are promising methods of delivering sexual health promotion for young people, although they are not without their challenges. Appropriate evaluation strategies should be considered for all interventions developed, in order to usefully assess intervention effectiveness, and factors impacting upon effectiveness.
General Declaration

Monash University
Monash Research Graduate School

Declaration for thesis based or partially based on conjointly published or unpublished work

In accordance with Monash University Doctorate Regulation 17/ Doctor of Philosophy and Master of Philosophy (MPhil) regulations the following declarations are made:

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes two original papers published in peer reviewed journals and five unpublished publications. The core theme of the thesis is developing and evaluating new approaches to sexual health promotion for young people. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Department of Epidemiology and Preventive Medicine under the supervision of A/Prof Margaret Hellard, Dr Jane Hocking and Dr Louise Keogh.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

I have reformatted submitted and published papers in order to generate a consistent presentation within the thesis.
In the case of chapters two to seven my contribution to the work involved the following:

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<td>Study design, data collection and analysis, results interpretation, manuscript preparation and review</td>
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<td>Three</td>
<td>Determining the Impact of Text Messaging for Sexual Health Promotion to Young People</td>
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<td>Six</td>
<td>Examining the Use of Online Social Networking Sites for Sexual Health Promotion</td>
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<td>Seven</td>
<td>Developing Health Promotion Interventions on Social Networking Sites: Recommendations from The FaceSpace Project</td>
<td>Submitted</td>
<td>Study design and management, manuscript conception, manuscript preparation and review</td>
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Signed

Date
Acknowledgements

This thesis would not have seen the light of day if it wasn’t for the many people that supported me along this journey. Firstly, to my three supervisors – Margaret, Jane and Louise – who offered unwavering support and encouragement, as well as academic guidance, throughout the three years of my candidature. Particular thanks to Jane for her knowledge of all things sexual and statistical, and to Louise for inducting me into qualitative research world. I would not have started this thesis without being subjected to the “Margaret Persuasion Model” (motto: don’t give up); Margaret, I am forever grateful for the many opportunities you have provided me without throughout my years at Burnet, and I shall greatly miss the organised chaos you have created and nurtured at CEPHR/cpop.

I was fortunate to spend the years of my PhD with an incredible group of colleagues at the Burnet Institute. Many individuals contributed towards the work presented in thesis, particularly for Big Day Out recruitment. Special thanks to Megan Lim for blazing the trail, to Alisa Pedrana for sharing the journey with me, to Danielle Horyniak for proving the gossip and laughs and to all the biscuit clubbers for the Friday morning sugar hit. To those that made substantial contributions to parts of this thesis (Campbell Aitken, Mark Stroove, Jane Goller, Rachel Sacks-Davis, Rebecca Guy, Tim Spelman and Maelenn Gouillou), thank you for your guidance and assistance with this work. To the honours students I co-supervised during my PhD (Katie Hall, Phuong Nguyen, Nadine Ata) I hope you learnt as much from me as I did from you. Sentinel surveillance provided me with a sometimes satisfying (although at times frustrating) alternative to working on my PhD, and I thank my sentinel buddies past and present (Rebecca Guy, Jane Goller, Megan Lim, Carol El-Hayek, Phuong Nguyen, Maelenn Gouillou) for this opportunity. One day I hope we can dance the six-step append!

Much of the work presented in this thesis was a result of collaborations, and I wish to thank Helen Dixon and Melanie Wakefield from The Cancer Council and the entire FaceSpace team (particularly Shanton Chang and Steve Howard) for their substantial contributions. I am extremely grateful for the funding bodies and study participants who enabled me to complete this work, as well my funding support from the Australian Government and Monash University.

Many friends and Gold and Feigin family members kept me sane, grounded and happy throughout my PhD years. Special thanks to Emma Newton and Danielle Horyniak for proof reading my thesis; I look forward to returning the favour. Finally to Ricky, who convinced me to take the PhD plunge, and for all the years of love, friendship and travel he has shared with me.

It’s been an adventure….and I can’t wait for the next one to begin!
Publications and Presentations

A list of publications and oral presentations during the PhD candidature is presented below. Those related to work contained within this thesis are indicated by an asterisk.

Peer-Reviewed Publications


Lim MSC, Bowring A, Gold J, Hellard ME. What’s your ‘porn star’ name? A novel method of identifying research participants [Letter] Sexually Transmitted Diseases (In Press; accepted 22/11/10)

Other Publications


*Gold J, Lim M. Using SMS for Health Promotion. Yikes (Newsletter of the Youth Affairs Council of Victoria) 2008: 6(2); May p28-29


Oral Presentations


FaceSpace Project. 19th National Australian Health Promotion Conference. Melbourne, May 2010

*Gold J. The FaceSpace Project: Developing and Evaluating Sexual Health Promotion on Online Social Networking Sites. Epidemiology and Social Science Group, Centre for Sexual Health & HIV Research University College London Monthly Meeting, June 2010


*Gold J. The Digital Divide or the Digital Provide? Using Communication Technologies for Health in Developed and Developing Settings Marie Stopes International Australia, August 2010

Acronyms Used

2G  Second Generation (used in reference to mobile phone systems)
3G  Third Generation (used in reference to mobile phone systems)
CI  Confidence Interval
GSM Global System for Mobile Communication
HIV Human Immunodeficiency Virus
HPV Human Papillomavirus
MMS Multimedia Message Service
MSM Men who have Sex with Men
RCT Randomised controlled trial
SMS Short Message Service (also known as text message)
STI Sexually Transmitted Infection
WHO World Health Organization

Notes

“Young people” is used throughout this thesis to refer to individuals aged between 16 and 29 years; any derivation from this definition will be specifically noted.
Chapter One: Introduction & Literature Review

This chapter provides a background and rationale to the program of research presented in this thesis. The chapter begins by defining the key terms of young people, sexual health and health promotion. Sexually transmitted infections and associated behavioural risk factors are then discussed, followed by theoretical frameworks relevant to sexual health promotion. The chapter then focuses specifically on approaches to delivering health promotion, including both ‘traditional’ and newer approaches using communication technologies. Evaluation of health promotion interventions, and how evaluation strategies can be adapted to account for health promotion using communication technologies, are also described. Finally, an overview of the thesis, including aims and theoretical basis, is presented.
Setting the Scene: Defining Key Terms

Young People

This thesis focuses on young people aged 16 to 29 years. This stage of life represents the overlap of adolescence (the teenage years) and young adulthood,¹ and is a period of great change. During these years individuals mature (physically, mentally, socially and intellectually), develop their self-identities, and gain the ability to form reciprocal relationships.¹ ² The behaviours that begin during this period of life often last throughout adulthood;³ it is estimated that 70% of premature deaths among adults are due to behaviours that began during adolescence.²

The sexual development of young people is a key component in developing independence; sexual experiences give young people the opportunity to practice adult roles, including building relationships and developing a sense of autonomy.⁴ However if cognitive and emotional skills lag behind sexual development, adverse outcomes can result.⁴

Sexual Health

The World Health Organization (WHO) defines sexual health as:

“a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled”⁵

This definition of sexual health acknowledges the interrelation of the physical, mental and social dimensions of sexuality and sexual well-being.⁵

Sexual health encompasses a range of issues including the human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs), reproductive tract infections, unintended pregnancy and unsafe abortion, infertility, sexual well-being, violence related to gender and sexuality, aspects of mental health, the impact of chronic illness and physical disability on sexual health and female genital mutilation.⁶ As unsafe sex makes the second largest contribution to the global burden of disease due to the impact of STIs on mortality and morbidity,⁷ this thesis will focus on STIs, and associated behavioural risk factors, when
referring to ‘sexual health’. Particular attention will be given to chlamydia infection due to its long-term consequences and high prevalence among young people in Australia.8 9

**Health Promotion**

The 1986 Ottawa Charter for Health Promotion defined health promotion as “the process of enabling people to increase control over, and to improve, their health”.10 The definition was later refined by the WHO to “the process of enabling people to increase control over the determinants of health and thereby improve their health”.11 The process of health promotion requires both individual actions to improve skills and capabilities, and societal actions to change social, environmental and economic conditions to reduce their (negative) impact on public and individual health.11

Key global health promotion priorities and strategies for both individual and societal health promotion were first outlined in the Ottawa Charter of 1986,10 and reaffirmed and extended in the Jakarta Declaration of 1997.12 Empowerment, ensuring individuals and communities are able to assume the power to which they are entitled, is a key underlying concept of health promotion.13

This thesis will focus on individual-focused health promotion; societal-level factors, although critical to ensuring health, are beyond the scope of this thesis.

**Geographical Focus**

Although reference will be made to global estimates and examples, this thesis will focus primarily on the delivery and evaluation of sexual health promotion for young people in Australia.
Sexually Transmitted Infections

Sexually transmitted infections (STIs) pose a substantial threat to the sexual health of young people, both in Australia and globally. STIs are infections that are spread primarily by person-to-person sexual contact; at least 30 pathogens have been described that can be transmitted sexually. These pathogens are often divided into two groups, curable STIs caused by bacteria or protozoa (e.g. Treponema pallidum, Neisseria gonorrhoeae, Chlamydia trachomatis and Trichomonas vaginalis) and chronic STIs caused by viruses (e.g. HIV, Herpes simplex virus and human papillomavirus (HPV)). The most important STIs globally include syphilis, gonorrhoea, chlamydia, trichomoniasis, chancroid, genital herpes, HPV infection and HIV.

Depending on the infection, diagnostic testing for STIs may involve genital swabs, urine or blood specimens, while treatment may include oral or topical application of antibiotics or antivirals. STIs can have both short and long term consequences, including pain and discomfort, adverse pregnancy outcomes and infertility. Importantly many STIs do not cause overt symptoms in individuals; individuals may thus be unaware they are infected and transmit the infection unknowingly to their sexual partners. The transmission of HIV may be facilitated by infection with other STIs.

**Epidemiology**

It is difficult to accurately estimate the true prevalence and incidence of STIs as many infections are asymptomatic, and thus infected individuals do not present at clinical services for testing and are not counted in surveillance figures. In addition, many surveillance systems are incomplete, especially as many viral STIs are not required to be reported to public health authorities.

**Global**

The most recent global estimate available reported 340 million new cases of curable STIs worldwide in 1999. This included 92 million new cases of chlamydia, 62 million new cases of gonorrhoea, 12 million new cases of syphilis and 174 million cases of trichomoniasis. The largest number of new infections with STIs occurred in South and Southeast Asia, with the highest rate of new infections in sub-Saharan Africa. Individuals aged under 25 years of age are believed to account for the majority of infections with STIs. It is estimated that 33.3 million people globally are infected with HIV, including 2.6 million who were newly infected in 2009.
Australia

In Australia there are over 40 notifiable communicable diseases, where new diagnoses are required to be reported to the Commonwealth’s National Notifiable Diseases Surveillance System. Notifiable STIs include HIV, syphilis, gonorrhoea and chlamydia. In the past five years the population rate of chlamydia diagnoses has increased, while rates of gonorrhoea diagnoses have decreased. The rate of syphilis infection doubled from 2005 to 2007 but has declined since. Rates of HIV diagnoses have decreased in some states (New South Wales), and increased in others (Victoria, Queensland, South Australia, Western Australia). New diagnoses of HIV, syphilis and gonorrhoea occur predominantly among among men who have sex with men (MSM), while chlamydia infections primarily occur among those aged under 30 years.

Chlamydia

The concentration of chlamydia infection among young people is an important public health issue; the consequences of infection can be severe, yet an effective health promotion response is possible as treatment is easy and effective. This section will outline the biology of chlamydia infection, testing and treatment for infections, and the epidemiology of chlamydia infection in Australia.

Biology of Infection

Chlamydia is caused by infection with the Chlamydia trachomatis bacteria in the mucus membrane tissue of the genital tract. Infections are often asymptomatic; it is estimated that up to 85% of infected men and women will not have symptoms of chlamydia infection. Infection with chlamydia can lead to pelvic inflammatory disease, which can in turn lead to tubal-factor infertility and ectopic pregnancy. Repeat infection with chlamydia is associated with an increased risk of these adverse outcomes.

The natural history of chlamydia infection, including the duration of infection and the factors that influence whether an infection resolves, is not completely understood. It is estimated that around half of chlamydia infections will resolve spontaneously within a year without treatment. Previous infections with chlamydia may confer some degree of protective immunity and shorten the duration of infection, however evidence for this is mixed.
Testing and Treatment

Chlamydia tests are now conducted using nucleic acid amplification tests, which have high sensitivity and specificity.\textsuperscript{29, 30} A variety of biological specimens can be tested; the most non-invasive specimens are first-void urine samples and self-collected vaginal swabs.\textsuperscript{29, 31}

Chlamydia infection can be treated quickly and easily. A single dose of the antibiotic Azithromycin (1g) taken orally is very effective; one study found 95% of those treated with this regimen were negative for chlamydia when they returned for a test of cure.\textsuperscript{32} Alternative antibiotic regimens may be equally effective, but require multiple day dosing.\textsuperscript{32, 33} Azithromycin is recommended for chlamydia treatment in Australia and elsewhere.\textsuperscript{34–36} There is currently no vaccine available to prevent chlamydia infection.\textsuperscript{37}

Epidemiology in Australia

Between 1999 and 2009, the number of chlamydia notifications increased by 345% in Australia overall, and 371% in the state of Victoria (Figure 1).\textsuperscript{38}

Figure 1: Number of Chlamydia Notifications 1999-2009, Australia and Victoria

Data for figure sourced from\textsuperscript{39}
The increasing chlamydia notifications in Australia may be due to increasing prevalence of infection, as well as several external factors such as increased testing, improved testing technology and better notification procedures. Analyses of chlamydia testing trends and positivity data suggest that these external factors can explain some, but not all, of the rise in chlamydia notifications, suggesting that there has been a true increase in population chlamydia prevalence over time. Similar patterns have been observed internationally.

Females account for 59% of chlamydia notifications in Australia, however, this is at least partially an artefact of testing patterns as far more females than males are tested for chlamydia each year. Young people aged 15 to 29 years accounted for 81% of all chlamydia notifications in 2009 (Figure 2).

Figure 2: Number of Chlamydia Notifications by Gender and Age Group, Australia 2009

A review of chlamydia prevalence studies conducted in Australia between 1997-2004 estimated a community-based overall chlamydia prevalence of 1.5% (95% confidence interval (CI) 1.1-1.9) among non-Indigenous men and 1.4% (95% CI 0.9-2.0) among non-Indigenous women. The estimate of the prevalence among adolescents and young people was 5.6% (95% CI 4.9-6.4); however this included both clinic and community-based samples. Recent community-based samples of young people estimate chlamydia prevalence of 3-5% among sexually active men and women.

As well as high prevalence, re-infection with chlamydia is also common in Australia. A recent analysis of follow up testing data from clients at sexual health centres found 21% of heterosexual males and 16% of females were re-infected with chlamydia, while the re-infection rate among a cohort of young Australian women was 28.1 per 100 person years (95% CI 13.9-75.7).
Behavioural Risk Factors

Multiple biological, psychological, and social influences impact upon young people’s vulnerability to STIs. This section will focus specifically on the behavioural risk factors - multiple sexual partners, inconsistent condom use, low level of sexual health knowledge and poor perception of STI risk – that contribute to the high prevalence of STIs among young people in Australia.

Multiple Sexual Partners

A global review of unmarried teenagers found a median of 5% (range 2-33%) of females and 29% (range 4-58%) of males reported two or more sexual partners within the last 12 months. In Australia this figure is higher; the nationally representative Australian Study of Health and Relationships found up to 40% of those aged 16-19 years, and up to a third of those aged 20-29 years reported multiple sexual partners within the past year (Table 1). Males were more likely to report multiple partners compared with females.

Similar results have been found in other surveys of young people in Australia; 34-37% of young people surveyed annually at a music festival and 45% of sexually active school students reported multiple partners within the past year. Data from the music festival surveillance suggests that the proportion of young people reporting multiple partners has not changed between 2005 and 2008, although the schools survey found a significant increase in the proportion reporting three or more sexual partners within the past year between the 2002 and 2008 surveys.

Table 1: Sexual Risk Behaviour of young people, Australian Study of Health and Relationships

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
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<tr>
<td></td>
<td>16-19 years</td>
<td>20-29 years</td>
</tr>
<tr>
<td>Multiple partners, past year (%)</td>
<td>33.1*</td>
<td>15.4</td>
</tr>
<tr>
<td>Condom use at last sex (%)</td>
<td>54.1*</td>
<td>30.9</td>
</tr>
<tr>
<td>Always used condoms with casual partner, past six months (%)</td>
<td>43.9</td>
<td>37.3</td>
</tr>
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</table>

* Proportion is significantly higher among 16 to 19 year olds compared to those aged 20 to 29 years

Data sourced from

Calculated from Table One, Bearinger et al 2007
Condom Use

Having multiple sexual partners is only a risk factor for STI transmission if protective measures – condoms – are not being correctly applied, and used consistently, with all sexual partners. Globally, although condom use is increasing among young people, usage rates appear to be too low to contain the spread of STIs. A global review of unmarried teenagers found a median of 28.5% (range 2-57%) of females and 38.5% (range 21-80%) of males reported a condom was used at last sex. These figures are higher in Australia, where over half of those aged 16 to 19 years reported using a condom at last sex (Table 1). Similarly, 60% of female and 74% of male secondary students surveyed reported a condom was used at last sex.

Even if condoms are being used, they are often not used consistently or correctly. Results from the Australian Study of Health and Relationships (Table 1) and those surveyed at a music festival indicated that fewer than 70% of young people with casual sexual partners reported always using condoms with these partners, and consistency of condom use did not increase over time. In addition, condoms are not always used correctly. Studies of condom breakage have found that condom breakage is significantly more common among younger men compared to older men.

Multiple external factors may influence whether a condom is used during sex. These include intoxication, availability and cost, gender roles (many females report difficulty negotiating condom use, particularly when they are economically and socially dependant on their males partners), and perception of trust and intimacy within relationships.

Knowledge & Perception of Risk

Other factors affecting the risk of STIs include low levels of sexual health knowledge and poor perception of STI risk among young people. Many surveys of young people have shown that knowledge of STIs is often inadequate and inaccurate. In Australia, knowledge of STI transmission routes and health consequences among the overall population is poor, with significantly lower knowledge scores observed among those aged 16 to 19 years compared with older age groups. Similarly poor sexual health knowledge has also been reported in other surveys of young people in Australia.

In addition to poor knowledge, a high proportion of young people potentially at risk of STIs do not recognise their own risk. A US based longitudinal study of adolescent females found 82% of those who were found to be infected with an STI (either at baseline or during 12 months of follow up) did not perceive themselves to be at risk at baseline.

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1 Calculated from Table One, Bearinger et al 2007
This mismatch between perception of risk and actual risk has also been reported in Australia; Lim et al found only a quarter of those surveyed at a music festival who were classed at risk of acquiring an STI (based on self-reported risk behaviour) perceived themselves to be at risk.\textsuperscript{76} However perception of risk was not associated with sexual health knowledge.\textsuperscript{76} Perception of risk for STIs was even lower among Australian high school students, with just 12\% of sexually active students perceiving themselves to be at risk of acquiring an STI.\textsuperscript{64} In both studies, those with a higher number of sexual partners were more likely to perceive themselves to be at risk. However consistency of condom use was not associated with risk perception.\textsuperscript{64, 76}

\textbf{Control and Prevention of STIs}

\textbf{Transmission Dynamics of STIs}

The transmission of STIs through a population can be understood using the ‘basic reproductive number’.\textsuperscript{78} This number is the average number of infections caused by one individual entering a population wholly susceptible to infection. The basic reproductive number is a product of:

\begin{itemize}
  \item \textbf{Likelihood of transmission}: the probability that an infection is transmitted during a sexual act;
  \item \textbf{Contact rate}: the rate of sexual partner change within a population; and
  \item \textbf{Duration of infectiveness}: the length of time an infected individual is infectious for (able to infect another individual).
\end{itemize}

The basic reproductive number will vary based on the characteristics of the infection and the population of interest. Furthermore, as not all populations are wholly susceptible (as some individuals may be already infected, and/or immune), the \textit{effective} reproductive number is the number of new infections caused by an average infection at a given time point, with time zero being the basic reproductive number.\textsuperscript{78}

Interventions to reduce the incidence of STIs aim to reduce the basic reproductive number by reducing the transmission probability, reducing the contact rate and/or shortening the duration of infection.\textsuperscript{79} This can be achieved via behavioural changes (e.g. altering sexual practices, delaying sexual debut, reducing concurrent sexual partnerships and the uptake of new sexual partners, condom use) as well as medical interventions (testing and treatment of infected individuals, circumcision). Vaccines, when they exist, introduce artificial immunity into the population, and thus reduce the effective reproductive number.\textsuperscript{78}
Public Health Approaches

The transmission dynamics of STIs inform the two key public health approaches to combating the spread of STIs within a population – control and prevention. Control aims to detect STIs and prevent their further spread in the population, while prevention aims to reduce the acquisition of STIs (and to limit further spread of STIs if acquisition occurs). Often interventions (e.g. treatment) can act as both a control and prevention strategy.

The WHO recommends that a comprehensive public health strategy to prevent and control STIs includes:

- Promotion of safer sexual behaviour;
- Promotion of early health-care seeking behaviour;
- Introduction of prevention and care activities across all primary health care programmes; and
- A comprehensive system of STI case management, including identification and treatment of infection, education and counselling, and partner notification.

As this thesis focuses on sexual health promotion rather than clinical care, emphasis is given to promotion of safer sexual behaviour and health-seeking behaviour. Promotion of safer sexual behaviour is discussed in detail later in this chapter (see Sexual Health Promotion, page 49); below access to, and uptake of, STI testing in Australia is discussed.

STI Testing Access and Uptake

In Australia, sexual health clinical care is widely available – at least in principle – at both general practitioners and specialised government-funded health services such as sexual health centres and family planning clinics. Testing for sexually transmitted infections is rebatable via Medicare, so an individual is usually not liable for the cost of the test, although they may be charged for the clinical consultation and any difference between the Medicare rebate and the charges of the pathology provider.

Chlamydia screening – offering testing to members of population who may not know they are at risk – is important in detecting and treating infections among individuals who may not know they are infected. While many countries have implemented screening programs, it is unclear whether chlamydia screening programs will actually reduce the incidence of pelvic inflammatory disease.

Mathematical modelling suggests that if 40% of individuals in Australia aged 15-25 years were screened annually, the prevalence of chlamydia would decrease rapidly within 10 years. Chlamydia screening has not been uniformly implemented in Australia; findings from screening
pilot studies (currently underway) will inform future implementation of screening approaches nationally.\textsuperscript{88} Australian clinical guidelines recommend that sexually active young people aged under 25 years are tested annually for chlamydia.\textsuperscript{89} Despite this, the current uptake of chlamydia testing is substantially lower than recommendations. While it is estimated that that 75\% of 16-29 year olds in Australian visit a general practitioner at least once within a 12 month period, only 8\% of those who are sexually active are tested for chlamydia.\textsuperscript{52} Males, individuals aged 16-19 years and those residing in metropolitan areas are significantly less likely to be tested.\textsuperscript{52} An earlier analysis of Medicare data reported that socioeconomic status was associated with the likelihood of having been tested for chlamydia, with rates of testing increasing with socioeconomic advantage.\textsuperscript{90} Thus although testing rates at general practice have increased over time among both males and females,\textsuperscript{91} only a small proportion of young people in Australia are tested each year.

**Barriers to STI Testing**

Several barriers at the individual and provider levels restrict uptake of STI testing by young people. Studies of young people in the US report that obstacles to STI testing include cost of testing, lack of knowledge of STIs and testing services, fear of finding out about infection, fear of surreptitious drug testing, denial and embarrassment, and provider related concerns (lack of privacy, waiting time, language barrier, perceived discrimination).\textsuperscript{92,93} Similar themes emerged from a review of studies from predominantly developed countries regarding women’s views of chlamydia screening.\textsuperscript{94} This review found factors that made chlamydia screening less acceptable included ignorance and inaccurate information about chlamydia, denial, moral connotations and stigma, fear or anxiety, confidentiality and privacy concerns, difficulty accessing services and discomfort.\textsuperscript{94}

As described earlier, young people often do not perceive themselves to be a risk of infection (see page 29), and this may be a reason why they do not actively seek STI testing. A survey of university students in Sydney found that 60\% of those sexually active would not seek STI testing in the coming year as they did not feel themselves to be at risk of infection.\textsuperscript{96} The requirement in Australia for young people to request their own Medicare card, rather than automatic issuing, may also be important in restricting testing uptake.\textsuperscript{96}

At the provider level, barriers to chlamydia testing by general practitioners in Australia include lack of time, difficulty remembering to suggest testing to patients, patient’s embarrassment and lack of knowledge and awareness about chlamydia testing.\textsuperscript{97,98} Similar provider level barriers have been reported elsewhere.\textsuperscript{99,100}
Increasing Uptake of STI Testing

Many strategies have been suggested for increasing the uptake of STI testing. A qualitative study of young women in Victoria reported that using age-based (rather than risk-based) screening, introducing screening during a sexual health consultation, normalising screening within the community and not requiring a sexual history prior to screening would increase the acceptability of screening.\textsuperscript{101} Studies of young people in the US suggest putting a positive focus on testing, providing a monetary incentive and improving clinical testing services (increased privacy, convenient location, low cost or free testing, increased provision of information, offering testing when presenting for other reasons, faster receipt of test results, offering testing outside of clinical settings) would increase testing uptake.\textsuperscript{92,93} In a review of women’s views of chlamydia screening, factors such as accurate knowledge about chlamydia, feeling chlamydia is personally relevant, having multiple options for chlamydia testing (both specimen collection and location of testing), ease of access and feeling supported to cope with a chlamydia diagnosis were thought to increase the acceptability of screening.\textsuperscript{94} At a provider level, automated computer reminders, clear targets and incentives for tests have been suggested as a strategy to increase uptake.\textsuperscript{100}

Several of these strategies to improve STI testing uptake have been formally evaluated, with promising results. Testing outside of clinical services has been shown to be an acceptable and effective method of reaching young people; however uptake has been more successful at community venues and educational institutions\textsuperscript{54,56,57,102-105} compared with home-based testing\textsuperscript{106-108} or at pharmacies.\textsuperscript{109} Evaluation of a community-based testing trial conducted in Victorian sporting clubs, which achieved a participation rate of over 95%, reported that most participants found the community approach useful for increasing access to testing and they would be willing to complete an annual screen at this location.\textsuperscript{56}

The effect of financial incentives on testing rates has also been examined. A study of university students in Canberra found that providing an incentive (AUD $10) to students to present for chlamydia testing resulted in more tests when compared with promotion of testing via media and student activities, and was a cheaper approach per test.\textsuperscript{110} A randomised controlled trial examining small financial incentives to general practitioners (AUD $5/test) to increase chlamydia testing did not find a significant increase in testing.\textsuperscript{97} The authors suggested that a greater incentive for general practitioners, along with regular payments and ongoing feedback on testing rates, may have been a more successful strategy.\textsuperscript{97} Whether financial incentives are paid to individuals or providers, these incentives need to be considered from a sustainability, as well as efficacy, perspective; the high rate of chlamydia re-infection\textsuperscript{111,112} suggests that
regular testing of those at risk is necessary, which may greatly increase the cost of incentive-based screening approaches.

At a provider level, interventions aiming to increase awareness of chlamydia and its consequences, improve knowledge of screening guidelines and non-invasive testing procedures, improve clinicians communications skills (including sexual history taking) and overcoming barriers within clinic systems have been found to significantly increase the rate of chlamydia testing.\textsuperscript{113-117} A randomised controlled trial of the use of computer reminders to prompt chlamydia screening found this relatively simple approach was effective in increasing testing rates.\textsuperscript{118}

\textbf{Summary}

Sexually transmitted infections among young people are of significant public health concern, particularly those with significant long term health consequences, such as chlamydia. The high prevalence of chlamydia among young people in Australia is driven by behavioural risk factors including multiple sexual partners, inconsistent condom use and poor sexual health knowledge and risk perception, coupled with low rates of STI testing. Interventions to address these factors are required to reduce the transmission and acquisition of STIs, and in turn, improve the sexual health of young people.
Theoretical Frameworks

In order to design and deliver effective interventions to improve the sexual health of young people, it is useful to consider social and behavioural theories. Theories present a systematic way of understanding events, behaviours and situations; they aim to explain or predict these actions by specifying relationships between variables.\textsuperscript{119} Although theories can never model human behaviour perfectly, they can assist with systematic thinking in the design, delivery and evaluation of interventions.\textsuperscript{120}

Two distinct groups of theories and models relevant to health promotion interventions are described below; behaviour change theories and communication models and strategies. This is followed by a discussion of how theoretical frameworks can be applied to sexual health promotion interventions.

**Behaviour Change Theories**

Theories of behaviour change aim to explain the behaviour of interest and/or suggest how to develop more effective ways to influence and change the behaviour.\textsuperscript{119} As virtually any intervention related to sexual health requires at least some behaviour change at the individual level, this section will focus on the most common theories related to individual health behaviour. This section will outline the key cognitive theories (Health Belief Model, Theories of Reasoned Action and Planned Behaviour, Social Cognitive Theory) and stage theories (Transtheoretical Model, Precaution Adoption Process Model) of behaviour change.

**Cognitive Theories of Behaviour Change**

**The Health Belief Model**

Developed in the 1950s,\textsuperscript{121} this model was based on a number of theories of risk taking and decision making, all of which hypothesised that an individual’s behaviour was dependant on the value an individual places on a particular goal, and the individuals’ estimate of how likely it is that a given action will achieve that goal.\textsuperscript{122}
In this model (Figure 3), four beliefs predict whether an individual performs a behaviour:

- **Perceived susceptibility**: individual’s belief in their personal vulnerability to a condition;\(^{123}\)

- **Perceived severity**: individual’s belief in the severity of the condition.\(^{123}\) This may include medical, clinical and social consequences,\(^{124}\)

- **Perceived benefits**: individual’s beliefs about whether there is a course of action that will reduce their susceptibility or minimize the consequences of the situation.\(^{123}\) This is influenced by norms and pressures of social groups,\(^{121}\) and

- **Perceived barriers**: individual’s beliefs about whether taking a course of action will outweigh any costs or barriers.\(^{123}\) This judgment is believed to occur as a type of subconscious cost-benefit analysis.\(^{124}\)

Figure 3: The Health Belief Model

Triggers for behaviour change (‘cues to action’) are also included in this model – these cues may be internal (e.g. symptoms) or external (e.g. conscious or unconscious viewing of media messages).\(^{121}\) Demographic, socio-physiological and structural factors may affect individuals beliefs, and thus indirectly influence behaviour change processes.\(^{124}\) Many now argue that self-efficacy, the belief an individual has in their abilities to perform a behaviour, should be added to the model to increase its explanatory power.\(^{124}\) (see Social Cognitive Theory (page 38) for more detail on self-efficacy).
Theories of Reasoned Action and Planned Behaviour

The Theory of Reasoned Action was developed in the mid-1970s in an attempt to better understand the relationships between attitudes and behaviours.\textsuperscript{126} It was later expanded into the Theory of Planned Behaviour to account for behaviours in which individuals have less voluntary control.\textsuperscript{127} Both theories (Figure 4) operate under the assumption that people are usually “reasoned” (rational) in their actions.\textsuperscript{128} ‘Intention to act’ is considered the most immediate determinant of an individual’s behaviour; this intention is directly influenced by:

- **Attitudes towards behaviour**: determined by an individual’s belief that an outcome will occur if a behaviour is followed and that this outcome is beneficial to health;\textsuperscript{126,127} and

- **Subjective norms**: determined by an individual’s belief about what other people think an individual should do (normative beliefs) and how motivated an individual is to comply with these normative beliefs.\textsuperscript{126,127}

The Theory of Planned Behaviour added an additional factor, **perceived behavioural control**, which is determined by an individual’s belief about how much control they feel they have personally over a behaviour.\textsuperscript{127} Perceived control is determined by beliefs of facilitators and barriers to performing a behaviour (control beliefs) and the impact of each of these factors to facilitate or inhibit the behaviour (perceived power).\textsuperscript{129}

Figure 4: Theories of Reasoned Action and Planned Behaviour

Both of the theories assume that all other factors – demographics, environment and so on – do not have an *independent* influence on the likelihood of performing a behaviour but act through
the factors included in the model. Feedback loops may also be important in these models; for example, attitudes towards a behaviour may influence beliefs about the behaviour and the result of performing the behaviour may influence future intentions and behaviour.

More recently, the Theories of Reasoned Action and Planned Behaviour have been extended to an ‘Integrated Behavioural Model’ that includes additional constructs from other theories, such as self-efficacy, knowledge and skills, salience (prominence) of the behaviour, habit, and environmental constraints. A major limitation of this combined model is the manner in which the various model constructs combine to affect behaviour has not been established.

**Social Cognitive Theory & Self Efficacy**

Social Cognitive Theory evolved from social learning theory and incorporates both determinants of health behaviour and models of promoting change. It was first published as a comprehensive framework in 1986, and attempts to synthesize cognitive, emotional and behavioural understandings of behaviour change. The theory is centered on “reciprocal determinism”, the interaction between an **individual**, the **behaviour**, and the **environment** (social and physical) (Figure 5). The influence of each of the three classes of determinants will vary for activities, individuals and circumstances; however in most cases all three classes are highly interdependent. These determinants may act sequentially or simultaneously.

Figure 5: Social Cognitive Theory

A range of personal cognitive factors play an important role in how the individual affects, and is affected by, specific behaviours and environments. These factors include observational learning, outcomes expectations, and **self-efficacy**, the belief an individual has in their ability to successfully perform a behaviour. Self-efficacy is argued to be the most important prerequisite for behaviour change as it affects how much effort is expended on a given action.
Stage Theories of Behaviour Change

A major evolution in behavioural change theories was the recognition in the early 1980s that behaviour change is a process, rather than an event occurring at a single point in time.\(^\text{134}\) Although these models proceed in stages, progression through the stages may be circular or spiral, rather than linear.\(^\text{135}\) Two stage theories of behaviour change are described below, the Transtheoretical Model and the Precaution Adoption Process Model.

**Transtheoretical Model**

This model attempts to describe the different stages of change, and the relevant intervention at each stage.\(^\text{134}\) Figure 6 displays the five basic stages of change, from pre-contemplation to maintenance. A critical feature of this model is that it recognizes not all individuals are at the same level of motivation or readiness to change.\(^\text{134}\)

Figure 6: Transtheoretical Model

1. **Pre-contemplation**
   - Individuals who have no intention to change

2. **Contemplation**
   - Individuals who are intending to change in the next six months

3. **Preparation**
   - Individuals who intend to change in the next month

4. **Action**
   - Individuals who have changed their behaviour in the past six months

5. **Maintenance**
   - Individuals who have maintained their behaviour change for more than six months

A sixth stage, termination, may be appropriate to some behaviours, where an individual no longer has the temptation of the behaviour and has high self-efficacy, as though they had never had the behaviour at the beginning.\(^\text{134}\) Reaching termination may be unrealistic for some individuals and behaviours.\(^\text{134}\)
Various factors, such as self-efficacy, decisional balance (weighting of positive and negative aspects of change) and processes of change (such as increasing knowledge, recognising negative impacts and seeking support from others) are believed to predict progression through the stages of the model.  

**Precaution Adoption Process Model**

This newer model extends the transtheoretical model by being more specific about which individuals are included at each stage. Figure 7 describes the stages of the model, in which the individual moves from being unaware of the consequences of a behaviour, through to deciding to act on and maintain a behaviour.

This model views the theories with a cost-benefit focus, such as the Health Belief Model and the Theories of Reasoned Action and Planned Behaviour, as primarily only applicable to individuals at the ‘deciding to act’ stage. The Precaution Adoption Process Model is wider than this, recognising other issues that may be important to consider before an individual is even considering change, or after they have made a change.

Figure 7: Precaution Adoption Process Model

![Figure adapted from 136, 137](image-url)
Communication Models and Strategies

As well as considering the process of behaviour change within individuals, development of effective health promotion interventions necessitates the examination of how to best communicate messages to the target audiences. While a full review of communication models and strategies is beyond the scope of this thesis, some of the most relevant and commonly used communication models and strategies within health promotion – the Information Processing Model, message effects theories, the Communication-Persuasion Model and social marketing – are outlined.

Information Processing Model

The dominant model of information processing is the ‘limited capacity model of motivated mediated messaging processing’. This model assumes that individuals actively process information within their cognitive system via three basic processes which operate simultaneously:

- **Encoding**: The process of bringing information into the cognitive system. This requires engagement with the sensory receptors (e.g. eyes, ears), entering the ‘sensory store’ (a short-lived storage location for each sense) and transformation, either consciously or unconsciously, into an active mental representation in short-term memory. Only information the individual perceives as important is encoded.

- **Storage**: The process of linking the newly encoded information to previously encoded information. The more associations there are between the new and older information, the more completely the new information will be stored.

- **Retrieval**: The process of reactivating the stored mental representation of some aspect of the information; this can occur concurrently as information is being processed, or later. Information with more links to other information is more easily retrieved.

The cognitive processing system has some limitations; individuals can only attend to a limited amount of information in an environment at one time, and the amount of information that can be held for processing is limited by short-term memory capacity and the resources available for processing. Many items that are encoded are poorly stored, because few resources are allocated for storage. There may also be insufficient resources available for processing (e.g. a complex message requiring retrieval from long-term memory may not allow for simultaneous message encoding) or the resources may not be allocated to processing (e.g. when attempting to process different information at the same time). The structure and content of the
information, and the individuals’ own goals and motivations, determine how resources are allocated to the processes of encoding, retrieval and storage.  

When designing health promotion messages, the goal of the message, the target audience, the medium used and the personal relevance of the messages should be considered, as they affect aspects of message processing. Messages aiming to raise awareness need to attract attention and be well encoded, while messages to increase knowledge require good storage as well. Messages that aim to change behaviour require good encoding and storage of the message regarding the behaviour to be changed, as well as information about the reasons for change and how to change. Different populations process information differently; for example, high-sensation seekers (to whom messages about risky behaviours are commonly targeted) will allocate more resources to processing of messages containing novel content. The medium of message delivery, and the personal relevance of the message, determines how resources are allocated across encoding, storage and retrieval by the message recipient. The effectiveness of the message will depend on if, and how many, resources are allocated across these stages of information processing.

**Message Effect Theories**

Message effect theories examine how features, formats and content of messages produce changes in knowledge, attitudes and behaviours. Some key message effects theories – fear appeals, message framing and tailoring – are described below.

**Fear Appeals**

Fear appeals emphasise the physical or social consequences of beginning or continuing an unhealthy behaviour. Fear may affect how an individual perceives the severity of, and their susceptibility, to the consequences of their behaviour, while their perceived self-efficacy (or lack thereof) determines their response to this fear.

There is evidence that the stronger the fear aroused, the stronger the persuasiveness of the message, and overall fear has weak (but consistent) affect on attitudes, intentions and behaviours. Nevertheless, as the majority of research in this area comes from artificial settings in the laboratory, and there are potentially negative impacts of using fear appeals (e.g. diminished ‘brand’ image, ethical implications), many remain hesitant about the use of fear appeals. The use of fear appeals for HIV prevention remains controversial.

**Message Framing**

Framing suggests that the way in which information is presented, or the perspective of the messages, influences the response of the individual. ‘Gain-frame’ messages present a
behaviour in terms of its benefits, while ‘loss-frame’ messages present a behaviour in terms of its costs. Most research in this area has focused on cancer screening, generally finding that loss-frame appeals are more effective. However gain-frame messages may be more effective for prevention behaviours.

**Tailoring**

Tailoring describes individualised communications, where data about an individual are used to determine the most appropriate messaging strategy to meet the individual’s needs. Most research into tailoring has focused on tailoring of content, but tailoring can also include modification of design and production elements, channel of delivery and/or framing of messages. Tailored messages appear more likely to be read and remembered, rated as catching attention, retained and discussed with others and perceived as personally relevant. Tailored messages have been associated with a variety of positive health-related behaviour change, however untailored materials may be equally effective if they are appropriate for the individual receiving the messages.

Message effect theories remained rather under-developed, and there is currently little guidance available for which of these elements are best to use within health promotion campaigns. The role of emotion in message effects is particularly under-studied.

**Communication-Persuasion Model**

The Communication-Persuasion Model was developed to guide public health communication within the mass media. The model proposes using five factors at the input stage to design an effective campaign, and to then assess whether these inputs are likely to achieve the desired outputs to mediate behavioural change (Table 2). The output stages must occur in sequence for the message to have an effect and a change to occur.

Table 2: Input and Output Variables, Communication-Persuasion Model

<table>
<thead>
<tr>
<th>Input Factors: Communication Variables</th>
<th>Output Factors: Processes Mediating Communication Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Source</td>
<td>1. Tuning in</td>
</tr>
<tr>
<td>3. Channel</td>
<td>3. Liking</td>
</tr>
<tr>
<td>4. Receiver</td>
<td>4. Comprehending</td>
</tr>
<tr>
<td>5. Destination (target)</td>
<td>5. Generating</td>
</tr>
<tr>
<td></td>
<td>6. Acquiring</td>
</tr>
<tr>
<td></td>
<td>7. Agreeing</td>
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<tr>
<td></td>
<td>8. Storing</td>
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<tr>
<td></td>
<td>9. Retrieval</td>
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<tr>
<td></td>
<td>10. Decision</td>
</tr>
<tr>
<td></td>
<td>11. Acting</td>
</tr>
<tr>
<td></td>
<td>12. Post-action</td>
</tr>
<tr>
<td></td>
<td>(13. Converting)</td>
</tr>
</tbody>
</table>

Table adapted from
The input variables can be manipulated by the message sender to maximise the likelihood of achieving the output stages. These include consideration of the credibility and attractiveness of the source, the appeal and style of the message, the media used to communicate the message, the targeting of the message receiver and the desired outcome of the message, whether knowledge, attitude or behaviour change.154

This model is incorporated in the Rossiter-Percy Six-Step Effects Model which has been applied to both commercial advertising and health-related communication campaigns.155 156 In this model there are six steps involved in communication, from initial exposure to the message to achieving the desired outcomes in a population (Figure 8). As well as incorporating the elements of the Communication-Persuasion Model, this model also includes information processing and message effects theories within step three (communications effects).

Figure 8: Rossiter-Percy Six-Step Effects Model

1. Message Exposure
   The individual must be exposed to the message

2. Message Processing
   The immediate response to the message; if the message attracts attention it is processed in short term memory

3. Communication Effects
   Production of more permanent responses (e.g. beliefs, attitudes, intentions) to the message

4. Behavioural Effects
   The individual takes action; this may be intermediate (e.g. seeking further information) or direct (e.g. trialing a new behaviour)

5. Sales/Market Share
   The accumulation of behavioural effects within the target population e.g. prevalence of a behaviour

6. Outcome
   Population outcome of the sales/market share e.g. reduced morbidity/mortality, reduced costs

Adapted from155 156
During the planning of a communications campaign, the six steps can be reversed i.e. the overall goal is defined, followed by the objectives (market share) and the desired behavioural effects. Consideration of communication effects, message processing and message exposure are then used to guide message design and delivery strategies.155

Social Marketing

Social marketing is a process that applies commercial marketing principles and techniques to influence target audience behaviours for the benefit of both the target audience and society.157 Social marketing involves the “selling” of behaviours – whether to encourage individuals to accept a new behaviour, reject a new, potentially undesirable behaviour, modify a current behaviour or abandon an old behaviour.157 It differs from commercial marketing in its product (behaviours rather than goods), its aim (societal rather than financial gain) and its competitors (current or preferred behaviours rather than other products or companies).158 159

The key principles of social marketing include:

- **Consumer orientated**: The focus is always on the consumer rather than the organisation conducting the social marketing.160 All social marketing campaigns must emanate from the consumers’ wants and needs;159
- **Focus on behaviour**: The goal of social marketing is to influence behaviour – it is insufficient to simply promote the product (behaviour), consumers must use it;160
- **Market perspective**: The functioning of markets is dependent upon the communication of information about the products available, and product competition (which may distract the consumer’s attention and resources);160
- **Audience Segmentation**: The identification of relatively homogenous subgroups in the population based on personal characteristics (demographics, psychological), past behaviours and benefits sought. The segment(s) to be targeted depends on the viability, accessibility and likelihood of response, and different marketing strategies are developed for each segment to be targeted;144 158 159
- **Marketing Mix**: the blend and balance of the “4Ps” – product, price, place and promotion;158 160
  - **Product** – The behaviour, and benefits of the behaviour, that are being offered. These benefits could be physical, economic, social, psychological or a combination158
  - **Price** – The monetary (objects, services) and non-monetary (time, effort, psychological, physical discomfort, diminished pleasure) costs associated with the product. These are often contrasted against benefits: both tangible, personal
benefits and intangible, societal benefits. The benefits of the product need to outweigh the costs for the product to be purchased (used).\footnote{158, 159}

\begin{itemize}
  \item **Place** – The channels where the product is promoted and places where the product is supported and encouraged. These include media and distribution channels, interpersonal channels, physical and non-physical places (e.g. social climate).\footnote{144}
  \item **Promotion** – How information about product, price and place is communicated to the consumer. This involves consideration of the messages themselves, the messengers who deliver the messages, the creative strategy and the communication channels.\footnote{158}
\end{itemize}

- **Positioning**: Ensuring that an organisation’s product takes a distinctive place in the mind of the target audience;\footnote{158} this depends on how the consumer views the product and how it measures up to the competition.\footnote{144}

Consistent with the consumer orientation of social marketing, the “4Ps” should be tailored to the audience e.g. promotion should align with the target audience preferences and their information processing styles, while place chosen should be convenient and accessible to the target audience.\footnote{158}

The steps to implement a social marketing campaign are well established;\footnote{144, 158, 159} they include the key elements of social marketing outlined above, as well as more traditional project planning aspects such as conducting situation analyses, setting objectives and goals and developing an evaluation plan. However, many advertising and communication campaigns described as social marketing do not incorporate many of the key principles; they focus mainly on promotion without also integrating product, price, place and positioning.\footnote{159, 161}

Social marketing has been criticised for its focus on the individual, rather than wider structural determinants of health.\footnote{159, 162, 163} However the approach is now being applied more broadly to focus on “upstream factors” such as the regulatory environment.\footnote{164} Another criticism is that social marketing is manipulative as it persuades individuals to be healthy, much like people are persuaded to purchase goods.\footnote{159, 162} However the converse argument is that the individual is at the centre of social marketing; the consumers define their own wants and needs when ‘purchasing’ a product.\footnote{162}
Applying Theory to Sexual Health Promotion

The theories presented in this section related to behaviour change and communication provides a useful structure in which to develop health promotion interventions. They offer a framework in which behaviours can be understood, targets for interventions identified, strategies to design intervention messages and a prediction as to what approach is most likely to work.

Certainly, sexual behaviour is a complicated behaviour to change. At a fundamental level it is an action involving two individuals, with emotion and arousal playing a large role,\textsuperscript{165} unlike other health behaviours where cognitive processes may dominate. Interventions aiming to change behaviour are often complex, and isolating the “active ingredient” that prompted change can be quite difficult, and may vary between individuals.

The evidence for the effectiveness of theory-based interventions for sexual health promotion is mixed; most of the major assumptions of behaviour change theories are supported,\textsuperscript{166} and most, but not all, meta-analyses have found that theory based interventions are more efficacious.\textsuperscript{167} There is limited information available to guide the choice of one theory over another,\textsuperscript{168} and little consideration has been given to assessing what proportion of the effectiveness of a theory-based intervention is attributable to the use of theory.\textsuperscript{169} Many concepts, such as attitudes, self-efficacy, behavioural intentions and the influences of social norms and the wider environment are common to most theories of behaviour change.\textsuperscript{119,168}

To be useful, a theory needs to be both accurate and applicable.\textsuperscript{170} On an implementation level, it may be more practical to combine elements from different theories rather than use an individual theory in isolation.\textsuperscript{119,125,169,171} Rather than competing, many theories can be seen as complementary.\textsuperscript{172} For example, stages of change theories can provide a broad framework in which other theories can be incorporated,\textsuperscript{172} and can also assist with audience segmentation and targeting. Cognitive theories of behaviour change can then identify potential factors or leverage points to direct the content of the messages to be delivered.\textsuperscript{135,160} Communication models and strategies can then be employed to craft and deliver the messages to the target audience. Although such a blending approach makes it difficult to measure individual theory constructs and identify the “active ingredient”, it may ultimately lead to more successful health promotion interventions.
Summary

There are many theoretical frameworks relevant to sexual health promotion interventions, including models of individual behaviour change and various communication models and strategies. The structure, emphasis and practical utility of these frameworks varies greatly. Combining elements from individual frameworks together may be a more comprehensive, and ultimately more successful, approach for designing and delivering effective sexual health promotion interventions.
Sexual Health Promotion

Successful promotion of sexual health requires comprehensive activities and strategies incorporating not only the health and education domains, but also the wider political, economic, legal and social environments. While approaches to address these wider determinants of sexual health are necessary, individual behaviour change is central to improving sexual health.

Individuals learn about sex, and sexual health, from many sources – peers and partners, family, mass media, formal sexual health education programs, health care providers, books, the internet, and from their own experiences. The Australian national survey of secondary students reported the most commonly used sources of information for sexual health were mothers (56%), female friends (55%) and school programs (49%), while doctors were the most trusted source of information.

This section focuses on group and community based sexual health promotion, such as institutional-based sex education programs. Health promotion delivered in a clinical setting or on an exclusively individual basis (e.g. parent-child communication) is not discussed. Approaches to sexual health promotion are divided into ‘traditional’ established approaches, and newer approaches utilising communication technologies.

‘Traditional’ Approaches to Sexual Health Promotion

Traditional approaches to sexual health promotion have included institutional-based sex education programs, peer education and mass media campaigns.

Institutional-Based Sex Education Programs

Description

Sex education programs are considered a ‘cornerstone’ in promoting sexual health to young people. These programs are most commonly delivered in schools, but may also be delivered in other settings where groups of young people are found, such as youth-focused community organisations, health clinics and youth detention facilities. Comprehensive sex education includes an ongoing health curriculum taught by an individual within the organisation (not outside agencies), uses a sex-positive approach including harm-minimisation, and incorporates same-sex attraction, gender, cultural awareness and notions of trust within the curriculum.
Evidence for Effectiveness

A 2007 global review evaluated the effect of 83 curriculum-based sex education programs.\textsuperscript{175} The review included programs from developed and developing countries targeting youth aged under 25 years with an experimental or strong quasi-experimental design. The majority of identified programs were from developed countries, focused on prevention of HIV and other STIs, included at least two different interactive activities and involved trained facilitators; the median length of programs was 12 hours (range less than 1 hour to 48 hours). Two thirds of programs were found to significantly improve one or more of the sexual behaviours examined (initiation of sex, frequency of sex, condom use, general contraceptive use, and a composite sexual risk taking measure). Seven percent of programs reported a significant negative effect on one or more behaviours or outcomes. Few studies used STI or pregnancy rates as an outcome measure; among those that did, most studies had a positive or neutral effect. Many programs also had positive effects on knowledge, attitudes, perception of risk, self-efficacy and intentions. Findings were similar across countries, cultures and settings (schools, clinics or communities). The authors concluded that there is quite strong evidence for positive effects of sex education programs for young people.\textsuperscript{175}

Similar findings were reported in a 2006 ‘review of reviews’ for STI prevention, which reported that there was sufficient evidence to conclude that school-based sex education can be effective in reducing sexual risk behaviour by adolescents.\textsuperscript{176} This review also found tentative evidence that programs are more effective if begun before the onset of sexual activity.\textsuperscript{176}

Implementation in Australia

In Australia sex education in schools has been delivered inconsistently, and in an ad-hoc manner.\textsuperscript{174, 177} Knowledge of STIs other than HIV among school students has improved over time but remains low.\textsuperscript{65} Although there is a comprehensive national framework for sex education in schools,\textsuperscript{178} how the framework is implemented is dependent on several factors at the level of the individual schools, including leadership, staff interest and willingness, resources and other curriculum demands.\textsuperscript{174, 177} The current Australian STI strategy recommends ongoing and enhanced sex education within schools, with a priority action of the strategy to ensure the implementation of an age-appropriate sexuality and sex education within the proposed national curriculum.\textsuperscript{88}

There are few published reports on the delivery and effectiveness of institutional-based sex education programs in Australia. The two school-based programs included in a recent review of interventions\textsuperscript{179} reported positive effects, but used very specific measures (attitudes to HIV positive individuals\textsuperscript{180} and knowledge and attitudes of hepatitis B vaccination\textsuperscript{181}) rather than
overall sexual health behaviour or outcomes. The only other intervention included in the review involving institutional-based sex education was the provision of information to international university students on campus; however only student feedback was collected, not outcomes measures such as changes in knowledge or behaviour.182

**Peer Education**

*Description*

Peer education is an umbrella term used to describe a range of approaches where the “educators” and the “educatees” share something (e.g. age, gender, experience, sexual identity) that creates an affinity.183 It is well recognised that peers are influential on individuals’ behaviours, and peers are regarded as credible communicators and can help shape social norms. Peer education usually emphasises interactive and participative learning, and peers may act both as a source of information and a behavioural role model. Both using peers to deliver an intervention, and personal development of peers as the intervention, have been described under the “peer education” label within the literature.185

A specific variation on peer education is the “popular opinion leader” approach, where popular and socially influential members of a target population are recruited to communicate risk reduction messages to peers during everyday conversations.184 Popular opinion leaders communicate messages around social norms, benefits of behaviour change and practical strategies, whereas other peer education interventions may focus more on factual, education messages.184

Within sexual health, peer education has often been used to deliver interventions to young people; peer education usually aims to develop knowledge, skills, attitudes, beliefs and skills required to engage in health behaviour.185 186

*Evidence for Effectiveness*

While there is a general belief that peer education programs are a useful and cost-effective strategy in relation to sexual health and young people, there is limited evidence to support this.185 Monitoring and evaluation of peer education programs can be difficult as many programs are unstructured and rely on informal discussions among youth.185

A recent review of the impact of peer-led sexual health interventions among adolescents identified 13 studies for inclusion; most studies were school-based and sourced from developed countries.186 Among the 12 studies assessing knowledge, ten were able to demonstrate a statistically significant improvement, and all ten studies that assessed attitudes reported positive effects. Despite this, no effect on condom use at last sex, or consistency of
condom use, or reductions in the number of recent, regular or casual sex partners were found. Mixed results were found for STI testing outcomes. Similar findings were observed in a review of European-based peer education programs; of the eight programs included in the review, six reported improvements in knowledge but only two reported significant changes in behaviour. The authors of the first review concluded that the mixed evidence for the effectiveness of peer-led programs indicated that the approach to peer education should be fine-tuned rather than abandoned, with more emphasis placed on intervention design.

**Implementation in Australia**

The only peer-education approach included in a review of interventions to reduce STIs among young people in Australia was a program to provide training to young, marginalised and disadvantaged Indigenous people to become sexual health peer educators in their communities. The program evaluation was a retrospective qualitative evaluation that was largely process based; impact measures were restricted to the effect of the program on the peer educators themselves and organisation partners. Positive effects on peer educators’ knowledge and skills were reported.

Thus while it appears peer education may have promise for sexual health promotion for young people, and is recommended in the Australian National STI Strategy, peer education approaches have not been extensively used or evaluated to date in Australian settings.

**Mass Media Campaigns**

**Description**

Mass media campaigns aim to generate specific outcomes for a relatively large number of individuals through an organised set of communication activities, usually within a specified period of time. Mass media encompasses broadcast, print and electronic media that are distributed to the population at large. The strength of mass media campaigns is that they can disseminate messages to large audiences repeatedly over time, and at a low cost per head.

Mass media campaigns may use single or multiple media channels; the choice of channel will depend on the usage patterns of the target audience, the nature of the message, and the resources available. Campaigns can be single, stand-alone efforts or part of a multi-component strategy, and may be delivered at local, regional or national level.

Usually media campaigns aim to promote a positive behaviour (e.g. seeking STI testing) and/or to prevent a problematic behaviour (e.g. unprotected sex). They may target behaviour change directly, or intermediate processes, such as awareness, knowledge, beliefs, and
attitudes.\textsuperscript{189} The effect of the campaign may be exerted directly (i.e. provoke change in the individual) or indirectly (e.g. increased interpersonal discussion of the behaviour, changed social norms, public discussion leading to policy change).\textsuperscript{190} In order to be effective, mass media campaigns must achieve sufficient exposure of the target audience, which is often challenging.\textsuperscript{191} Mass media campaigns may only have a small effect on behaviour change at the individual level,\textsuperscript{193, 194} however the public health impact may be great if the campaign has large audience reach and exposure.\textsuperscript{194}

**Evidence for Effectiveness**

Globally, there is significant evidence for the effectiveness of media campaigns in improving knowledge of HIV transmission, increasing HIV testing and reducing high-risk sexual behaviour.\textsuperscript{192, 195-196} However as the consequences of infection with HIV are quite different to infection with other STIs, evidence from HIV focused campaigns may not be directly transferrable to campaigns that focus on other STIs, or sexual behaviour more broadly.

There is limited evidence regarding the effect of media campaigns on increasing testing rates for STIs other than HIV among young people. Two evaluations of media campaigns in Australia promoting chlamydia testing used analysis of Medicare testing and passive notification data to assess whether testing increased during the campaign period.\textsuperscript{197, 198} Both reported an increase in testing during the period of the campaign,\textsuperscript{197, 198} however one analysis failed to account for the concurrent background increasing rate of chlamydia testing within their analysis.\textsuperscript{198} A Danish media campaign to promote home-based chlamydia testing among those aged 21-23 years in a geographical region (n=30,000) resulted in just over 1% of those targeted requesting a test kit, and 0.6% of those targeted providing a biological sample for testing.\textsuperscript{199} A similarly low rate of return was seen in an American campaign targeting 15-25 year olds in a 'mid-sized Southern US city’, which resulted in 31 individuals presenting for chlamydia testing.\textsuperscript{200} Limited evidence of campaign effectiveness have also been found with media campaigns targeting men who have sex with men (MSM), including young MSM, for STI testing,\textsuperscript{201-204} of the four published evaluations, only one reported a increase in testing associated with the campaign.\textsuperscript{203}

There is also limited evidence of the success of media campaigns to promote condom use among young people. Apart from one American study that reported that television public service announcements led to an increase in condom use among high risk youth in the intervention areas,\textsuperscript{205} other studies have found no effect of mass media interventions on condom use.\textsuperscript{206-208} A condom social marketing campaign conducted in Mozambique did find that exposure to the campaign was significantly associated with self-reported intent, attempt and success in changing behaviour, but did not measure condom use directly.\textsuperscript{209}
Even fewer reports examine whether mass media campaigns increase knowledge of STIs among young people. A randomised controlled trial assessing a condom social marketing campaign in 12 American neighbourhoods targeting females aged 15-25 years found no increase in condom knowledge among those who were exposed to the campaign. Three of the syphilis campaigns targeting MSM, including younger MSM, assessed knowledge; one found those exposed to the campaign had better syphilis knowledge compared to those not exposed, while the other two observed no association between knowledge and campaign exposure.

A 2006 ‘review of reviews’ of non-clinical interventions to prevent STIs found there was insufficient evidence of the effectiveness of community interventions (including mass media), and specifically recommended that further research be undertaken to determine the effectiveness of these approaches.

**Implementation in Australia**

Despite the limited evidence of effectiveness of media campaigns in changing knowledge and behaviour related to STIs other than HIV, they continue to be commissioned and implemented. Recent sexual health mass media campaigns in Australia targeting young people include the “You never know who you’ll meet” campaign in Victoria, the “Safe Sex, No Regrets” campaigns in New South Wales, Western Australia, Queensland and the Northern Territory and the national “STIs are spreading fast” campaign (Figure 9).

Figure 9: Examples of Australian sexual health mass media campaigns targeting young people

Mass media campaigns conducted recently in Australia have used a variety of media channels including TV, radio, billboards, print media (including street press), advertising in public spaces and venue based promotions. Evaluation strategies are largely limited to audience reach and message recall, rather than impact on knowledge and behaviour.
Newer Approaches to Sexual Health Promotion

Communication technologies such as mobile phones and the internet have fundamentally transformed how individuals access information, connect and communicate. These changes in communication have huge implications for the delivery of sexual health promotion, particularly among young people who are the greatest users of these technologies,\textsuperscript{217,218} and are now spending less time engaging with other forms of media.\textsuperscript{218,219}

Communication Technologies

\textit{Mobile Phones}

Globally, mobile phone subscriptions have increased by a massive 450\% in the last decade, from 737 million in 2000 to 4 billion in 2008.\textsuperscript{220} Accounting for multiple subscriptions, there are an estimated 3.6 billion mobile phone users worldwide,\textsuperscript{221} making mobile phones the most widely used technology in history, far more than computers (1.2 billion), TV sets (1.6 billion) or fixed landline phones (1.2 billion).\textsuperscript{221} Although access in developed countries is far greater than in developing countries, the developing world is rapidly catching up, reaching a mobile phone penetration of 57\% in 2009, up from 23\% in 2005.\textsuperscript{222} In Australia there were 24.2 million mobile phone subscriptions in 2009,\textsuperscript{223} with 85\% of Australians aged 14 years and older using a mobile phone.\textsuperscript{224}

\textit{Internet}

Internet use has also skyrocketed, with an estimated 1.6 billion global internet users in 2008, up from 393 million users in 1998.\textsuperscript{225} However, the ‘digital divide’ between the developed and developing world is greater for internet access than mobile phones, with 64\% of those in developed countries using the internet compared to 18\% in developing countries.\textsuperscript{222} Fortunately, this divide is slowly shrinking, and the roll-out of mobile internet (internet on mobile phones) is likely to provide internet access in many locations where it was previously unavailable.\textsuperscript{222}

In Australia there were a reported 15.2 million internet users in 2008,\textsuperscript{223} up from 12 million in 2007.\textsuperscript{226} Eighty nine percent of Australians have used the internet at least once; among those that use the internet, over half are online for at least seven hours per week.\textsuperscript{219}

\textit{Use by Young People}

Young people are the greatest users of both mobile phones and the internet.\textsuperscript{217,218} Worldwide, mobile phone ownership is greatest among those aged under 35 years.\textsuperscript{221,227,228} In the UK, 80\% of those aged 16 to 24 years use their mobile phone every day, compared to 60\% of those
Australians aged under 35 years use mobile phones more often than fixed line services, and almost 60% of those aged 18 to 24 years living away from their parents reside in a mobile-phone only household, significantly more than any other age group.224

Virtually all (97%) of young people aged 14 to 34 in Australia have ever used the internet, compared to 89% of the overall population.223 Almost half (46%) of those aged 18 to 24 years use the internet for 15 or more hours in an average week, compared with fewer than 30% of those aged 35 years and over.219 Australians aged 18-34 years are more likely to use multiple communications services (fixed line phones, internet, mobile phones and/or voice-over-internet) than older age groups.224

**Implications for Health Promotion**

The uptake of communication technologies such as mobile phones and the internet have huge implications for the delivery of health promotion interventions. Barak and Fisher describe five features which make the internet attractive for sexual health promotion – accessibility, affordability, acceptability, aloneness and anonymity229 230 – which can equally be applied to mobile phone based interventions. The accessibility and affordability of these communication technologies ensure that most individuals (at least in developed countries) can access these technologies anywhere and at almost any time. This creates a very large potential audience that can be reached for health promotion in a cost-effective fashion, including those that are physically incapacitated or geographically remote and may not be reached by alternative methods. The normative acceptance of both mobile phones and internet contribute to their attractiveness and widespread use, further increasing potential audience reach. Individuals usually use these technologies in a relatively unobserved manner (even if in a public space) and can block or obscure their identity to ensure, or create a sense of, anonymity, which may assist with overcoming some stigma associated with sexual health.229 230

Further advantages of using communications technology to deliver sexual health promotion include the ability to use multiple types of media (audio, visual, text, video), regularly update and upgrade materials, and tailor materials to individual users’ wants, needs and preferences.229 232 233 Once developed, interventions should be able to be scaled to reach a large number of users with relatively low incremental costs compared to other approaches.233 Perhaps the biggest advantage of communication technologies is that unlike other health promotion interventions where users are largely passive viewers of content, communication technologies allow active, and rapid, participation and engagement of the target audience.218 229 Separately, and combined, these factors indicate the potential (greater)
effectiveness of sexual health promotion delivered via mobile phones and the internet compared to other modes used to deliver health promotion.

This section will focus on the use of mobile phone text messages and internet-based interventions as these have been the most commonly used communication technologies to-date for sexual health promotion.

**Text Messages**

**Definition & Use**

In the early 1990s second generation (2G) mobile systems were introduced, providing better quality voice services compared with the earlier analogue systems. The most widely used 2G system, GSM (Global System for Mobile Communication), introduced Short Message Service (SMS; also know as ‘text message’) in the early 1990s, with a 160 character limit. Since then, SMS has spread to other mobile systems and other devices (e.g. internet hosts). Communication via SMS is instantaneous and cheap, and delivery of the message is virtually guaranteed. Messages can be saved for future reference and responded to immediately or after a delay. As well as person-to-person communication, SMS are used to deliver information services, notifications of voicemail, downloading of objects to customise mobile phones (e.g. ringtones) and remote monitoring of devices. In the mid 2000s, third generation (3G) mobile systems were introduced, which allow the transfer of image, video, audio and texts within Multimedia Message Service (MMS).

The use of text messages has become incredibly popular in recent years; this popularity has been attributed to low cost per message and the convenience of being able to communicate with an otherwise occupied individual. In 2009 it was estimated that there were 3.6 billion global SMS users and 1.7 billion users of MMS; 4.6 trillion SMS were sent in 2008, an average of 2.7 per day for all mobile phone subscribers. Half of all Americans aged 18 and over report between one and ten messages daily. The most common reasons for sending SMS were to ‘say hello and chat’, to report on or check another’s location, and to coordinate a meeting location. In Australia SMS is the most popular ‘non-voice’ activity on mobile phones; 89% of mobile phone users use SMS and 55% use MMS.

Globally, young people are the most likely to use SMS. Ninety five percent of Americans aged 18 to 29 years who own mobile phones use SMS, significantly more than any other age group, and 18% of those aged 18 to 24 years report sending more than 200 messages per day. Text messages account for 50% of the time spent on mobile phones by young people aged 16 to 24 years in the UK, compared with 35% or less in older age groups.
Health Applications

The access, speed, ease of use and low cost of SMS have led to a variety of applications in health including appointment, vaccination and medication reminders, disease self management, diagnostic testing and results and health promotion interventions. Health promotion interventions using SMS have covered a spectrum of topics including smoking cessation, physical activity, weight loss and weight management, and use of sunscreen and vitamins. Of these 12 published studies, five have specifically targeted young people. Two studies related to physical activity (one targeting adolescents with diabetes, the other among senior high school students), and a study assessing the use of mobile phone reminders to take vitamin C supplements.

Recent reviews have concluded that SMS are feasible and effective for short term behavioural change, but further research is needed to better understand the characteristics of SMS (e.g. message framing and style, how SMS messages are initiated, dose of messages required, general or tailored content) that affect behaviour change, as well as studies with longer term follow up. Most published studies to date have low reach (all but two have 200 or fewer participants) and all have relied on volunteers recruited individually, through community advertising or clinical sites, which can be time-consuming, costly and inefficient, especially if a large number of individuals are to be accessed.

Applications for Sexual Health

Within the sexual health field, SMS have been used for a variety of purposes including clinical management, sexual health services and health promotion. Published examples include using SMS for partner notification, appointment, contraception and vaccination reminders, monitoring of HIV medication adherence and adverse treatment events, delivery of chlamydia test results from clinic and community settings, promotion of chlamydia testing, and delivery of sexual health information. A randomised controlled trial of 994 young people conducted by the Burnet Institute found that those who received regular sexual health SMS significantly improved their sexual health knowledge and females in the intervention group were more likely to have discussed sexual health with their clinician and had an STI test compared to the controls. However the population effectiveness, scalability and long term impact of this approach is unknown.
Internet

Online Health Interventions

Since the commercialisation of the internet during the 1990s, numerous online health related interventions for individuals have emerged. Reviews have concluded that these have generally positive effects on knowledge, behaviour and/or clinical outcomes for a variety of health conditions, however the heterogeneity of studies can make them difficult to combine in a meta-analysis. Online interventions have used multiple tools including message boards and forums, chat rooms, information provision (general or tailored) and online or email feedback.

Published examples of online interventions and services specifically related to sexual health include support services for HIV positive individuals, outreach and counselling in chat rooms, online sexual risk assessments, access to home-based STI testing, online partner notification services, online booking and triage for sexual health clinics, provision of sexual health education and programs to promote behavioural risk reduction. The programs to promote behavioural risk reduction use a variety of approaches including skills building, online videos, role-modelling, self-risk assessments, virtual activities, and/or a combination of information delivery and feedback mechanisms. A recently published Cochrane review of interactive computer-based interventions for sexual health promotion (some, but not all, delivered online) concluded that these interventions had a moderate positive effect on sexual health knowledge, a small effect on safer sex self-efficacy and safer-sex intentions, and were associated with a positive effect on sexual behaviour.

Despite their successes, online interventions are not without their challenges, including attracting and retaining participants, the rapid change inherent in online environments and ethical issues such as privacy, anonymity and informed consent.

Web 2.0: The Social Web

In recent years, the so-called “Web 2.0” has emerged. Web 2.0 refers to a loose collection of web-based technologies and services that allow end-users to interact and collaborate as content creators, compared with the one-way information flow on relatively static ‘Web 1.0’ websites. Web 2.0 differs from Web 1.0 on the following aspects:

- **Technological**: the technologies used to present sites and allow user interaction;
- **Structural**: the purpose and layout of sites; and
- **Sociological**: notions of friends and groups.
Individual websites may mix elements of Web 1.0 and Web 2.0, for example, have content provided by the site owner, but also encourage users to comment, interact, and even modify, the provided content.

The term ‘social media’ is often used interchangeably with Web 2.0 to describe sites and applications that allow information sharing and interactive activities among online communities; examples include blogs, wiki’s, content-sharing sites, virtual worlds and social networking sites. Of the ten most accessed websites globally, five are social media sites, all but one of which did not exist a decade ago (Table 3). The rapid growth in social media is said to be driven by a variety of social factors, including the desire of individuals to express themselves and be creative, to maintain and build connections with others and to communicate with like-minded individuals and communities.

Table 3: Most accessed websites globally

<table>
<thead>
<tr>
<th>Rank</th>
<th>Site</th>
<th>Type of Site</th>
<th>Year Launched</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Google</td>
<td>Search engine</td>
<td>1997</td>
</tr>
<tr>
<td>2</td>
<td>Facebook</td>
<td>Social media</td>
<td>2004</td>
</tr>
<tr>
<td>3</td>
<td>YouTube</td>
<td>Social media</td>
<td>2005</td>
</tr>
<tr>
<td>4</td>
<td>Yahoo!</td>
<td>Web portal</td>
<td>1994</td>
</tr>
<tr>
<td>5</td>
<td>Windows Live</td>
<td>Web portal</td>
<td>2005</td>
</tr>
<tr>
<td>6</td>
<td>Baidu*</td>
<td>Search engine</td>
<td>2000</td>
</tr>
<tr>
<td>7</td>
<td>Wikipedia</td>
<td>Social media</td>
<td>2001</td>
</tr>
<tr>
<td>8</td>
<td>Blogger</td>
<td>Social media</td>
<td>1999</td>
</tr>
<tr>
<td>9</td>
<td>QQ.com*</td>
<td>Instant messaging</td>
<td>1999</td>
</tr>
<tr>
<td>10</td>
<td>Twitter</td>
<td>Social media</td>
<td>2006</td>
</tr>
</tbody>
</table>

* Chinese sites

Social Networking Sites

The most popular online social media are social networking sites. These sites allow users to visualise, form and maintain their social networks, and often offer additional functions, such as public and private messaging and sharing of photos, videos and other content. Facebook, LinkedIn and MySpace are the most popular social networking sites globally, although many others exist. Use of these sites are generally free of charge, although some sites charge for additional (premium) services. Social networking sites are most commonly used by young people to maintain, reinforce and enhance existing relationships.

Growth in use of social networking sites has been extremely rapid, for example in August 2010 Facebook reported over 500 million active users, up from 200 million in April 2009. A multi-country study found two thirds of those online in 2008 accessed social networking
In June 2010 it was estimated that 8.7 million Australians accessed social media sites, including 6.8 million who accessed Facebook.\textsuperscript{219}

As well as the increase in the number of users accessing social networking sites, the time individuals spend on these sites is also increasing. The total time spent on social networking sites increased by 63\% between 2007 and 2008, compared with an 18\% increase in the total time spent on the internet overall.\textsuperscript{314} A study in the UK conducted in 2007 reported that 50\% of social networking site users visit their profile at least every second day.\textsuperscript{315}

Young people are the most frequent users of social networking sites. Studies from the US and UK report that the majority of young people who use the internet access social networking sites.\textsuperscript{218,227} In the UK, 23\% of time spent on computers by those aged 16 to 24 years is spent on social networking sites, compared to 10\% or less among older age groups.\textsuperscript{218} In Australia, two thirds of the 9.5 million Facebook users are aged under 35 years.\textsuperscript{316} An Australian study conducted in late 2008 of 16 and 17 years olds found that 78\% had ever used the then most popular social networking site (MySpace) and 63\% had used the next most popular (Facebook).\textsuperscript{310}

It is not only the large reach and frequent use of social networking sites that suggests these sites could be a useful medium for health promotion. Social networking sites offer functions such as groups and pages, live updates\textsuperscript{4} and applications such as games, quizzes and polls that could potentially be exploited to deliver health promotion messages.\textsuperscript{317-319} A key characteristic of these functions is the ability for two-way interaction and engagement with, and between, users. Interaction may range from users referring content to others within their networks, commenting on content posted by the site creator or other users, and contributing and co-producing content.\textsuperscript{305} As interactivity is known to promote deep learning and understanding,\textsuperscript{320} the interactive functions of social networking sites may provide a useful mechanism to more effectively deliver health promotion messages.

The huge increase in users of social networking sites, the frequency of this use, and the functionality of these sites have prompted calls for health related interventions, including health promotion, to be delivered in these spaces.\textsuperscript{303} 321-324 Businesses have already begun using these sites for internal communications, external networking, job hunting, and marketing.\textsuperscript{307} However, despite the extraordinary use of social networking sites, very little has been published regarding how health interventions could or should be delivered in this medium, for example which of the functions of social networking sites could be exploited for health promotion.

\textsuperscript{4} Often referred to as a ‘newsfeed’ or ‘stream’
A recent review of the use of social media for social marketing identified just four examples, none of which used the most common social networking sites listed earlier.\textsuperscript{325} Some health organisations have begun extending their presence into social networking sites,\textsuperscript{326-329} however this has often been used as an additional form of marketing to promote services rather than intervention delivery. Other work has focused on the public display of risky behaviour on these sites.\textsuperscript{330 331} Often online interventions operate in a “Web 1.0 manner” (one way delivery of information), even if they are using a Web 2.0 platform.\textsuperscript{323 332} The next generation of online interventions need to use social networking sites, and their interactive functions, if they are going to continue reaching and engaging with young people.\textsuperscript{323 333}

\textbf{Summary}

Traditionally sexual health promotion has been delivered through institutional-based sex education programs, peer education and mass media campaigns. These traditional approaches \textit{may} be effective methods of sexual health education, depending on the intervention program and delivery, but they often require significant resources and may not reach all young people. The extent and quality of delivery of these education methods varies enormously, and thus the impact of such approaches on sexual health education and behaviour varies greatly. Text messages and the internet, particularly social networking sites, offer a new approach to delivering sexual health promotion for young people. Benefits of using these technologies include their popularity (and thus large audience reach), their low cost, and the ability for two-way communication and interaction.
Evaluation in Health Promotion

Evaluation in health promotion aims to determine the extent to which an intervention has achieved its desired outcomes, and the contribution of the processes to achieve these outcomes.\textsuperscript{334} The aims, methods and resources required to conduct an evaluation is very much dependent on the type, aims and scale of the intervention to be evaluated, and the priority placed on evaluation.\textsuperscript{334} Evaluation is important to ensure that effective interventions are deployed, further deployment of harmful interventions is prevented, and to maximise the cost-effectiveness of interventions.\textsuperscript{335} Evaluation can be viewed as both a science and an art;\textsuperscript{336} the science is the selection of an evaluation method that is methodologically robust while the art is conducting an evaluation that is appropriate to the context and meets stakeholder needs. Despite the importance of evaluation in health promotion, the majority of sexual health promotion interventions have not been evaluated.\textsuperscript{335}

Both quantitative and qualitative methods can, and should, contribute to health promotion evaluations.\textsuperscript{334} Common qualitative methods used for evaluation include structured observations, interviews, focus groups and content analysis (e.g. of meeting minutes). Common quantitative methods include attendance logs, checklists, questionnaires and analysis of routinely collected statistics.\textsuperscript{334, 337} Often qualitative methods are used primarily during intervention planning while quantitative methods are used to assess intervention effects, although both methods can be used throughout all evaluation stages.\textsuperscript{334}

Although other approaches exist,\textsuperscript{338, 339} evaluation of health promotion interventions are commonly divided into three stages of formative, process and impact/outcome evaluation.\textsuperscript{334} These stages are described below, and include examples of how this stage has been used in evaluation of previous sexual health promotion interventions using communications technology.

**Formative Evaluation**

Formative evaluation occurs during the development of the intervention, prior to its implementation.\textsuperscript{334} It usually involves stakeholders and/or individuals from the population being targeted by the intervention. The purpose of formative evaluation is to develop and refine an intervention to maximise its likely chance of success. Although it is often not possible to conduct comprehensive formative evaluation due to time and resource pressures, formative evaluation can have a substantial effect on intervention success or failure.\textsuperscript{334} Methods commonly employed during formative evaluation include needs assessments and pilot testing.
of strategies and materials with members of the target audience. Data for formative evaluation may be pre-existing and/or collected specifically for the intervention.\textsuperscript{340}

An example of a formative evaluation for a sexual health promotion intervention using communications technology is the development of the SEXINFO text messaging system in San Francisco.\textsuperscript{265} Focus groups with young people, the target audience, were held to investigate the system’s feasibility and to assist with the development of the service.\textsuperscript{265}

**Process Evaluation**

Process evaluation relates to how the intervention was implemented; it describes and explains what happened during the implementation phase.\textsuperscript{337} The purpose of this phase is to identify how the intervention was implemented, whether the target population were exposed to, and participated in the intervention, and the reactions of those participating.\textsuperscript{334} Ultimately, the goal is to understand which components on an intervention are effective, for whom, and under what conditions.\textsuperscript{337}

In recent years there has been increasing attention on process evaluation, probably due to the proliferation of complex interventions (multi-component, multi-location, multi-level),\textsuperscript{341} making it increasingly important to monitor implementation delivery and the effectiveness of individual intervention components.\textsuperscript{337} Other contributing factors include the increased emphasis on assessing quality, accuracy and cost-effectiveness of interventions, the desire to understand the mechanisms by which theoretical constructs result in behaviour change, and the growing recognition of the value of qualitative research methods.\textsuperscript{337}

The key components of process evaluation are:\textsuperscript{337}

- **Delivery** – Information about how the intervention was implemented. This includes measurement of fidelity (if the intervention was carried out in the manner and spirit of which it was intended), recruitment (how individuals were recruited, any bias in recruitment, participation rates) and dose delivered (the amount/proportion of the intended intervention that is actually delivered to participants);

- **Reach** – The degree to which the target audience participates in an intervention; this is often measured as the proportion of the target audience that attends all or part of an intervention;

- **Exposure** – The extent to which those reached by the intervention engage with the intervention (‘dose received’); and
• **Context** – The larger physical, social and political environment that affected intervention delivery, reach and/or exposure. Context may also include participant satisfaction as this may affect reach and exposure of interventions.

Data from process evaluations can be used during the implementation phase to improve the delivery of an intervention, as well as after, to explain the role of implementation factors on the impact/outcomes of the intervention. Common methods of data collection used during process evaluations include recording audience reach and exposure, measurement of resources (time, money, staff) to deliver the intervention and assessment of stakeholder and participant satisfaction.

An example of process evaluation for a sexual health promotion intervention using communications technology is the evaluation of the CyberReach project from Western Australia. This project involved peer-based health promotion outreach in online chat rooms; process evaluation measures included the number of online interactions and a feedback form completed online assessing participant satisfaction.

**Impact/Outcome Evaluation**

Impact/outcome evaluation refers to whether the intervention achieved its stated aims. ‘Impact’ is generally used to refer to intermediate health outcomes of an intervention, such as changes in knowledge, attitudes and behaviour while ‘outcome’ refers to longer term health and social changes such as reduced morbidity and mortality. The purpose of impact/outcome evaluation is to assess whether the intervention had an effect (whether positive or negative) on the aims it was attempting to achieve, and that the effect observed was not due to chance or other factors.

There are multiple evaluation designs available to conduct impact/outcome evaluations. The three main approaches – randomised controlled trials, quasi-experimental designs and non-experimental designs – are described below, with an example provided of each. The choice of impact/outcome evaluation design will depend on the outcome(s) of interest, how well developed the intervention is, the resources available, and what is feasible and acceptable to conduct in the context in which the intervention is being delivered.

**Randomised Controlled Trials**

The gold standard design for impact/outcome evaluations are randomised controlled trials (RCT). In an RCT, individuals or groups are randomised to receive the intervention or a control condition (which may be no intervention, ‘usual care’, a reduced version of the
intervention or an alternative intervention). Baseline and follow up assessments are used to assess changes over time. Assuming randomisation is successful and no contamination occurs, any difference between the groups can be attributed to the intervention, as this is the only factor differing between the groups.\textsuperscript{334} This is of considerable advantage when evaluating sexual health promotion interventions, as it is often difficult to measure the many individual, group and community factors influencing sexual behaviour, and the mechanisms by which interventions influence behaviour are frequently poorly understood.\textsuperscript{342}

An example of impact/outcome evaluation using a RCT design for a sexual health promotion intervention is the Youthenet trial in the US.\textsuperscript{293} All participants in the online trial completed modules of HIV-related risk assessments; in between the modules the intervention arm received a ‘role model’ story using pictures, audio and music, while the control arm received text-based generic HIV prevention information. The evaluation compared the intervention and control arms on the change in the proportion of sex acts protected by a condom before and after the intervention.\textsuperscript{293}

**Quasi-Experimental Designs**

Due to ethical constraints, logistical difficulties, and resource limitations, it is not always possible to randomly allocate individuals or groups to receive an intervention.\textsuperscript{334} An alternative to RCTs are ‘quasi-experimental’ designs where a comparison group who did not receive the intervention is able to be identified and compared to the group who received the intervention. Various methods are used to assemble the comparison group; a common one is to identify a similar population residing in a location that did not receive the intervention.\textsuperscript{334}

Although quasi-experimental designs are practical, they contain the risk that the intervention and comparison groups differ in some way, and that any differences observed between the groups may be due to factors other than the intervention.\textsuperscript{334} However, unlike RCTs, the evaluation can be designed after the intervention has been implemented.\textsuperscript{336}

An example of impact/outcome evaluation using a quasi-experimental design for a sexual health promotion intervention is the TeenWeb project implemented in Kenya and Brazil.\textsuperscript{290} Schools were recruited as either ‘intervention’ or ‘comparison’ sites; within intervention sites, students had easy access to web-based reproductive health information and completed six web based modules. Students at all schools completed a baseline and follow up questionnaire; differences between students at intervention and comparison schools on the follow up questionnaire were used to evaluate the effect of the intervention on condom-related knowledge and attitudes.\textsuperscript{290}
Non-Experimental Designs

When it is not possible to conduct a RCT, and no comparison population is able to be identified or practical to recruit, alternative approaches must be used. Programs that achieve ‘full coverage’ (e.g. those rolled-out across entire jurisdictions) must use non-experimental designs, as there will be no comparison group avaliable. Three common non-experimental designs are time-series analyses, pre- and post- and post-only designs.

Time-Series Analyses

Time-series analyses involve multiple measurements of the outcome of interest before, during and after intervention implementation within a population. This allows observation of trends over time; changes in the trend line during (and after) the intervention implementation period is used to judge the effect of the intervention. Such analyses are commonly used when repeat measures of the outcome of interest are already routinely occurring in the population of interest.

A variation on time-series analyses is the multiple baseline design, which uses multiple time-series analyses in different populations. Intervention implementation is staggered across the populations, providing greater confidence that any changes observed over time are due to the intervention.

Pre- and Post- Design

In a pre- and post- design the outcome of interest is measured in the population of interest before and after the intervention is delivered. In evaluations using this design it can be difficult to conclude that any change observed is due to the intervention as there is no comparison group and other factors may account for the change. This design is often used in pilot studies, as it can estimate the likely effect of an intervention.

Post-Only Design

In a post- only design the outcome of interest is only measured after the intervention has been implemented. However, it is problematic to conclude that any differences between those exposed and not exposed to the intervention is due to the intervention itself because of the lack of baseline data.

An example of impact/outcome evaluation using a non-experimental design for a sexual health promotion intervention is the pre- and post- evaluation of “The Morning After” video drama. MSM were recruited online, and completed online behavioural questionnaires before viewing the video online and three months later. Changes in the rate of HIV status
disclosure to partners between baseline and follow up were used to evaluate the effectiveness of the intervention.\textsuperscript{205}

**Triangulation**

There are clear benefits and limitations of the main approaches to impact/outcome evaluation described above. What may be desirable from an evidence-strength standpoint, may not be possible or practical to conduct. Triangulation – the use of more than one approach to answer the same question – can improve confidence that any change observed is due to the intervention itself rather than other factors.\textsuperscript{334} Triangulation may occur at various levels:\textsuperscript{334}

- **Data triangulation**: the use of different data sources within the evaluation;
- **Methodological triangulation**: the use of different data collection methods within the evaluation; and
- **Evaluator triangulation**: involving multiple people to evaluate the intervention, each of whom may have different methodological and theoretical perspectives.

Recently a “public health triangulation process” has been described to methodically review and assess secondary data from multiple data sources to understand HIV epidemics; key steps include assessing data reliability and examining trends across datasets.\textsuperscript{345} While this approach is not intended to replace formal intervention evaluations, the steps involved may be useful in ‘formalising’ a triangulation approach to impact/outcome evaluations.

**Efficacy and Effectiveness**

Impact/outcome evaluations may be examining the efficacy or effectiveness of a health promotion intervention. Efficacy refers to the extent an intervention is successful under ‘ideal’ conditions – the improvement in a health outcome achieved in a research setting in expert hands.\textsuperscript{346, 347} Effectiveness is the impact of the intervention in the ‘real world’, under resource constraints in entire populations or specified sub-populations.\textsuperscript{346, 347} Effectiveness is determined by an intervention’s efficacy, reach and population uptake and ‘compliance’.\textsuperscript{346, 347} For example, an intervention may be efficacious when delivered in a controlled condition, such as in one site with strict inclusion criteria and intensive follow up, but not effective once it is rolled out to a wider population in the community. Usually, but not always, the efficacy of an intervention is higher than its effectiveness.\textsuperscript{346}

The ‘background noise’ of society – underlying secular trends at the population level – may obstruct the measurement of effectiveness, and lead to erroneous conclusions regarding the effectiveness of an intervention.\textsuperscript{348}
Evaluation & Communication Technologies

As the examples described above demonstrate, the three basic stages of health promotion evaluation, and many of the underlying measures and methods of data collection, are equally relevant for health promotion interventions delivered by communications technologies as they are for more traditional modes of delivery. Particular aspects such as ensuring informed consent, sampling issues, defining appropriate control groups and loss to follow up may require additional attention for interventions using communication technologies. In addition, the appropriateness of the evaluation design, and additional data measurements and data collection tools should be considered when evaluating these interventions.

‘Standard’ evaluation designs for health promotion intervention may need to be adapted for interventions using communication technologies. For example, the speed at which technologies emerge and change may make using some evaluation designs (e.g. RCTs) unfeasible, and alternative designs may need to be considered (e.g. time series analysis). Additional emphasis on process evaluation may be warranted as user-controlled interventions may be effective when used as intended by the developer, but ineffective in the way most users apply it (or vice-versa). Detailed process evaluation measures of usage, and users’ opinions, is critical to understanding if and how an intervention is exerting its’ effect. In addition, specific evaluation approaches can be employed to systematically optimise as well as simultaneously test multiple components within interventions using communication technologies.

In addition to considering the overall evaluation design, health promotion interventions delivered using communications technologies may need to consider additional data measurements beyond what is commonly collected in health promotion evaluations. O’Grady et al have identified five elements that should be considered for evaluations of interventions using Web 2.0. Some elements such as people (stakeholder needs, user characteristics and perspectives, behavioural outcomes) and content (quality, credibility, utility) are already included in most, if not all, evaluations of health promotion interventions, although may be described using different terms. Specific elements such as technology (system robustness, security and privacy, usage statistics, system reliability) and computer-mediated interaction (usability, accessibility, interactivity) will require additional data measurements, beyond what may be commonly collected during evaluation processes.

As well as additional data measurements that may be considered, new technologies themselves offer novel means of data collection for evaluation purposes. Mobile phones are increasingly used for many forms of data collection, one with direct utility for evaluation
of health promotion interventions are using text messages to obtain data directly from participants. Most internet sites used to deliver interventions, including social networking sites, allow detailed usage and traffic data to be downloaded to page owners or administrators. Internet applications, such as instant chat and forums can be utilised to conduct online focus groups, either in ‘real time’ or delayed. These data collection methods may be used alongside, or instead of, more traditional methods of data collection.

**Implications for Practice**

Systematic evaluation of the development, implementation and outcomes of sexual health promotion interventions are crucial to understanding their feasibility, efficacy and effectiveness. Evaluation is critical not only to assess the benefit of interventions, but also to assess potential harms – harms from the intervention itself, as well as the potential waste of resources if an intervention is found to be ineffective. Ideally evaluation is an iterative process; emerging findings should be able to influence further implementation of an intervention. However this can be difficult to achieve in practice.

While the fundamental stages of health promotion evaluation – formative, process and impact/outcome – are relevant for all evaluations, the emphasis placed on each stage may depend on the level of development of the health promotion intervention. For example, pilot studies and field testing in ‘real world’ settings usually emphasise formative and process evaluations while large scale roll-outs of interventions tend to emphasise impact/outcome evaluation. While impact/outcome evaluations using experimental designs can quantify the ‘added value’ that an intervention gives to sexual health outcomes across the population exposed, these designs are not always possible or practical to implement. Deciding what approach to use will always be a balance of the ‘optimal against the possible’; however, the more rigorous the evaluation design, the more plausible it is that the result represents a ‘true’ result.

Interventions aiming to change sexual behaviour are typically complex interventions, as they comprise multiple components designed to act both on their own and in conjunction with each other. This brings its own challenges, and multiple ‘rounds’ of evaluation using different evaluation strategies may be required to establish if an intervention is efficacious and effective, and which component(s) are responsible for the impact. Interventions involving the use of communication technologies offer the potential to use novel evaluations designs, utilising additional tools for data collection and measurement.
Summary

Evaluations of health promotion interventions are commonly designed around the three stages of formative, process and impact/outcome evaluation. Formative evaluation focuses on refining an intervention prior to implementation, process evaluation on how an intervention is implemented and impact/outcome evaluation on assessing whether an intervention achieved its desired health outcomes. Both quantitative and qualitative data collection methods can be used across the evaluation stages. The design of an evaluation depends on the aims and scale of an intervention, as well as what is feasible and acceptable within the context of the intervention. For evaluations of health promotion interventions using communication technologies, evaluation designs may need to be adapted, and the use of additional data measurements and data collection tools considered.
Thesis Overview

Sexual health is a key issue for young people, with high and increasing rates of STIs among this group. Young people frequently report multiple sexual partners, inconsistent condom use, have poor sexual health knowledge and perception of risk and infrequently access healthcare providers for services related to sexual health. These factors indicate the need for effective interventions to target and reach this at-risk group. Theoretical frameworks such as behavioural change models and communication strategies and models may assist in guiding the development of effective interventions.

Traditionally sexual health promotion has been delivered through institutional-based sex education programs, peer education and mass media campaigns. The evidence of the effectiveness of such approaches is varied, and many are quite resource intensive.

Communications technologies, such as text messages and online interventions, offer a novel means of reaching large numbers of young people, who are the greatest and most frequent users of these technologies. However, development and evaluation of the use of these technologies for sexual health promotion is in an embryonic stage. Multiple SMS interventions have been developed, with promising efficacy, however they often have low population reach and rely on resource-intensive methods of participant recruitment which are not able to be scaled up to reach entire populations of young people. Social networking sites have rapidly become a setting in which young people spend substantial amounts of time, yet few interventions have been developed to reach individuals in these spaces. Overlaying health promotion delivery in these new environments is the limited knowledge about how such interventions exert their impact, and how the effects of such interventions are best measured.

Thesis Aims

This thesis consists of a literature review (this chapter) and seven manuscripts which have been published, or submitted for publication, in peer-reviewed scientific journals.

The key aims of this thesis are to:

- Explore new approaches for delivering sexual health promotion for young people;
- Investigate how these approaches exert their impact on the target population; and
- Utilise innovative evaluation strategies to evaluate the process and impact of health promotion interventions.

The projects included in the thesis cover both traditional and newer approaches to sexual health promotion for young people. They explore the development and evaluation of such
approaches, with a focus on how these novel interventions and evaluation strategies could be applied in the ‘real world’, rather than research, setting. Together, they offer an exciting, and complementary, approach to established methods of delivering and evaluating sexual health promotion interventions to young people.

**Theoretical Foundation**

A mixed-models approach was used to develop the interventions described in this thesis. The interventions were primarily based on the Precaution Adoption Process Model\(^{137}\) stage theory of behaviour change, and incorporated elements from the Theory of Planned Behaviour (intention to act, attitudes towards behaviour, perceived behavioural control)\(^{127}\) and the concept of self-efficacy.\(^{133}\) Factors impacting on message exposure and delivery,\(^{154}^{156}\) and social marketing principles (particularly the focus on behaviour and the marketing mix)\(^{158}\) influenced both how the interventions were delivered, and the content and style of the health promotion messages used.
Chapter Two: Impact Evaluation of a ‘Traditional’ Mass Media Campaign

Introduction

This first chapter introduces an alternative approach to impact evaluation of a ‘traditional’ mass media campaign. In 2007, the Victorian Department of Health commissioned a campaign aiming to increase STI testing and condom use among young people aged 18 to 25 years in Victoria. This impact evaluation was conducted retrospectively in 2008, utilising multiple sources of routinely collected data. The findings of this evaluation highlight the difficulty in achieving behaviour change using a mass media approach, as well as provide a useful framework for how routinely collected data sources can be used for impact evaluation when no robust evaluation mechanism has been established at the outset of the intervention.
Declaration for Chapter Two

Monash University

Declaration by candidate

In the case of Chapter Two, the nature and extent of my contribution to the work was the following:

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<tr>
<td>Study design, data collection and analysis, results interpretation, manuscript preparation and review</td>
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The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

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<td>Margaret Hellard</td>
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<tr>
<td>Megan Lim</td>
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<td>Jane Hocking</td>
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<td>Tim Spelman</td>
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<td>Kathleen McNamee</td>
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<td>Philip Clift</td>
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<td>Rebecca Guy</td>
<td>Study design, data collection and analysis, results interpretation, manuscript preparation and review</td>
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Candidate’s Signature | Date 15/11/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.

(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(4) there are no other authors of the publication according to these criteria;

(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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Impact Evaluation of a Youth STI Awareness Campaign Using Routinely Collected Data Sources

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**Abstract**

**Background:** Young people are at high risk of sexually transmitted infections (STIs), and notifications of chlamydia are rising rapidly. In 2007 a Victorian multimedia campaign aimed to increase STI testing and condom use among 18-25 year olds. We conducted a retrospective impact evaluation using multiple sources of routinely collected data.

**Methods:** Population-level chlamydia testing data from general practice, chlamydia testing data from five government primary care clinics with a high caseload of young people and behavioural data from an annual youth behavioural survey was analysed. Analyses included time-series regression to assess trends in testing levels, Kruskal-Wallis tests to assess changes in positivity, and chi-squared tests to assess knowledge and behaviour change.

**Results:** There was no significant difference in slope of monthly chlamydia testing in population-level or clinic-based surveillance during the campaign compared to before or after the campaign, and no changes in chlamydia positivity. Between 2007 and 2008 there was a significant increase in STI knowledge among females (p<0.01) and in the proportion of females reporting always using a condom with casual (p=0.04) and new sexual partners (p<0.01) in the annual behavioural survey.

**Conclusions:** Our findings suggest the campaign had no impact on STI testing but may have contributed to an increase in knowledge and condom use among females; however, this increase could not be directly attributed to the campaign. Future campaigns targeting young people for STI testing should consider alternative messages and approaches and include robust evaluation mechanisms to prospectively measure campaign impact.
Introduction

Chlamydia is the most common sexually transmitted infection (STI) in Australia, and notifications more than doubled between 2002 and 2007, with 80% of notifications in 2007 among 15-29 year olds.\(^1\) \(^2\) A similar pattern was observed in Victoria, the second most populous state in Australia, where the number of chlamydia notifications increased from 4,861 in 2002 to 11,162 in 2007.\(^3\) A high proportion of young people in Victoria are at risk of STIs due to multiple sexual partners and inconsistent condom use.\(^4\)\(^6\)

Regular testing for chlamydia is recognised as a key public health control strategy. National guidelines recommend regular testing of sexually active young people (<25 years).\(^7\)\(^9\) However, only 12% of women and 4.8% of men aged 16-29 years in Australia who attended a GP in 2007-2008 received a chlamydia test.\(^10\) In this context, the Public Health Branch of the Victorian Department of Human Services (DHS) undertook a STI awareness campaign in 2007 titled “You never know who you’ll meet”, targeting young people aged 18 to 25 years. An online survey of 300 young people conducted for the campaign in late September 2007 found 75 (25%) recalled the campaign cinema advertisements, 99 (33%) recalled the campaign radio advertisements, and 111 (37%) recalled the campaign print and internet advertisements.\(^11\)

The gold standard for evaluating the impact of health promotion interventions are randomised controlled trials (RCTs).\(^12\) However, RCTs are often not feasible to implement due to their high cost and the need for fast campaign implementation in the context of growing epidemics or political pressures. Additionally, it may be impossible to conduct a true RCT when campaigns are rolled out across entire jurisdictions. Designs such as cohort studies and phased implementation have been proposed as suitable alternatives;\(^13\)\(^14\); however, these can also be costly and difficult to implement. Recently, “public health triangulation”, the review and interpretation of secondary data from multiple sources, has been proposed as a useful tool for monitoring and evaluation.\(^15\) Triangulation can be used to examine the effectiveness of widely disseminated interventions at a population level, and to strengthen interpretation of trends.\(^15\) However, many impact evaluations of mass media campaigns utilise single-source pre- and post- measurements, and make little attempt to minimise bias, particularly adjusting for temporal trends.\(^13\)

In this paper we present the results of an impact evaluation of the “You never know who you’ll meet” STI awareness campaign As no robust impact evaluation mechanism was established at the outset, the evaluation was conducted retrospectively in 2008. Consistent with the public health triangulation approach,\(^15\) data from three routinely collected data sources were assessed, using a pre- and post- analysis design with time series analysis.
**Methods**

**The Campaign**

In June 2007 DHS launched the ‘You never know who you’ll meet’ campaign, which aimed to raise awareness of STIs, promote condom use and STI testing among young people. The primary target group was heterosexuals aged 18-25 years in Victoria. The campaign messages were developed by BoilerRoom ([www.boilerroom.com.au](http://www.boilerroom.com.au)) and tested and refined in focus groups in April 2007. The campaign was officially launched on June 14th 2007 and ran until December 2007, with most media activity concentrated in June to September 2007. The total cost of the campaign was AUD $650,000. All campaign materials featured pictures of young people enjoying a night out; first names (e.g. Lauren) appeared above each individual with one individual having an STI listed as their first name (Figure 1). The tag line, ‘You never know who you’ll meet’, appeared at the bottom of each image, followed by brief information about STIs and testing, and concluding with the line, “Play safe. Use a condom,” and a website link.

Figure 1: Example campaign poster

The campaign was promoted through print and broadcast media, public and internet advertising and person-to-person methods. Print advertisements were placed in one daily commuter newspaper (10x6cm, weekly on Fridays for 8 weeks), two weekly street newspapers (quarter page for eight weeks), four monthly university magazines (full page) and two monthly commercial magazines, one targeting males and the other targeting females (full page). Thirty
second radio advertisements were played on two commercial and two community stations over eight weeks, and cinema advertisements were played on 100 screens each week across Victoria. Campaign posters were displayed in 85 bars and nightclubs in Melbourne (A3 size; 250 posters per month) and at higher education institutes across the state (A2 size; 2,200 posters per month). Postcards (miniature version of the posters) were distributed to youth-targeted venues in Victoria (120,000 postcards printed; distributed to 200 venues per month). Advertisements were placed on popular internet sites (one music focused site, one social networking site, and one dating site). The campaign also involved peer-led education where an ‘STI promo squad’ of young people visited popular venues on Friday and Saturday nights for ten weeks to promote the campaign messages and distribute condoms and information cards.

**Key Indicators**

Analysis of the impact of the “You never know who you’ll meet campaign” on STI testing focused on chlamydia testing as this is by far the most common STI in the target age group.¹ This evaluation focused on four key indicators: chlamydia testing, chlamydia positivity, STI knowledge and condom use.

**Evaluation Data Sources**

Three routinely collected data sources were used to assess the impact of the campaign on the four key indicators. The campaign period was defined as June to December 2007 and the 12 month periods on either side of the campaign period were defined as ‘before’ and ‘after’ the campaign. Time series analyses were conducted in two of the data sources.

**1. Population-Level Testing Data**

Medicare rebatable chlamydia testing data were downloaded from Medicare Australia’s website.¹⁶ Medicare is Australia’s publicly-funded universal health care system, operated by the government authority Medicare Australia. Chlamydia tests conducted in settings which are not directly government funded attract a Medicare rebate.

Data for people aged 15 to 24 years tested for chlamydia with a Medicare rebate claimed between 1st May 2006 and 31st December 2008 were extracted (data specific to 18-25 year olds were not available). Prior to May 2007 chlamydia testing was rebated as part of general microbiology item numbers 69364, 69365 and 69367. From May 2007, the general microbiology item numbers were still rebated but additional specific chlamydia item numbers 69316, 69317 and 63919 became available.

For the period prior to May 2007, we estimated the proportion of general microbiology tests which would have been due to chlamydia testing by applying the proportion calculated in the
period following the introduction of the specific chlamydia items (71.6% for June to December 2007). Testing data from May 2007 were excluded from analysis due to data inconsistencies most likely resulting from the changeover period of item numbers.

2. Clinic-Based Testing Data

The second data source included chlamydia testing and behavioural data from five government funded primary care clinics with a high caseload of young people participating in the Victorian Primary Care Network for Sentinel Surveillance (VPCNSS). The methodology for the VPCNSS is described in detail elsewhere.17

Demographic and sexual behaviour information from all males and females aged 18 to 25 years tested for chlamydia between 1st June 2006 and 31st December 2008 were extracted. Known sex workers, transgenders and individuals with repeat positive tests within 30 days were excluded from analysis.

3. Annual Behaviour Survey

The third data source was an annual cross-sectional sexual behaviour survey of young people attending a music festival in Melbourne. The methodology has been described previously.5 The survey is a convenience sample of at least 1,000 young people from the 40-50,000 annual attendees. Participants self-completed a brief paper questionnaire covering demographics, sexual behaviour, STI knowledge, testing history and alcohol and other drug use. Participants were approached to participate from a festival market stall and recruitment continued until the recruitment target was reached. The 18-25 year olds surveyed in January 2007 (n=635, 59% female) served as the pre-campaign baseline measure, with 18-25 year olds surveyed in January 2008 (n=1602, 55% female) serving as a post-campaign measure.

Data Access and Approval

Medicare data is publically available at the Medicare Australia website (http://www.medicareaustralia.gov.au/provider/medicare/mbs.jsp#N10030). The investigators of the Victorian Primary Care Network for Sentinel Surveillance and the Annual Behaviour Survey granted access to their data for this evaluation.

Data Analysis

Time series analysis was conducted using linear regression to determine if there were difference in the slope of monthly chlamydia tests before, during and after the campaign in the non-government funded clinics using Medicare data and the five government funded clinics in the VPCNSS. Analyses were conducted overall, by males and females and, in the VPCNSS, by
various demographic and sexual behaviour subgroups. The non-parametric Kruskal-Wallis one way analysis of variance test was used to compare the proportion of chlamydia tests that were positive in the VPCNSS before, during and after the campaign. Chi-squared tests were used to determine changes in STI knowledge, self-reported STI testing history and condom use by gender between survey time-points in the Annual Behavioural Survey.

**Results**

**Indicator One: Chlamydia Testing**

**Population-level testing data:** From 1st May 2006 to 31st December 2008 there were 127,643 chlamydia tests rebated by Medicare among 15-24 year olds in Victoria, with most (79%) among females (Figure 2). There was an average increase of 34 tests per month across the 31 month analysis period (p<0.01); 11 tests per month among males (p<0.01) and 23 tests per month among females (p<0.01). There was no difference in the slope of monthly chlamydia tests conducted during the campaign compared to non campaign months, both overall (p=0.58) and when males (p=0.27) and females (0.70) were examined separately.

Figure 2: Chlamydia tests in Medicare, 15-24 year olds Victoria, May 2006–December 2008

Note: arrows and shaded area on the figure indicate the campaign period

**Clinic-based testing data:** In the VPCNSS there were 13,755 chlamydia tests conducted in 18-25 year olds attending the five government funded clinics from 1st June 2006 to 31st December 2008, with 58% of tests among females (Figure 3). Across the analysis period there was a significant decrease in the average monthly number of tests among females (1.6 tests per month; p<0.01) and a significant increase in the average monthly number of tests among males (1.3 tests per month; p<0.01). Chlamydia testing significantly increased at sexual health
centres (p<0.01), among those aged 18-19 years (p=0.02) and 20-21 years (p=0.01), and decreased at primary health care services (p<0.01) and among those aged 24-25 years (p=0.01). No significant increase in testing in the campaign compared to non-campaign months was found overall or in any subgroups examined (analysed by age group, clinic type, sexual partner type, multiple partners in past 12 months, consistency of condom use, new partners in past three months).

Figure 3: Chlamydia tests in Victorian Primary Care Network for Sentinel Surveillance, 18-25 year olds, Victoria, June 2006 – December 2008

![Graph showing Chlamydia tests over time](image)

Note: arrows and shaded area on the figure indicate the campaign period

Annual Behaviour Survey: There was no change in the proportion reporting history of STI testing in the Annual Behaviour Survey. (Table 1)

**Indicator Two: Chlamydia Positivity**

Clinic-based testing data: Over the 31 month analysis period, 7.3% of tests conducted among 18 to 25 year olds in the VPCNSS were found to be positive (9.0% in males, 6.2% in females). This proportion did not change significantly before, during or after the campaign (p>0.90), nor were there differences related to gender.

**Indicator Three: STI Knowledge**

Annual Behaviour Survey: There was a significant increase between 2007 and 2008 in the proportion answering some of the STI knowledge questions correctly. Overall knowledge improved only among females (p<0.01) and not among males (p=0.18). (Table 1)
Table One: Comparison of STI Knowledge, Testing History and Condom Use in 18-25 years completing an Annual Behaviour Survey, 2007 and 2008 Victoria

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th></th>
<th></th>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th></th>
<th>Females</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2007 n %</td>
<td>2008 n %</td>
<td>p</td>
<td>2007 n %</td>
<td>2008 n %</td>
<td>p</td>
<td>2007 n %</td>
<td>2008 n %</td>
<td>p</td>
<td>2007 n %</td>
<td>2008 n %</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>People infected with STIs often don’t have any symptoms and won’t know they have the infection</td>
<td>366 57.6</td>
<td>1268 79.2</td>
<td>&lt;0.01</td>
<td>111 42.7</td>
<td>529 73.4</td>
<td>&lt;0.01</td>
<td>255 68.0</td>
<td>734 83.8</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlamydia can be diagnosed by a urine test</td>
<td>257 40.5</td>
<td>712 44.4</td>
<td>0.12</td>
<td>104 40.0</td>
<td>330 45.8</td>
<td>0.16</td>
<td>153 40.8</td>
<td>381 43.5</td>
<td>0.42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonorrhoea, syphilis and chlamydia can all be easily treated with antibiotics</td>
<td>335 52.8</td>
<td>883 55.1</td>
<td>0.45</td>
<td>114 43.9</td>
<td>355 49.2</td>
<td>0.21</td>
<td>221 58.9</td>
<td>526 60.1</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The pap smear can be used to diagnose all the main STIs</td>
<td>217 34.2</td>
<td>641 40.0</td>
<td>0.02</td>
<td>76 29.2</td>
<td>244 33.8</td>
<td>0.22</td>
<td>141 37.6</td>
<td>395 45.1</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlamydia can make women infertile (unable to become pregnant)</td>
<td>360 56.7</td>
<td>1054 65.8</td>
<td>&lt;0.01</td>
<td>103 39.6</td>
<td>398 55.2</td>
<td>&lt;0.01</td>
<td>257 68.5</td>
<td>653 74.5</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge score of four/five out of five</td>
<td>204 32.1</td>
<td>783 48.9</td>
<td>&lt;0.01</td>
<td>86 33.1</td>
<td>313 43.4</td>
<td>0.18</td>
<td>118 31.5</td>
<td>468 53.4</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested for STI in last 12 months</td>
<td>NA</td>
<td>-</td>
<td>448 28.0</td>
<td></td>
<td>NA</td>
<td>-</td>
<td>114 15.8</td>
<td>-</td>
<td>NA</td>
<td>-</td>
<td>333 38.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tested for STI in last 6 months</td>
<td>72 11.3</td>
<td>199 12.4</td>
<td>0.52</td>
<td>16 6.2</td>
<td>43 6.0</td>
<td>0.89</td>
<td>56 14.9</td>
<td>155 17.7</td>
<td>0.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sexual partner/s in past 12 months</td>
<td>544 85.7</td>
<td>1431 89.3</td>
<td>0.02</td>
<td>235 90.4</td>
<td>658 91.3</td>
<td>0.80</td>
<td>309 82.4</td>
<td>769 87.8</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always used condoms with sexual partner/s*</td>
<td>170 31.3</td>
<td>528 36.9</td>
<td>0.01</td>
<td>76 32.3</td>
<td>248 37.7</td>
<td>0.12</td>
<td>94 30.4</td>
<td>278 36.2</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual partner/s in past 12 months</td>
<td>265 41.7</td>
<td>822 51.3</td>
<td>&lt;0.01</td>
<td>126 48.5</td>
<td>410 56.9</td>
<td>0.07</td>
<td>139 37.1</td>
<td>410 46.8</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always used condoms with casual partner/s*</td>
<td>157 59.2</td>
<td>529 64.4</td>
<td>0.13</td>
<td>79 62.7</td>
<td>258 62.9</td>
<td>0.96</td>
<td>78 56.1</td>
<td>270 65.9</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New partner/s in past 3 months</td>
<td>220 34.7</td>
<td>538 33.6</td>
<td>0.36</td>
<td>409 41.9</td>
<td>286 39.7</td>
<td>0.38</td>
<td>111 29.6</td>
<td>249 28.4</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always used condoms with new partner/s*</td>
<td>110 50.0</td>
<td>313 58.2</td>
<td>&lt;0.01</td>
<td>58 53.2</td>
<td>160 55.9</td>
<td>0.40</td>
<td>52 46.9</td>
<td>151 60.6</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NA= Not asked

^ Results refer to individuals answering the knowledge question correctly

* Denominator is those reporting this type of partner
Indicator Four: Condom Use

Annual Behaviour Survey: The proportion of females reporting always using condoms with casual (p=0.04) and new sexual partners (p<0.01) significantly increased from 2007 to 2008, but did not change significantly for males. (Table 1)

Discussion

This evaluation suggests that the 2007 ‘You will never know who you’ll meet’ STI awareness campaign in Victoria had no detectable effect on STI testing among the target group. An increase in knowledge and condom use among females was observed between two surveys conducted before and after the campaign. The strength of this evaluation was the combination of multiple data sources with a pre- and post- analysis design utilising time series analysis. However, the reliance on routinely collected data sources with no control group meant that the observed changes in knowledge and condom use among females could not be directly attributed to the campaign.

Medicare testing data, the largest source of chlamydia testing data available in Victoria, indicated that chlamydia testing was already increasing prior to the campaign commencing, but this increase was not accelerated during the campaign. Similarly, there was no increase in chlamydia testing or changes in proportion of positive tests observed during the campaign period in the government funded clinics participating in the VPCNSS, nor was there an increase in self-reported history of STI testing in the Annual Behavioural Survey.

These findings contrast with those of the evaluation of an earlier Victorian chlamydia awareness campaign, which targeted a similar age group in 2002-2003. That evaluation analysed Medicare data, finding that chlamydia testing was increasing, and that more tests were conducted in the campaign period, compared to before the campaign.18 The success of this earlier campaign in increasing testing may have been due to some differences in approach – campaign materials were gender-specific, placed primarily in toilet facilities and emphasised the ease of testing. In addition, the 2002-03 campaign was one of the first population-based chlamydia-specific campaigns so may have had greater resonance with the target group, and utilised a different analytical strategy with shorter pre- and post- campaign periods.18

Unlike for HIV, where the success of mass media to increase testing in developed countries is well established,19 there are few published accounts of the impact of mass media on chlamydia testing uptake. One example is the earlier Victorian campaign described above.18 Another is an evaluation of a 2005 Western Australian campaign that reported a significant increase in chlamydia testing during the campaign period compared to before the campaign; however, the
analysis did not account for the background of increasing chlamydia testing over this time period. Internationally, two studies have reported on the use of mass media to promote chlamydia testing, both resulting in small numbers of people being tested for chlamydia (n=183 out of a target population of 30,000 in Denmark, n=31 in the United States). Even though there wasn’t a significant increase in chlamydia testing during the campaign period, it is possible that the ‘You never know who you’ll meet’ campaign resulted in higher-risk young people seeking STI testing and these patients were prioritised over others. However the positivity data and risk behaviour data collected from the VPCNSS clinics suggest individuals tested at these clinics during the campaign period were of similar risk to those tested before and after the campaign. The stable chlamydia positivity also confirms the campaign didn’t result in more ‘worried well’ seeking testing at the VPCNSS clinics during the campaign period which has been found in previous population based HIV media campaigns.

The impact of the ‘You never know who you’ll meet’ campaign on condom use was difficult to assess from routinely collected data sources. The annual behaviour survey found a significantly higher proportion of females reporting consistent condom use with casual and new partners immediately after the campaign period. However the evaluation was unable to ascertain whether these changes were due to the campaign or other factors, as the surveys were cross-sectional and did not contain specific questions about campaign recognition. Internationally there is little evidence that mass media interventions have improved consistency of condom use among young people. Apart from one American study that reported that television public service announcements led to an increase in condom use among high risk youth in the intervention areas, other studies have found no effect of mass media interventions on condom use.

The limited observed impact of the ‘You never know who you’ll meet’ campaign may have been due to its low penetration, with fewer than 40% of those surveyed recalling the campaign advertisements just after the peak of media activity. This is lower than previous campaigns targeting a similar demographic in other Australian states, where 60-80% of those surveyed recalled campaign advertisements. Using television advertisements, and placement of campaign materials with specific health promotion messages in particular physical settings (e.g. toilets) may have been a more effective approach. More generally, it has been reported that mass media health promotion campaigns often lead to small effect sizes.

This evaluation has a number of limitations. First, the evaluation relied on analysis of routinely collected data sources which had not been tailored for the purposes of campaign evaluation. No control groups were available, limiting the conclusions that can be drawn from changes over time, particularly for condom use where ‘before-during-after’ analysis among those that
were exposed to the campaign could not be undertaken. A pre-planned evaluation design involving longitudinal assessments of appropriate indicators among those exposed to the campaign would provide much better evidence of the campaign impact. However, as no cohort was established for this campaign, and there are no ongoing cohorts of young people in Victoria that could be used to evaluate this or similar interventions, such analyses were not possible. For this reason, we compiled data from multiple sources and used time-series analysis to strengthen the evaluation design. In order to ensure our data sources included the campaign’s intended target audience we included testing data from both general practice (which accounts for the majority of chlamydia testing in Victoria) along with testing data from specific government-funded clinics (with a high caseload of sexually active young people) and data from a youth behavioural survey.

Other limitations of the evaluation include the approximation of the number of Medicare chlamydia tests prior to May 2007 as only non-specific Medicare item numbers were available between November 2005 and May 2007. VPCNSS behavioural data is not representative of the general population due to the small number of clinics and the risk profile of clients attending these clinics. The characteristics of clients attending these services, but not tested for chlamydia, is not known. The Annual Behaviour Survey is a convenience sample of youth attending a music festival and may not be representative of all those in the same age group in Victoria. We were unable to conduct a comprehensive process evaluation of the campaign due to the limitations in data available; ideally, both process and impact evaluations would be conducted of all health promotion campaigns.

Despite these limitations, this evaluation is more comprehensive than most STI campaign evaluations in Australia to date 18 29 30 as it utilises multiple data sources and time-series regression analysis19 to improve the validity of the findings. This evaluation also provides a useful example of how multiple routinely collected data sources can be used to gather information about campaign impact where no robust evaluation mechanism has been established at the outset. This method may be particularly useful for countries and settings where more rigorous randomised controlled trials and longitudinal designs are not always feasible.

The three data sources utilised in the evaluation are appropriate for future evaluation of campaigns of this nature, as they include chlamydia testing in the general practice setting and in specialised youth and sexual health services as well as behavioural data from the campaign’s target audience who may not be attending health services. The data sources enable measurement of key indicators such as chlamydia testing, chlamydia positivity, STI knowledge and condom use. The utility of these data sources for future campaign evaluations could be
enhanced by including measures of campaign recognition within behavioural surveys, collecting patient attendance data in clinic-based surveillance to allow for calculation of testing rates as well as collecting more detailed information about reason for attending clinical services (including presentation due to the campaign). It would also be ideal to include more representative behavioural surveys. However such systems would need to be in place before the campaign to be evaluated is conducted, to allow for before, during and after campaign analysis.

The lack of evidence of an increase in chlamydia testing due to the campaign is consistent with previous published literature,\textsuperscript{21, 22} and reinforces the need for public health officials to continually refine and improve health promotion messages and techniques to maximise impact of often quite costly campaigns. Future mass media campaigns should consider including messages that are more specific and informative and may act more as a ‘prompt to action’ (e.g. what an STI test involves and where it is available). Targeting campaigns at sub-groups at greatest risk (e.g. individuals with new partners in the past three months or with sequential regular partners who have not had STI tests and are having unprotected sex) may also be important. The placement of campaign materials should be carefully considered and could be extended to other mediums accessed by the target group, such as mobile phones and social networking sites.\textsuperscript{32} Regardless of the method of intervention, robust evaluation mechanisms should be established at the outset of any intervention so that any changes in knowledge and behaviour due to the intervention can be tracked, and then form the evidence base for future initiatives.

Conclusions

Our evaluation of routinely available chlamydia testing and behavioural data found limited impact of the ‘You will never know who you’ll meet’ campaign on STI testing and condom use. Future campaigns need to consider alternative messages and approaches and, where possible, include robust evaluation mechanisms that can directly measure campaign impact.

Acknowledgements

Judy Gold receives funding from the Australian Government through an Australian Postgraduate Award and a Monash University Faculty of Medicine Excellence Award. Margaret Hellard receives funding from the NH&MRC as a senior research fellow. Megan Lim receives funding from a NH&MRC postdoctoral training fellowship. Jane Hocking receives funding from a NH&MRC career development award.
References


Chapter Three: Expanding the Use of SMS for Sexual Health Promotion

Introduction

This chapter presents the first use of communications technology in this thesis to deliver sexual health promotion for young people. As noted in Chapter One, the use, and thus reach, of communication technology is expanding rapidly, and none so more than mobile phone text messages (SMS).

Building on the success of a pilot randomised controlled trial conducted in 2006-7, we aimed to greatly scale up the use and evaluation of SMS to deliver sexual health promotion for young people. This project involved recruiting one of the largest samples to date for an SMS behavioural intervention, and using both quantitative and qualitative approaches to conduct a process and impact evaluation of the intervention. This chapter presents the results of the quantitative evaluation of this project.
Declaration for Chapter Three

Monash University

Declaration by candidate

In the case of Chapter Three, the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and management, data collection and analysis, results interpretation, manuscript preparation and review</td>
<td>65%</td>
</tr>
</tbody>
</table>

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
<th>Extent of contribution (%) for student co-authors only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megan Lim</td>
<td>Study design, data collection and analysis, results interpretation, manuscript preparation and review</td>
<td>NA</td>
</tr>
<tr>
<td>Jane Hocking</td>
<td>Study design, data analysis, results interpretation, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Louise Keogh</td>
<td>Results interpretation, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Tim Spelman</td>
<td>Data analysis, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Margaret Hellard</td>
<td>Study design, data analysis, results interpretation, manuscript review</td>
<td>NA</td>
</tr>
</tbody>
</table>

Candidate's Signature [Signature] Date 15/11/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.

(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(4) there are no other authors of the publication according to these criteria;

(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

| Location(s) | Centre for Population Health, Burnet Institute |

<table>
<thead>
<tr>
<th>Signatures</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megan Lim</td>
<td>15/11/10</td>
</tr>
<tr>
<td>Jane Hocking</td>
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<td>Tim Spelman</td>
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<td>Margaret Hellard</td>
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Determining the Impact of Text Messaging for Sexual Health Promotion to Young People

Judy Gold1,2, Megan Lim2, Jane Hocking3, Louise Keogh3, Tim Spelman1, Margaret Hellard1,2,4

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Abstract

**Background:** The use of new technologies, such as mobile phones and internet, has increased dramatically in recent years. Text messages offer a novel method of sexual health promotion to young people who are the greatest users of new technology and are also at high risk of sexually transmitted infections (STIs)

**Methods:** In January 2008 young people aged 16-29 were recruited from a music festival in Melbourne, Australia. They completed a short survey and were asked to provide their mobile phone number. Participants received fortnightly SMS relating to sexual health for four months and then completed an online follow-up survey. Survey data were weighted to account for those lost to follow up. McNemar’s test was used to compare changes in survey responses.

**Results:** 1,771 participants were included in analysis as they were sexually active and provided a valid mobile phone number at baseline. Eighteen percent (319/1,771) withdrew from receiving the SMS during the broadcast period and 40% (587/1,452) completed the follow-up survey. The majority reported on the follow-up survey that they found the SMS entertaining (80%), informative (68%) and they showed the SMS to others (73%). Weighted analyses found a significant increase in knowledge (p<0.01) and STI testing (p<0.05) over time in both males and females.

**Conclusion:** The findings indicate that SMS appear to be a feasible, popular and effective method of sexual health promotion to young people with a relatively low withdrawal rate, positive feedback and an observed improvement in sexual health knowledge and STI testing.
Introduction

In the past two decades the use of new technologies - mobile phones, internet and the like - has exploded. New communication technologies have the potential to play an important role in sexual health education and prevention, particularly among young people, who are at high risk of sexually transmitted infections (STIs)\(^2\) and have the highest rate of internet use and mobile phone ownership in the population.\(^3\) Short messaging service (SMS), also known as text messaging, is a particularly promising method of health promotion as it does not rely on fixed equipment, messages can be sent to multiple recipients simultaneously with immediate delivery and the cost of sending messages is low.\(^4\)

In recent years SMS has been used to successfully deliver clinical care and preventative health interventions related to disease self-management, smoking cessation, diet and physical activity.\(^5\)\(^6\) Within the sexual health field, SMS has been used by health practitioners for communication between clinics and patients, partner notification, contraception reminders and health promotion and education; however evidence of its effectiveness has been limited.\(^5\)

A randomised controlled trial conducted in 2006-2007 found those receiving SMS and email messages about sexual health improved their knowledge, and that females receiving messages were more likely to seek an STI test than those who did not receive any messages.\(^1\) We report the results of a second study that aimed to determine the impact of using SMS on a population level on sexual health knowledge and behaviour.

Methods

Design

This project was designed as a health promotion intervention with baseline and follow up behavioural surveys to determine the interventions’ effect on sexual health knowledge and behaviour.

Recruitment

Each year the Burnet Institute holds a market stall at the Melbourne Big Day Out music festival and conducts a cross-sectional behavioural survey to monitor sexual behaviour and drug use among young people attending the event.\(^7\)\(^8\) Individuals are eligible to participate if they are aged between 16 and 29 years and have sufficient English skills to complete a self complete questionnaire. Participants completing the survey in 2008 were asked to provide their mobile phone number to receive SMS about sexual health after the event. The questionnaire collected
information regarding demographics, sexual health knowledge and behaviour and alcohol and drug use and served as the baseline measure for the project. Participants receive refreshments, a showbag containing sexual health information and condoms, and are entered into a draw to win an mp3 player and CD vouchers.

**Intervention**

Text messages about STIs (asymptomatic nature, urine testing, simple treatment, and prevalence), their consequences (chlamydia causing infertility) and condom use were developed by authors JG, ML and MH and tested and refined with Burnet Institute staff and students in the target age group. Messages were designed to address the known low level of sexual health knowledge, STI testing and condom use among this age group,\(^8\)\(^{12}\) as well as perceived barriers to STI testing.\(^12\) We did not subscribe to a single behavioural change theoretical model, but based our intervention primarily on Weinstein’s Precaution Adoption Process model\(^14\)\(^15\) and incorporated elements from Ajzen’s Theory of Planned Behaviour\(^16\) and Bandura’s concept of self-efficacy.\(^17\)

Messages were designed to be short, catchy and informative, and where possible, tied into particular events (e.g. Valentines Day, Mother’s Day). A total of twelve messages were sent out approximately fortnightly, between February and July 2008 (Table 1). Participants could opt out of receiving the SMS by texting back ‘stop’ or similar to the study mobile phone number.

**Evaluation**

Two weeks after the last broadcast SMS, participants were sent an SMS inviting them to complete an online follow up survey. The survey contained similar questions to the baseline questionnaire, with some additional questions to evaluate the messages. Tickets to the following year’s Big Day Out music festival and CD vouchers were offered as prizes to encourage participation. Up to five reminder SMS and two email reminders were sent to those not completing the online survey.

**Analysis**

Participants who reported never having had sex at baseline were excluded from analysis. McNemar’s test was used to determine changes in sexual health knowledge, STI testing and condom use between baseline and follow up.

To account for differences in sexual activity among those who were lost to follow up (either due to actively withdrawing from receiving the messages or by not completing the follow up survey) the retained sample was weighted upwards to represent the full initial sample.
Multivariate logistic regression was used to first identify baseline factors which predicted loss to follow up. These factors were then used to design weighting strata, in which those subjects lost to follow up were matched with groups of retained subjects they most closely resembled in terms of the baseline predictors isolated by the multivariate analysis. The number of individuals within each weighting stratum completing the follow up survey was then divided by the number of individuals within each stratum at baseline; the inverse of this formed the weight for individuals in this group. Both unweighted and weighted analyses were performed.

Table 1: Text Messages Broadcast

<table>
<thead>
<tr>
<th>Broadcast Date</th>
<th>Message Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1^ Friday, 1 February 2008</td>
<td>Big Day Out! Big Night In? Forgot to use your free condoms? Speak to your doctor about a chlamydia test. Love from the Burnet Institute</td>
</tr>
<tr>
<td>2 Thursday, 14 February 2008 (Valentine’s Day)</td>
<td>Roses are red, daisies are white, use a condom if you get lucky tonight. Happy Valentines Day! Love the Burnet Institute</td>
</tr>
<tr>
<td>3 Friday, 29 February 2008 (Leap year)</td>
<td>Unlike February the 29th, having chlamydia is common. More than 50,000 Australians were diagnosed with chlamydia last year. Love the Burnet Institute</td>
</tr>
<tr>
<td>4 Friday, 17 March 2008 (Easter long weekend*)</td>
<td>Protect your or your partners eggs this Easter with a condom. Chlamydia can cause infertility. Enjoy the long weekend! Burnet Institute</td>
</tr>
<tr>
<td>5 Tuesday, 1 April 2008 (April Fools Day)</td>
<td>Don’t be fooled, chlamydia testing and treatment is easy. Its just a pee and a pill, see your doctor today. Love the Burnet Institute</td>
</tr>
<tr>
<td>6^ Thursday, 10 April 2008 (End of daylight savings*)</td>
<td>Change your clocks, change your smoke detector battery. Change your partner, get an STI test. Love the Burnet Institute</td>
</tr>
<tr>
<td>7^ Tuesday, 29 April 2008</td>
<td>I know ur hurting, feels like ur burning - but maybe not? Don’t be the Biggest Loser! Most STIs have NO symptoms, only way to know is to get tested.</td>
</tr>
<tr>
<td>8 Friday, 9 May 2008 (Mother’s Day)</td>
<td>Spare a thought for condoms this Sunday, they can help you have babies too (chlamydia causes infertility). Burnet Institute PS Don’t forget to call your mum</td>
</tr>
<tr>
<td>9 Friday, 23 May 2008</td>
<td>Well before the Big Day Out, its time to clear chlamydia out. Pap smears and blood tests are not the go, you need to pee in order to know. Burnet Institute</td>
</tr>
<tr>
<td>10 Friday, 6 June 2008</td>
<td>Chlamydia: hard to spell, easy to catch. Use a condom! Burnet Institute</td>
</tr>
<tr>
<td>11 Friday, 20 June 2008</td>
<td>Why did the chicken cross the road? Coz it realised a pap smear or a blood test didn’t test it for chlamydia. Urine samples are the best chlamydia test.</td>
</tr>
<tr>
<td>12 Friday, 4 July 2008</td>
<td>Get those dancing shoes on, it takes two to Tango! Pill for pregnancy, condoms for chlamydia. Last SMS from us but stay tuned for survey and prizes next week...</td>
</tr>
</tbody>
</table>

* This message refers to the Big Day Out music festival where participants received free condoms and were recruited for the study
* These were broadcast in advance of the event itself
* This message is a play on a well known Australian advertisement with the slogan “change your clocks, change your smoke alarm battery”
# This messages plays on the theme song of the television show “The Biggest Loser”, popular at the time
Ethics

Approval was sought from and granted by the Department of Human Services Human Research Ethics Committee and the Monash University Standing Committee on Ethics in Research Involving Humans.

Results

Participant Characteristics

Overall 2,377 valid baseline surveys were completed; 250 (11%) had never had sex and were excluded from further analysis. Of the remaining 2,127 surveys, 1,771 (83%) provided a valid mobile phone number and were thus enrolled to receive the intervention. Over the four months of the intervention 319 of the original 1,771 (18%) withdrew from receiving the SMS and 587 (40%) of those invited (n=1452) completed the follow up survey. (Figure 1)

Figure 1: Participant Summary
Baseline Survey Results

The median age was 22 years, with just over half (56%) female. The majority of participants were born in Australia, resided in metropolitan Melbourne and had completed high school (Table 2).

Table 2: Participant Characteristics at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>797</td>
<td>100</td>
</tr>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reside in metropolitan Melbourne</td>
<td>543</td>
<td>68.1</td>
</tr>
<tr>
<td>Born in Australia</td>
<td>721</td>
<td>90.5</td>
</tr>
<tr>
<td>Completed high school</td>
<td>631</td>
<td>79.2</td>
</tr>
<tr>
<td>Live with parents</td>
<td>342</td>
<td>42.9</td>
</tr>
<tr>
<td><strong>Alcohol and Other Drug Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used illicit drugs in past month</td>
<td>420</td>
<td>52.7</td>
</tr>
<tr>
<td>Consumed alcohol at high risk levels* at least once a week in past 12 months</td>
<td>493</td>
<td>61.9</td>
</tr>
<tr>
<td><strong>Sexual Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visited GP in past 12 months</td>
<td>535</td>
<td>67.1</td>
</tr>
<tr>
<td>Discussed sexual health with GP</td>
<td>126</td>
<td>23.6</td>
</tr>
<tr>
<td>Ever had an STI test</td>
<td>207</td>
<td>26.0</td>
</tr>
<tr>
<td>Had STI test in past six months</td>
<td>55</td>
<td>6.9</td>
</tr>
<tr>
<td>Score of &gt;=5 out of 6 sexual health knowledge questions</td>
<td>235</td>
<td>29.5</td>
</tr>
<tr>
<td><strong>Sexual Behaviour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more opposite sex partners in past 12 months</td>
<td>342</td>
<td>42.9</td>
</tr>
<tr>
<td>Regular sexual partner/s in past 12 months</td>
<td>711</td>
<td>89.2</td>
</tr>
<tr>
<td>Always used condoms with regular partner/s</td>
<td>293</td>
<td>41.2</td>
</tr>
<tr>
<td>Casual sexual partner/s in past 12 months</td>
<td>476</td>
<td>59.7</td>
</tr>
<tr>
<td>Always used condoms with casual partner/s</td>
<td>306</td>
<td>64.3</td>
</tr>
<tr>
<td>New sexual partner/s in past three months</td>
<td>324</td>
<td>40.7</td>
</tr>
<tr>
<td>Always used condoms with new partner/s</td>
<td>182</td>
<td>56.2</td>
</tr>
</tbody>
</table>

* For females, drinking five or more drinks in a day; For males, drinking seven or more drinks in a day

Just over a third (39%) reported ever having had an STI test, with 13% reporting an STI test within the past six months. Most reported a regular sexual partner in the past 12 months, and just over half reported a casual sexual partner in the same time frame. Around a third reported a new sexual partner in the past three months. Just over half reported always using condoms with casual and/or new partners (Table 2).
Follow Up Survey Results

Of the 587 who completed the online follow up survey, 469 (80%) reported they found the SMS interesting or entertaining, 401 (68%) reported they learnt something from the SMS and 132 (23%) reported they found them annoying. Almost three quarters (n=428, 73%) reported they showed the SMS to others, most commonly friends (68%) and partners (38%). Nineteen percent reported they would not be willing to receive similar SMS in the future.

Three factors were found to be significantly associated with being lost to follow up – male gender (OR 1.6, 95% CI 1.3-1.9, p<0.01), not having completed high school (OR 1.4, 95% CI 1.0-1.9, p=0.03) and not attending a doctor in the 12 months prior to the baseline survey (OR 1.6, 95% CI 1.2-2.1, p<0.01). These factors were used to derive weighting strata upon which the retained sample of participants who completed the follow up survey were weighted upwards to represent the full 1,771 sexually active participants at baseline.

Both unweighted and weighted analyses found a significant increase in sexual health knowledge among males and females at follow up compared to baseline (Table 3). At follow up, more than 55% of males and more than 70% of females correctly answered five or more of six sexual health questions correctly, compared to fewer than 30% of males and 45% of females at baseline.

Weighted analysis indicated a significant increase in STI testing among both males and females within the past six months. Twenty three percent of females reported an STI test within the past six months at follow up, compared to 18% at baseline. For males, 10% reported an STI test within the past six months at follow up compared to 8% at baseline (Table 3).

A significantly lower proportion of males reported multiple, casual or new partners at follow up compared to baseline. A higher proportion reported always using condoms with casual partners, with a lower proportion reporting always using condoms with new partners (Table 3).

A significantly higher proportion of females reported multiple sexual partners at follow up compared with baseline, but a lower proportion reported casual or new partners. There was a significant decrease in the proportion reporting always using condoms with casual or new partners at follow up compared to baseline. (Table 3)
Table 3: Comparison between survey response at baseline and follow up, unweighted and weighted analyses using McNemar’s test

<table>
<thead>
<tr>
<th></th>
<th>Males Unweighted</th>
<th>Males Weighted</th>
<th>Females Unweighted</th>
<th>Females Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>p</td>
<td>n</td>
</tr>
<tr>
<td>Total</td>
<td>211</td>
<td>100</td>
<td>735</td>
<td>100</td>
</tr>
<tr>
<td>Knowledge score of &gt;=5/6 correct</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>60</td>
<td>28.4</td>
<td>201</td>
<td>27.3</td>
</tr>
<tr>
<td>Follow Up</td>
<td>123</td>
<td>58.3</td>
<td>&lt;0.01</td>
<td>430</td>
</tr>
<tr>
<td>STI test in past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>18</td>
<td>8.6</td>
<td>55</td>
<td>7.5</td>
</tr>
<tr>
<td>Follow Up</td>
<td>20</td>
<td>9.5</td>
<td>0.67</td>
<td>76</td>
</tr>
<tr>
<td>Multiple partners past 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>84</td>
<td>39.8</td>
<td>304</td>
<td>41.4</td>
</tr>
<tr>
<td>Follow Up</td>
<td>72</td>
<td>34.1</td>
<td>0.09</td>
<td>273</td>
</tr>
<tr>
<td>Casual partner/s past 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>113</td>
<td>54.3</td>
<td>400</td>
<td>54.9</td>
</tr>
<tr>
<td>Follow Up</td>
<td>85</td>
<td>40.9</td>
<td>&lt;0.01</td>
<td>317</td>
</tr>
<tr>
<td>Always use condoms with casual partners*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>40</td>
<td>58.0</td>
<td>143</td>
<td>57.0</td>
</tr>
<tr>
<td>Follow Up</td>
<td>47</td>
<td>68.1</td>
<td>0.13</td>
<td>167</td>
</tr>
<tr>
<td>New partner/s past three months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>69</td>
<td>32.9</td>
<td>242</td>
<td>33.0</td>
</tr>
<tr>
<td>Follow Up</td>
<td>49</td>
<td>23.3</td>
<td>0.01</td>
<td>185</td>
</tr>
<tr>
<td>Always use condoms with new partners*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>21</td>
<td>72.4</td>
<td>72</td>
<td>66.1</td>
</tr>
<tr>
<td>Follow Up</td>
<td>15</td>
<td>51.7</td>
<td>0.07</td>
<td>51</td>
</tr>
</tbody>
</table>

* Only includes those with casual or new partners at baseline and follow up

**Discussion**

This project demonstrated that SMS are a feasible, popular and effective method of sexual health promotion to young people with a relatively low withdrawal rate, the demonstrated improvement in sexual health knowledge and STI testing and the positive feedback received.

We successfully enrolled over 1,700 young people from a community venue to receive sexual health related text messages. Over a four month intervention period fewer than twenty percent of those enrolled actively withdrew from receiving the messages. This indicates the success of this approach in retaining an audience over time. With three exceptions,18 19 previous trials of SMS for health promotion have recruited 200 or fewer individuals.20-28
Retention rates in previous trials ranged from 39-100%, 18-28 however most interventions ran for a shorter time period than this project. 18 20 21 23-25 27

There was a significant increase in knowledge in male and female participants after receiving the SMS compared to baseline. Many other approaches, such as sex education and peer-led programs have also led to demonstrated improvements in sexual health knowledge among young people. 29 30 The advantage of using SMS over these approaches is that it is that is very resource efficient to implement, can reach a large number of individuals simultaneously, does not require a physical setting, and requires very little input or disruption to the individual. Additionally, the text messages can, and were, shared with others, furthering their reach and potential impact.

Around 70% of young men and 90% of young women in Australia see a general practitioner each year, 31 yet fewer than eight percent are tested for chlamydia. 11 We observed a significant increase in the proportion reporting a recent STI test after the SMS intervention compared to baseline. Few other interventions have reported increased uptake of STI testing – one multimedia awareness campaign has been shown to have increased testing in Australia 32 while two other studies measuring the use of mass media to promote chlamydia testing resulted in very small numbers being tested for chlamydia. 33 34 Encouraging uptake of chlamydia testing via SMS may be useful in assisting the implementation of a proposed national chlamydia screening program for young people. 35

The findings relating to changes in partner numbers and condom use are somewhat difficult to interpret. The apparent reduction in the number of casual and new sexual partners reported at follow up compared to baseline may reflect seasonal trends in partner numbers due to holiday periods 36 or a chance finding rather than impact of the messages themselves, which did not specifically address partner numbers and STI risk. Alternatively, receiving regular reminders about sexual health, particularly STIs, may act indirectly to prompt individuals to alter their partner seeking behaviour. Similarly the apparent reduction in consistent condom use with new sexual partners, and among females with casual partners, could be a chance finding or may reflect participants believing they have a decreased risk of STIs because they have been tested for an STI or have reduced their partner numbers. Certainly choices and decisions about sexual partners and condom use are complex, and are influenced by many more social and environmental factors than just information and intentions.

This project has some limitations. The response rate to the follow up survey was below 50%, perhaps because we required participants to have internet access and to manually type in the link from the SMS to access the survey (unlike the baseline survey which was completed on-site). The changing modes of data collection may have also influenced results. 37 Those who
were lost to follow up were significantly different to those who completed the follow up survey, which may indicate either differential access or interest in completing the follow up survey and/or differential impact of the intervention. It is possible that this intervention is less effective among certain sub-populations that may be considered harder to reach (i.e. males, those with a lower level of education and those who don’t regularly attend health services). This project was not a randomised controlled trial, and it is possible the observed project outcomes may be due to other factors apart from the SMS intervention, such as ongoing school and media sexual health education and promotion and peer and other social and environmental influences. However the consistent results relating to sexual health knowledge and STI testing with the earlier randomised controlled trial\(^1\) increases confidence that the observed changes were due to the intervention. The question related to STI testing did not specifically exclude pap smears, which may account for the high proportion of females who report having ever had an STI test. Finally, all data was self-reported which may not be accurate.\(^38\)

The major strength of this project was that it was able to confirm the findings of the earlier randomised controlled trial regarding increasing knowledge and health seeking behaviour,\(^1\) but on a larger scale and outside of the artificial parameters of a scientific trial.

Although using SMS for sexual health promotion is unlikely to replace ongoing, more comprehensive sexual health education programs, it appears to be an effective and useful addition to the arsenal to target young people, especially those outside of institutional settings, for sexual health promotion.

**Acknowledgements**

Judy Gold receives funding from the Australian Government through an Australian Postgraduate Award and a Monash University Faculty of Medicine Excellence Award. Megan Lim receives funding from a NH&MRC postdoctoral training fellowship. Jane Hocking receives funding from a NH&MRC career development award. Louise Keogh received funding from a NH&MRC Australian Research Training Fellowship. Margaret Hellard receives funding from the NH&MRC as a senior research fellow. The project was funded by the Windermere Foundation, the Pierce Armstrong Trust and the Burnet Institute.
References


Chapter Four: Understanding the Impact of Health Promotion SMS

Introduction

Although multiple studies of the use of SMS for behavioural interventions have now been reported in the literature, very little is known about how these messages exert their impact. The medium is an extremely short format – maximum 160 characters, including spaces – and it may appear implausible to some that messages in such a concise format are sufficient to encourage meaningful and measurable behaviour change. However recent reviews have found text message interventions do generally have positive impacts on behaviour change, even if the mechanism of action is not well understood.

This chapter presents the qualitative evaluation of the SMS intervention introduced in Chapter Three. This evaluation was conducted using focus group discussions with participants who had received the SMS intervention and completed the follow up survey. Discussions centred on message style, content and delivery, and if and how the messages exerted any impact on knowledge and behaviour. The findings of this paper offer valuable insights for the delivery of future health promotion interventions using text messages.
Declaration for Chapter Four

Monash University

Declaration by candidate

In the case of Chapter Four, the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and management, data collection and analysis, results interpretation, manuscript preparation and review</td>
<td>75%</td>
</tr>
</tbody>
</table>

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
<th>Extent of contribution (%) for student co-authors only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megan Lim</td>
<td>Study design, data collection, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Margaret Hellard</td>
<td>Study design, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Jane Hocking</td>
<td>Study design, data collection, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Louise Keogh</td>
<td>Study design, data collection and analysis, results interpretation, manuscript preparation and review</td>
<td>NA</td>
</tr>
</tbody>
</table>

Candidate’s Signature

Date 29/11/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

<table>
<thead>
<tr>
<th>Location(s)</th>
<th>Centre for Population Health, Burnet Institute</th>
</tr>
</thead>
</table>

<table>
<thead>
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<tr>
<td>Megan Lim</td>
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<tr>
<td>Jane Hocking</td>
<td>2/12/10</td>
</tr>
<tr>
<td>Louise Keogh</td>
<td>29/11/10</td>
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What’s in a Message? Delivering Sexual Health Promotion to Young People in Australia via Text Messaging

Judy Gold¹,², Megan Lim¹, Margaret Hellard¹,²,³, Jane Hocking⁴, Louise Keogh⁴

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2. Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria, Australia
3. The Nossal Institute for Global Health, The University of Melbourne, Melbourne, Victoria, Australia
4. Centre for Women’s Health, Gender and Society, The University of Melbourne, Melbourne, Victoria, Australia
Abstract

Background: Advances in communication technologies have dramatically changed how individuals access information and communicate. Recent studies have found that mobile phone text messages (SMS) can be used successfully for short-term behaviour change. However there is no published information examining the acceptability, utility and efficacy of different characteristics of health promotion SMS. This paper presents the results of evaluation focus groups among participants who received twelve sexual health related SMS as part of a study examining the impact of text messaging for sexual health promotion to on young people in Victoria, Australia.

Methods: Eight gender-segregated focus groups were held with 21 males and 22 females in August 2008. Transcripts of audio recordings were analysed using thematic analysis. Data were coded under one or more themes.

Results: Text messages were viewed as an acceptable and ‘personal’ means of health promotion, with participants particularly valuing the informal language. There was a preference for messages that were positive, relevant and short and for messages to cover a variety of topics. Participants were more likely to remember and share messages that were funny, rhymed and/or tied into particular annual events. The message broadcasting, generally fortnightly on Friday afternoons, was viewed as appropriate. Participants said the messages provided new information, a reminder of existing information and reduced apprehension about testing for sexually transmitted infections.

Conclusions: Mobile phones, in particular SMS, offer health promoters an exciting opportunity to engage personally with a huge number of individuals for low cost. The key elements emerging from this evaluation, such as message style, language and broadcast schedule are directly relevant to future studies using SMS for health promotion, as well as for future health promotion interventions in other mediums that require short formats, such as social networking sites.
Introduction

Over the past two decades communication has changed beyond imagination. Mobile phones, portable computing devices and the internet have all become widely accessible and provide entirely new avenues to access information, connect, and communicate regardless of geographic location. This rapid change in communications can be understood using Giddens’s notion of the ‘discontinuities of modernity’; contemporary society is characterised by the rapid pace and scope of change and changing nature of modern institutions. Alongside these discontinuities, Giddens identifies reflexivity as a key feature of modern life. The proliferation of modes and speed of communication and the reflexivity of knowledge all have important implications for health promotion. Individuals continually examine and change their practices in light of incoming information from a variety of sources. How best to present and deliver information in this rapidly changing environment is a key challenge for health promoters.

As the use of newer communication technologies continues to exponentially increase, health promotion will inevitably expand out from the ‘old’ media (TV, radio, billboards) and into the ‘new’ (mobile telephones, social networking sites). Text messages (SMS) are a highly promising method of health promotion for multiple reasons. They are widely available and accessible; in 2009 it was estimated that there were 3.6 billion global users of SMS, double the number of internet users. Most mobile phone users have their phones turned on, and in reach, during waking hours. Messages can be sent to multiple recipients simultaneously and are delivered immediately. The delivery of messages to individuals can be tracked and is guaranteed, and the cost of sending messages is relatively low (generally less than USD 20 cents per message). Using SMS for health promotion is particularly appealing for reaching healthy individuals not regularly in contact with health services, and for behaviours that may be socially sensitive, as they offer a confidential, non-confrontational means of communication.

Recent reviews have concluded that SMS can be used successfully to promote behaviour change in the short term (one year or less) for several behaviours, including smoking, diet and physical activity. Behaviour change interventions using SMS have generally provided participants with information and reminders relevant to the behaviour of interest. Approaches to designing and delivering the text messages include relatively simple systems, where the same message is sent out to each participant, as well as systems where broadcasts are individually tailored to participants characteristics and preferences, whether they reply to messages or both. A recent review identified the lack of knowledge about optimising and enhancing the use of SMS for health behaviour change interventions. As text messages
become more widely used for health promotion it is critical to understand what characteristics affect the acceptability, utility and efficacy of messages.

A randomised controlled trial we conducted in 2006-2007 found those receiving SMS and email messages about sexual health improved their knowledge, and that females receiving messages were more likely to seek a test for sexually transmitted infections (STIs) than those who did not receive any messages.\(^8\) Subsequently, we scaled up this approach in the “SMS 2008 project” to determine the impact of using SMS on a population level on sexual health knowledge and behaviour using a pre and post evaluation design. The SMS 2008 project targeted young people aged 16 to 29 years recruited at a music festival in Melbourne, Australia; participants (n=1,771) received fortnightly SMS relating to sexual health for four months.\(^17\) The quantitative evaluation of the project found a significant improvement in sexual health knowledge and an increase in the proportion tested for STIs after receiving the messages.\(^17\) Here we present the results of the focus group evaluation, designed to examine the characteristics of the messages that affected acceptability and efficacy of the messages in promoting behaviour change.

**Methods**

**Recruitment**

All participants in the SMS 2008 project were aged 16 to 29 years when enrolled at baseline in January 2008. The twelve messages that formed the SMS intervention were broadcast in February to July 2008 (Table One). At the conclusion of the broadcasts participants were asked to complete an online follow up survey to evaluate the intervention.

Those who completed the online follow up survey (n=676) were asked if they consented to be contacted for future evaluation of the project. From the 676, 369 (55%) consented to be contacted. Selection criteria for the focus groups was being aged 16 to 24 years, the age group for which the intervention was most relevant; we aimed to recruit an equal number of males and females. Among the 289 16-24 year olds who had consented to be contacted, we attempted to contact 162 (56%) and successfully contacted 141 (49%); the remaining individuals were not contacted as sufficient participants had been recruited for the eight focus groups planned.
Table One: Text Messages Broadcast

<table>
<thead>
<tr>
<th>Broadcast Date</th>
<th>Message Text</th>
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</thead>
<tbody>
<tr>
<td>1^ Friday, 1 February 2008</td>
<td>Big Day Out! Big Night In? Forgot to use your free condoms? Speak to your doctor about a chlamydia test. Love from the Burnet Institute</td>
</tr>
<tr>
<td>2 Thursday, 14 February 2008 (Valentine’s Day)</td>
<td>Roses are red, daisies are white, use a condom if you get lucky tonight. Happy Valentines Day! Love the Burnet Institute</td>
</tr>
<tr>
<td>3 Friday, 29 February 2008 (Leap year)</td>
<td>Unlike February the 29th, having chlamydia is common. More than 50,000 Australians were diagnosed with chlamydia last year. Love the Burnet Institute</td>
</tr>
<tr>
<td>4 Friday, 17 March 2008 (Easter long weekend*)</td>
<td>Protect your or your partners eggs this Easter with a condom. Chlamydia can cause infertility. Enjoy the long weekend! Burnet Institute</td>
</tr>
<tr>
<td>5 Tuesday, 1 April 2008 (April Fools Day)</td>
<td>Don't be fooled, chlamydia testing and treatment is easy. Its just a pee and a pill, see your doctor today. Love the Burnet Institute</td>
</tr>
<tr>
<td>6 Thursday, 10 April 2008 (End of daylight savings*)</td>
<td>Change your clocks, change your smoke detector battery. Change your partner, get an STI test. Love the Burnet Institute</td>
</tr>
<tr>
<td>7^ Tuesday, 29 April 2008</td>
<td>I know ur hurting, feels like ur burning - but maybe not? Don't be the Biggest Loser! Most STIs have NO symptoms, only way to know is to get tested.</td>
</tr>
<tr>
<td>8 Friday, 9 May 2008 (Mother’s Day)</td>
<td>Spare a thought for condoms this Sunday, they can help you have babies too (chlamydia causes infertility). Burnet Institute PS Don't forget to call your mum</td>
</tr>
<tr>
<td>9 Friday, 23 May 2008</td>
<td>Well before the Big Day Out, its time to clear chlamydia out. Pap smears and blood tests are not the go, you need to pee in order to know. Burnet Institute</td>
</tr>
<tr>
<td>10 Friday, 6 June 2008</td>
<td>Chlamydia: hard to spell, easy to catch. Use a condom! Burnet Institute</td>
</tr>
<tr>
<td>11 Friday, 20 June 2008</td>
<td>Why did the chicken cross the road? Coz it realised a pap smear or a blood test didnt test it for chlamydia. Urine samples are the best chlamydia test.</td>
</tr>
<tr>
<td>12 Friday, 4 July 2008</td>
<td>Get those dancing shoes on, it takes two to tango! Pill for pregnancy, condoms for chlamydia. Last SMS from us but stay tuned for survey and prizes next week…</td>
</tr>
</tbody>
</table>

^ This message refers to the Big Day Out music festival where participants received free condoms and were recruited for the study

* These were broadcast in advance of the event itself

^ This message is a play on a well known Australian ad with the slogan “change your clocks, change your smoke alarm battery”

# This messages plays on the theme song of the television show “The Biggest Loser”, popular at the time
Data Collection

Focus groups were held in private meeting rooms at one urban and one regional site (Melbourne and Ballarat) and lasted no more than one hour. To encourage full participation, separate groups were held for males and females. Participants were provided with a participant information and consent form and were required to read and sign the consent form before the discussion commenced. Participants were provided with refreshments during the focus group, were reimbursed AUD $30 (USD $25) for their time and travelling expenses and sexual health information and condoms were distributed at the conclusion of the discussion. All discussions were audio recorded.

A focus group schedule was developed to determine what participants thought of the messages, and what, if any, impact the messages had on their sexual health knowledge and behaviour. Participants were asked what they thought of the messages in general, and of each message individually. Participants were prompted to comment on what they liked and disliked about the messages, and which messages they remembered receiving and why. They were also asked whether or not they thought the information contained within the message was important and if the messages had any impact on their sexual health knowledge and behaviour. Finally, participants were asked to comment on what could be improved for a similar project in the future, both in terms of the content and format of the messages themselves, and the broadcasting schedule. The same questions were asked at each focus group, although the order of the questions, and the specific wording of the questions, varied slightly from group to group.

Author JG facilitated all the focus groups, with another author (ML, JH or LK) also in attendance at each group.

Data Management & Analysis

Audio recordings were transcribed verbatim, with names replaced with pseudonyms to protect confidentiality. Transcripts were imported into NVivo 8 for coding and analysis.\(^{18}\) Transcripts were read and reviewed multiple times by author JG before analysis commenced. Thematic analysis was used, with data coded under one or more themes. The themes were pre-existing from the focus group schedule, with new themes identified and added during the analysis. Data was scrutinized for differences and similarities within themes.\(^{19}\)

An iterative analysis process was used, with author JG performing the coding, discussing the coding with author LK and then refining as necessary. Illustrative quotations for each theme were selected by authors JG and LK. Responses from male and female focus groups were
generally similar; any differences found by gender are specifically noted. All names included in this manuscript are pseudonyms.

Ethics

Approval for the evaluation focus groups was sought and granted from the Alfred Hospital Human Ethics Committee (located in Melbourne, Australia).

Results

The main themes emerging from the focus groups are presented in Table Two.

Table Two: Key Themes

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<td><strong>Theme One: Information</strong></td>
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Participation

Among the 141 individuals successfully contacted, 108 (77%) were interested in participating in a focus group. There was no significant difference by gender or region of residence for expressing interest in participating (data not shown). Forty three individuals, 21 males and 22 females aged 16 between 24 years, attended one of the eight focus groups held in August.
2008. The size of each focus group conducted ranged from four to seven participants. Six focus group discussions were held in central Melbourne, and two in Ballarat, a large regional centre.

**Message Style, Content & Delivery**

When participants were asked what they thought of the messages in general, a number of participants commented that they liked receiving the messages. Although not asked directly, several participants said they like receiving health promotion messages via SMS, as it felt more personal and informal than receiving messages in other forms.

> It’s different ... It’s a new take on rather than sort of seeing sort of posters or billboards like everywhere, bombarding you ... because it’s in a text, more personal. (Rick, 22 years)

> And especially because it was being told to you over SMS it like made it...made it more casual, it wasn’t a doctor or a teacher. (Christina, 17 years)

The remaining comments related to the messages could be categorised into the following four broad themes: message style, language, content and broadcast schedule.

**Theme One: Style**

While discussing the messages overall, and individual messages specifically, a number of elements related to the style of the messages emerged in all focus groups. These included the use of humour and rhyming the messages, the variety and length of the messages, tie in with events and the ‘sign off’ used.

**Humour and Rhyming**

When responding to what they liked about the messages, participants in all focus groups commented how the humour and rhyming in the messages made them more likely to pay attention to the message and to remember the message and its contents.

> It was sort of like, I’d open it and I’d be like, I really don’t care about sexual education at the moment, but because it was funny, it just sort of stuck anyway and it’s like, information gets through. (Pete, 17 years)

> The ones that rhymed are really easy to remember (Tracy, 17 years)

**Variety**

Some participants noted they liked the variety in the messages sent, in particular the balance between information and humour.
.. That what was really good about the SMS thing. There were some that, like the 50,000 Australians every year, wow that’s a lot of people you know, and you might not even know about it. And then there were other ones that were just really lighthearted, “hey you know, remember to use a condom” sort of thing. So it was a good balance.

(Natalie, 18 years)

**Message Length**

Messages varied in length from 71 characters to 160 characters, the maximum allowed in the SMS format. There was no direct question about message length, but a number of comments emerged related to length when reviewing individual messages.

Many participants liked the shorter messages, finding them more straightforward and easier to remember.

[Re Message 10] I, I reckon it’s just good because it’s just short, sharp. (Luke, 18 years)

Opinions varied about the longer messages – some liked them and acknowledged the need for the extra length, whereas others found them too long which lessened their impact.

Tracy (17 years): Like short and to the point

Christina (17 years): Its easy to remember...

Meg (16 years): Still, some of the long messages are like, very effective though. It’s a mixture...

**Event Tie In**

Participants in all eight focus groups commented that they liked that some of the messages tied into particular annual events, such as Valentine’s Day and Easter, and tended to remember these messages the most.

...because you can associate it with something I think it’s just more memorable. (Luke, 18 years)

**Sign Off**

When reviewing the individual messages, a number of participants commented they found the sign off of many of the messages “Love the Burnet Institute” made the messages more personal, and gave the message credibility.

I know it was good they all ended with “Love from the Burnet Institute” rather than just a random message because otherwise I would have wondered “Who the hell is this??!”

(Natalie, 18 years)
Theme Two: Language

Along with style, language was another theme that emerged from all groups when reviewing the messages. Most prominent were comments related to the informality of the language use, the positive framing of the messages and the use of indirect versus direct language. Other elements of language that were commented on included the use of ‘fear factor’ and statistics.

Informal

Many participants commented they liked the informal language used in the message, which resonated with them.

Natalie (18 years): Its not like one of those things the teachers say “When you are having intercourse make sure...” its “If you get lucky...” [laughs]

Belinda (20 years): Its more like our language, than our teachers language in a way

However some participants thought the combination of informal language and serious content wasn’t appropriate.

[Re Message Four]

Barry (20 years): I don’t like the bit about the long weekend afterwards ... have a nice weekend. It’s putting a dampener on things

Mark (24 years): I think it’s, it’s too far. Like it’s too laid back to the point of this isn’t a serious issue.

Positive

Another recurring sentiment that emerged while reviewing the messages was the positive angle of the messages, which was liked by a number of participants.

.....it’s not like, “use a condom or you’re going to die!”, it’s like, “hey if you’re lucky enough to get sex, why don’t you use a condom?!” (Kate, 17 years)

Indirect vs. Direct

A third recurring emerging sentiment related to the use of indirect or direct language. Some participants felt the messages were quite indirect, and liked this.

Its not telling you to do something, its kind of like you want to do something. (Sarah, 20 years)

Other participants found the messages quite direct.

It was like every message accused you of having chlamydia [laughter] (Mick, 23 years)
However there was a sense that the directness could be interpreted as positive or negative – some liked it, and thought this approach would act as a good motivation, while others thought it could be seen as offensive.

[Re Message Six] Change your partner...it makes it sound like changing your partner is an everyday kind of thing... It’s amusing.....[but] some people would probably get offended by that. (Kenny, 18 years)

Fear Factor

In one focus group there was a lot of discussion about mixing the informality of the language with an element of ‘fear’ to prompt action, and whether this was effective or not.

I think its really difficult, because one of the best ways to get through to people is through fear.... ....but, I mean saying “you could become infertile” is not going to make people want to go out and find out if they’ve got chlamydia. But at the same time, if you say “its not really that big a deal, you know, its easy to treat” well then they are going to go “well don’t worry about it”. Yeah, so its difficult either way (Natalie, 18 years)

Others though the use of fear wouldn’t be effective.

And its kind of one of those things you know, all those ads that just say all those statistics and try to scare you and just like yeah, whatever, I can’t be bothered (Rebecca, 18 years)

Use of Statistics

Only message three included a statistic. When reviewing this message, opinions varied greatly as to whether this was effective to include. Some found the statistic impressive and important to include.

[Re Message Three] I reckon it’s a good one ... it kind of does suggest that a lot of people do have it, so you might want to be a bit careful (Kate, 17 years)

Others didn’t like the use of the statistic, finding it boring, not memorable and not relevant personally.

That’s like the Easter one, protect you and your partners eggs. It was like, it was hitting home, look after yourself rather then all that 50,000 Australians, I don’t know them! [laughter] (Michalea, 22 years)

When asked how the messages could be improved, participants in three of the focus groups specifically nominated making the messages more personal, rather than the more generic statistics, and that this would have a bigger impact.
Maybe make them more personal to you, like if in the message if it says something like, I dunno, like it said think about 10 of your friends, one of you will get chlamydia, you’re going to remember it. (Meg, 16 years)

Theme Three: Content

Comments related to message content emerged both out of direct questioning related to opinions of the overall content of the messages, as well as during review of the individual messages. The strongest theme to emerge related to content was repetition, specifically the focus of many of the messages on chlamydia. Other elements related to content include content relevance, ease of understanding, and the ‘different’ take of one particular message.

Repetition

A few male participants remarked they found the messages repetitive.

Ben (18 years): Yeah with the repetitive thing it sort of, I mean, like, sort of got bit old, just the way there wasn’t really anything new to it.

Participants in all focus groups commented there was too much focus on chlamydia in the messages. This repetition made them pay less attention to the message content, and it would be more effective to include information about a wider range of topics in the future.

I think, look so many were just about chlamydia, I think if they had different information every time, quite clearly different, then I reckon it would have been more, like less annoying, because it was new (Jim, 17 years)

However others thought that the repeated focus on chlamydia was effective in building their knowledge about the infection.

I don’t think necessarily it was too much [focus on chlamydia]. Like I feel like I know a fair bit about--now you know (Rob, 19 years)

Relevance

Some participants reported they found the messages very relevant to themselves and their peers.

Yeah, I think they, I think they were on the money ... geared towards the age that you’re working towards. Like I think they were pretty accurate and resonated with everyone (Luke, 18 years)
Others remarked they didn’t think the messages were relevant to everyone, and this may have affected how they reacted to the messages.

> Oh, I was aware that there was a lot of sort of illnesses and that sort of thing which there aren’t any symptoms for um, I’m pretty confident that I wouldn’t be affected at the moment so I’ve got nothing to worry about personally. And then, I suppose, in that case I haven’t taken as much notice to these messages. (Paul, 20 years)

**Ease of Understanding**

When reviewing the individual messages, a number of participants commented they found some of the messages hard to understand, which reduced their effectiveness.

> There were some that were okay but then ... there was a few that I found that were a bit round about. Um, I wasn’t--they were a bit hard to follow. (Carol, 22 years)

**Different**

A few participants commented that they liked, and specifically remembered, the mother’s day message that had a different take on condoms from the ‘standard’ health promotion messages.

> [Re Message Eight] Yeah and I like the way that one makes you think because it turns it around, saying condoms can help you have kids. Because normally it’s just like, you wear a condom, you don’t want to have kids kind of thing. (Kate, 17 years)

**Theme Four: Broadcast Schedule**

Participants were asked to comment when and how often they recalled the messages coming, whether this was appropriate, and if and how this should be changed in the future. SMS were always sent in the afternoon, generally either on Friday’s, or the day of a particular event (e.g. on Valentine’s Day). Messages were broadcast approximately fortnightly (Table One).

**Message Timing**

Many participants recalled that most messages came on Friday afternoons, and thought that this was an appropriate time.

> Mark (24 years): Friday afternoon seems to work because it’s like, you know, easing into the weekend.

> Paul (20 years): Yeah, you’re in a good mood anyway.

Some participants didn’t particularly notice when the messages were arriving, and liked this.
If you had recorded dates it would have been boring. Because like it could be any time of day and I’d just be like, hey! (Bec, 18 years)

In terms of alternate times for message broadcasts, several participants suggested it would be beneficial to have messages sent ‘after the fact’ (on weekend mornings or Monday’s). However others thought this wouldn’t be an effective strategy.

**Message Frequency**

When prompted, the majority of participants recalled the messages as coming approximately monthly (not fortnightly), but felt the frequency was appropriate.

*And they were nicely spread, it wasn’t like, you know, all the time, like bombarding.*

*That would have got annoying (Karen, 18 years)*

A minority of male participants felt the messages came too frequently, and became too routine.

*Yeah, but like toward--like, you know, it started being a routine thing. You’re like, you know, they should be messaging me pretty soon about this. And then you do and you’re like oh, yeah. So I think that could be why. It became a bit routine. (Josh, 23 years)*

**Impact of the Messages**

As well as gaining an understanding of what characteristics of the messages participants liked, the focus group discussions were also structured to examine if and how the messages had an effect on participants knowledge and behaviour as has been demonstrated by quantitative findings. Given the group setting, we did not require participants to detail exactly how the messages impacted them (if at all), however a number of participants volunteered how they perceived the messages affected them.

The impact of the messages was broadly categorised into information and behaviour change, as well as sharing the messages with others.

**Theme One: Information**

Information emerged as a key impact of the messages, both the provision of new and specific information and a reminder of information already known to participants.

**New and Specific Information.**

Participants in all focus groups commented they learnt new information from the messages, particularly about chlamydia causing infertility, and often not having any symptoms. Some
remarked they liked how the SMS gave them specific information, particularly about STI transmission and methods of STI testing, that they didn’t know previously.

*Another one I remember was like... to protect you from being able to have children in the future or something. That was actually new to me.* (Pete, 17 years)

*... the bits about the chlamydia testing and everything, I had no idea how it got tested or anything like that.* (Tracy, 17 years)

Highlighting the value of the messages even further, several participants thought that they wouldn’t have found out the information that was new to them in other ways.

*Like it’s not kind of information you really get um, through other sources really* (Freddy, 20 years)

**Reminder**

Alongside new information, participants in all focus groups also reported that some messages acted as a reminder them of things they already knew.

*Yeah.... I don’t know how much of it was new information. It was like, jogging my memory sort of* (Pete, 17 years)

Several participants commented they didn’t mind being reminded of information they already knew.

*It was like, some of it was stuff you already knew but it was like, cause they were funny, they weren’t like up in your face kind of thing, it was just a reminder* (Kate, 17 years)

One participant thought being reminded about information was really useful.

*... it’s kind of like you need to be reminded... Because there’s knowing something and then being reminded about it as well.* (Manisha, 22 years)

A number of participants commented the information they were reminded about was information they had originally learnt in school.

*I think I did [know chlamydia causes infertility]. I think we did get taught something like that in school but like you don’t really listen much in school, it all kind of blurs together* (Christina, 17 years)
Theme Two: Behaviour Change

Alongside provision of information, the messages aimed primarily to change two key behaviours; 1) encourage uptake of STI testing and 2) reinforce consistent condom use. Participants generally viewed the messages as having no direct impact on their behaviour, but may have had indirect effects, such as reducing apprehension of STI testing and causing them to consider their risk of contracting an STI.

No Direct Effect

Many participants stated they didn’t think the messages had a direct effect on their behaviour related to STI testing or condom use, especially if they thought they already were doing the things they should already.

Yeah, I was--I don’t think I like I particularly thought I better put on a condom because of those messages. (Luke, 18 years)

Um...I haven’t really changed anything because pretty much everything that I learnt from the SMS I sort of already know before and taken whatever measures, things like that. (Natalie, 18 years)

However a number of participants thought the messages may have had indirect effects, particularly in keeping sexual health ‘up in their mind’.

....it was regular, it kept me on my toes a bit, because if you don’t have that....I mean you don’t see billboards of it so if you don’t hear it from your mum, you just don’t hear it. (Steph, 21 years)

When asked to reflect what had directly caused behaviour change in the past, participants in all groups described the impact of a crisis situation that had occurred, either to themselves or to a friend.

...I’ve had like little scares along the way which have made me go “I really need to use more condoms, this is ridiculous” (Belinda, 20 years)

... a friend of mine thought she was pregnant for like, for a while and that sort of like shocked her into being more careful. Whereas, you know, a cute SMS will never, can never really have the same impact (Chris, 20 years)

Perceptions of STI testing

Participants in almost all focus groups remarked how the messages made them less apprehensive about STI testing, particularly with the (new) knowledge that it didn’t have to involve an invasive procedure.
... a lot of people when they like talk about STI testing, it’s like, you know only at doctors, it’s a big deal and you’ve got to feel embarrassed about doing it and the SMSs kind of put into context that it’s not actually a stupid thing to do.....I haven’t had one, but it made it seem a lot more easier to get one (Tracy, 17 years)

...I thought it was going to be the whole drop your daks* and everything, like yeah. If it’s just a urine sample and a blood test then that’s alright. (Bruce, 18 years) *pants

A few participants stated it made them consider getting an STI test, although they didn’t necessarily go and get one.

Like think about it, like, “oh maybe I should get an STI test”, eventually. (Brett, 17 years)

Consider Risk

A few participants felt that the information in some of the messages made them consider their risk of having an STI.

.. it makes you feel that you, that everybody could um, sort of have something in a way. Because usually you just assume that you don’t have something because you, you feel okay or whatever. (Josh, 23 years)

Theme Three: Spreading the Word

Participants were asked if they shared the messages with others, whether by showing them the text or forwarding them on. Most had shared the messages, mainly with friends, family members and workmates. One participant did not show the messages to others, apart from a friend who also received the messages.

When and Why

Participants reported they were most likely to show other people the message if there were others around when they received the message, or if they found the message funny. A couple of females reported they also passed messages onto others when it was relevant to those individuals.

.... there was one that was really really funny and like I showed it to my friend and told him it was a joke but it was kind of like....it like jokingly like suited him in a way! [laughter] I told him like “someone sent me a message for you!” (Karen, 18 years)

In one focus group there was some discussion about it being easier to share messages that were linked into an event, because it gave a reason to pass the message on without risking accusing or offending individuals.
....it gives you a reason to pass it on because [it’s] like an Easter greeting or a Valentines Day greeting (Mainisha, 22 years)

Reactions

Reactions from others were generally positive, although participants often needed to explain why they were receiving these messages.

They [people I work with] liked them. And they were like “how do you get these” and you have to like explain “I did this survey, and la la la” (Jess, 17 years)

Some participants commented they thought that reading out the messages to others help to reinforce the content within the message.

Samuel (17 years): ..... you read them out to your friends and not only do you get the message across when you read out the message but then they ask you more about it ...

...

Luke (18 years): And because, because you read it aloud you I think you remember it a lot more as well.

Discussion

Although a number of studies using SMS for health promotion have been published to date,6-16 this is the first evaluation to systematically examine how the characteristics of text messages influence the acceptability and efficacy of such interventions. As text messages continue to be used not only for health promotion, but also for other health-related functions such as disease self-management, appointment reminders, results of diagnostic testing and partner notification,3 20 it is critical to understand the factors that influence such intervention’s success. Beyond SMS, understanding these factors is also relevant to other areas that could be exploited for health promotion purposes, such as updates on social networking sites, where concise formats are also required.

A clear finding from this evaluation was that the text messages were able to engage this group of young people for a subject area that is often viewed as ‘sensitive’ or ‘personal’. The use of the SMS medium itself for health promotion was accepted, and was seen as being more personal than other approaches, particularly with the ‘sign off’ used.

However, this is a sophisticated and demanding audience— individuals wanted messages that were engaging, different, positive, contained a message relevant to them and were received at the right day and time. When these expectations were met, interest in the messages was high, and the messages were likely to be shared with others. If messages were deemed to be boring,
too long, repetitive, use inappropriate language, or provide nothing new, they were ignored. Consistent with Giddens’s ‘reflexivity of knowledge’, participants were able to reflect on traditional health promotion strategies used to promote behaviour change, such as the use of fear, statistics and direct language and were able to see both the potential and drawbacks of these approaches. In a modern world where individuals are constantly exposed to a huge range of media, and are continually processing large amounts of information, sophisticated reflection on health messages presents a huge challenge for health promotion messages.

The quantitative findings from this study indicated a significant increase in knowledge after receiving the messages; this finding was echoed in the focus groups with participants reporting obtaining new and specific information, as well as being reminded of information they already knew. The ‘sign off’ on the message gave the message credibility, increasing participant’s trust of the information. In turn, this trust may increase the likelihood the information will be viewed favourably.

The reminding potential of SMS has been discussed previously where SMS has been used for appointment and medication reminders. However this reminding function has also been seen as useful for health promotion related to smoking cessation and may be more widely applicable to other behaviours. Reminders trigger individuals to think about potentially important topics that they might not otherwise consciously consider, or only consider at certain times, such as during a crisis. However the challenge is to find a way to provide a reminder that individuals want to receive, without being seen as repetitive, annoying or ‘nagging’ which will make them be less likely to a) pay attention to the message and b) continue to subscribe to receive the messages.

It appeared that participants did not believe the messages had any direct effects on their behaviour, but that the messages may have had some indirect effects. Most prominent was the changed perception of STI testing, with participants in almost all groups reporting they were now much less apprehensive about testing knowing that it was relatively easy and painless. This finding is consistent with previous work suggesting knowing STI testing is easy promotes screening uptake, while fear and anxiety about testing and testing being seen as difficult discourages uptake. In addition, some participants reported the messages made them consider their risk of STIs, which is encouraging given young people are reported to underestimate their risk of infection. The significant increase in STI testing observed in the quantitative evaluation of this project, as well as our previous randomised controlled trial, suggests that these perceived ‘indirect’ effects may have indeed had a direct effect, even without the messages providing direct referrals to clinical services.
Taken together, these findings suggest several elements need to be incorporated into short format health promotion messages to maximise the likelihood of behaviour change. All messages need to be novel or engaging (in both style or content) to ensure attention is given to them, and the individual needs to believe the sender of the message is a credible source of information. A balance between ‘new’ and ‘reminding’ content is required to ensure that content is delivered, but the messages are not viewed as repetitive and dismissed. The timing of message broadcast should be designed to be both acceptable to participants as well as relevant to the information provided within the messages.

This study has some limitations. Participants who were recruited to the focus groups had not unsubscribed from the messages, completed the online follow up survey and consented to be contacted again. Thus they may not be representative of all individuals who received the messages and there may be some bias in their responses, such as preferring our message style. Participants who preferred other styles of messages may have been less likely to be retained within the study and less likely to participate in the focus groups. The researchers conducting the focus groups and analysing the data were also involved in developing and delivering the intervention; this may have introduced some bias into the discussion or analysis. However participants were instructed at the outset of the discussion that we wished to receive all feedback (both positive and negative) and were repeatedly prompted to provide negative, as well as positive, feedback. Additionally, the group setting may have limited disclosure of any effects the messages may have had on behaviour change, as well as criticism of the messages (although negative feedback was actively encouraged).

**Conclusions**

Mobile phones, in particular SMS, offer health promoters an exciting opportunity to engage personally with a huge number of individuals for low cost. This evaluation is the first to examine the characteristics of text messages that determine their acceptability and efficacy in promoting behaviour change. The key elements emerging, such as message style, language and broadcast schedule, are directly relevant to future studies using SMS for health promotion, as well as for future health promotion interventions in other ‘new technology’ mediums.
Acknowledgements

Judy Gold received funding from the Australian Government through an Australian Postgraduate Award and a Monash University Faculty of Medicine Excellence Award. Megan Lim received funding from a NH&MRC postdoctoral training fellowship. Margaret Hellard received funding from the NH&MRC as a senior research fellow. Jane Hocking received funding from a NH&MRC career development award. Louise Keogh received funding from NH&MRC Australian Research training Fellowship. The project was funded by the Windermere Foundation, the Pierce Armstrong Trust and the Burnet Institute. The funding bodies were not involved in study design, data collection or analysis, manuscript preparation or the decision to submit the manuscript for publication.
References


Chapter Five: Scaling Up the Delivery of Health Promotion SMS

Introduction

Although the success of SMS for sexual health promotion had been established in the pilot randomised controlled trial,²⁶⁷ and the SMS project described in Chapter Three and Four, these interventions still relied on the individual recruitment, and manual enrolment, of individuals. Although this approach has been used for all previous published trials of SMS for behavioural health interventions,²⁴¹⁻²⁵² ²⁶⁷ ³⁶³ it can become quite resource intensive, especially if text messages are to be used for health promotion interventions targeting entire populations.

This chapter describes an alternative approach to recruiting individuals, using a commercial telecommunications provider. This provider offers a mobile advertising service, whereby individuals have ‘opted in’ to receive advertising SMS and MMS messages to their mobile phones, in return for reduced cost mobile services. In terms of health promotion, this is analogous to purchasing ‘advertising space’ in traditional media channels, such as TV and radio. A key advantage of mobile advertising is that messages can be delivered to the target group of interest, in this case, young people aged 16 to 29 years residing in Victoria.

This chapter also describes a novel evaluation design. The project was designed as a randomised controlled trial with simultaneous SMS interventions to assess the utility of the use of SMS for both safer sex and sun safety behaviour change. Data collection for the evaluation was conducted entirely via mobile phones.

Two manuscripts relating to this SMS intervention using mobile advertising are presented in this chapter. The first manuscript presents the quantitative impact evaluation of the intervention, while the second describes some of the challenges encountered when working with the commercial telecommunications provider.
## Declaration for Chapter Five

### Monash University

#### Declaration by candidate

In the case of Chapter Five, the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
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<tr>
<td>Study design and management, data collection and analysis, results interpretation, manuscript preparation and review</td>
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The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
<th>Extent of contribution (%) for student co-authors only</th>
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<tbody>
<tr>
<td>Campbell Aitken</td>
<td>Study design, data analysis, results interpretation, manuscript preparation and review</td>
<td>NA</td>
</tr>
<tr>
<td>Helen Dixon</td>
<td>Study design, data collection, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Megan Lim</td>
<td>Study design, results interpretation, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Maelenn Gouillou</td>
<td>Data analysis, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Tim Spelman</td>
<td>Data analysis, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Melanie Wakefield</td>
<td>Study design, results interpretation, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Margaret Hellard</td>
<td>Study design, data analysis, results interpretation, manuscript review</td>
<td>NA</td>
</tr>
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</table>

Candidate’s Signature: [Signature]

Date: 29/11/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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**Signatures**

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<td>Margaret Hellard</td>
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A Randomised Controlled Trial Using Mobile Advertising to Promote Safer Sex and Sun Safety to Young People

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Abstract

Mobile phone text messages (SMS) are a promising method of health promotion, but a simple and cost-effective way to obtain phone numbers is required to reach a wide population. We conducted a randomised controlled trial with simultaneous treatments to a) test the use of mobile advertising for health promotion and b) evaluate effectiveness of messages related to safer sex and sun safety. Mobile advertising subscribers aged 16-29 years residing in Victoria, Australia (n=7606) were randomised to the ‘sex’ or ‘sun’ group and received eight messages during the 2008-2009 summer period. Changes in sex- and sun-related knowledge and behaviour were measured by questionnaires completed on mobile phones. At follow-up, the sex group had significantly higher sexual health knowledge and fewer sexual partners than the sun group. The sun group had no change in hat-wearing frequency, compared to a significant decline in hat-wearing frequency in the sex group. This is the first study of mobile advertising for health promotion, which can successfully reach most young people. Challenges experienced with project implementation and evaluation should be considered as new technological approaches to health promotion continue to be expanded.
Introduction

Short message service (SMS) – text messages sent via mobile phones - is a highly promising method of health promotion to young people. Young people aged 16-30 years have the highest rate of mobile phone ownership.\(^1\) Mobile phones are usually turned on and within reach during waking hours, if not 24 hours a day.\(^1\) Advantages of using SMS for health promotion include the low message cost, and the ability to send messages to multiple recipients simultaneously with immediate delivery.\(^2\) Multimedia message service (MMS), which allow transfer of image, video, audio and text, may also be a useful tool for health promotion.

The access, speed, and low cost of SMS have led to a variety of health-related applications including appointment, vaccination and medication reminders, disease self-management, diagnostic testing and results and health promotion interventions.\(^3-6\) Health promotion SMS interventions for behaviour change have addressed smoking cessation,\(^7-9\) physical activity,\(^10-13\) weight loss and weight management,\(^14-16\), sexual health,\(^17,18\), sunscreen use\(^19\) and vitamin adherence,\(^20\) most report positive behavioural change attributable to the SMS.\(^7 \, 9 \, 10 \, 12-19\) The only published meta-analysis of using SMS for health promotion found text message programs resulted in a significant increase in self-reported smoking cessation in the short term.\(^21\) All published trials using SMS for health promotion to date rely on volunteers recruited individually, through community advertising or clinical sites,\(^7-20\) which can be time-consuming, costly and inefficient. If SMS is to be scaled up for mainstream health promotion – particularly for behaviours that do not provide individuals with an immediate benefit of change (unlike, for instance, smoking cessation) – a simple and cost-effective method of obtaining a large number of mobile phone numbers is required.

Mobile advertising (advertising delivered directly to mobile phones) offers a novel way to reach a potentially huge number of individuals. The mobile advertising market is growing rapidly, with an estimated increase in market size of 85% in 2009 alone.\(^1\) A British survey of 1500 young people aged 11-20 years found only one-third (32%) were happy to receive advertising on mobile phones – but 71% were happy to receive advertising targeted to their interests, 76% were happy to receive advertising in exchange for discounts or special offers and 82% were happy to receive advertising in exchange for top-up credit.\(^22\) To date, no studies have been conducted that utilise mobile advertising to reach individuals to promote health-related behaviour change.

In this article, we describe a study of the use of SMS for health promotion at a population level. The S\(^5\) (SMS for safer sex and sun safety) project was designed as a randomised
controlled trial with simultaneous treatments aiming to improve behaviours around safer sex and sun safety in young people. These behaviours were targeted as young people frequently report exposures (multiple sexual partners, inconsistent condom use, infrequent use of sun protection measures\(^{23}\) \(^{24}\)) that place them at risk of significant long term consequences (infertility as a result of chlamydia infection, melanoma).\(^{25}\)\(^{26}\)

At the time of study conception, the only SMS studies addressing safer sex and sun safety issues were the SEXINFO service in San Francisco\(^ {27}\) and our own previous SMS studies of sexual health promotion to young people;\(^ {17}\)\(^ {18}\) we could find none related to sun safety. More recently, Armstrong \textit{et al} investigated the use of SMS to increase sunscreen adherence among American adults, finding those who received daily SMS reminders were significantly more likely to apply sunscreen daily compared to those not receiving the messages.\(^ {19}\) Our previous work indicated that SMS was effective for sexual health promotion to young people but relied upon manual collection of mobile phone numbers from individuals;\(^ {17}\)\(^ {18}\) in this project we aimed to both trial the use of mobile advertising as a means to reach individuals for health promotion and to evaluate the effectiveness of SMS to increase knowledge and promote beneficial behaviour change related to safer sex and sun safety among young people.

**Methods**

**Trial Design**

The S\(^5\) project was designed as a randomised controlled trial with simultaneous treatments. The study population was randomised to receive messages about either safer sex or sun safety over a four month period. This design allowed the ‘sex’ group to act as a control group to the ‘sun’ group to measure changes in sun safety behaviour over time, and the ‘sun’ group to act as a control group to the ‘sex’ group to measure changes in safer sex over time.

**Participants**

The study population was individuals aged 16 to 29 years residing in the state of Victoria, Australia who subscribed to a mobile advertising service offered by one of the largest mobile telecommunications providers. In return for receiving mobile advertising, subscribers receive free access to various internet sites on their mobile phones via wireless application protocol (WAP). The telecommunications provider manages the delivery of mobile advertising; third parties are not given subscribers’ mobile numbers. Baseline and follow up survey data were collected electronically via WAP.
Intervention Design

The intervention was based primarily on Weinstein’s Precaution Adoption Process model and incorporated elements from Ajzen’s Theory of Planned Behaviour and Bandura’s concept of self-efficacy.

All text messages were designed prior to the commencement of the broadcast period. The messages aimed to increase knowledge, reinforce protective behaviours, change attitudes and increase perceived behavioural control. To maximise appeal, messages were humorous, short, used informal language and were linked to particular annual events (such as Valentine’s Day) where possible. These factors were shown to positively affect message acceptability and impact in our earlier study using SMS for sexual health promotion.

Messages were developed by the authors and staff at the Burnet Institute in the target age group, and informed by those used in earlier SMS projects and pre-existing sun safety slogans. Where possible, messages for each of the groups were aligned in terms of topic (prevention, consequences, etc.), phrasing, and framing to minimise differences other than actual content between the groups.

Initial SMS messages were focus tested with young people recruited via the Monash University Careers website. Four focus groups were held, two with males and two with females, in a central city location. Groups were audio recorded, and all participants provided written informed consent before participating. Participants were presented with a scoring sheet and asked to rate alternate versions of each proposed message on characteristics such as appeal, ease of understanding, emotions solicited and utility. Once participants had rated all messages, a facilitated discussion was held to examine reasons for preference for particular messages and message style, as well as message utility. The overall results of the ranking and the discussions were used to design the final messages for broadcast.

Two MMS were also designed for each intervention group. The concepts for these messages were developed by the authors and graphically designed by the telecommunications provider’s technicians. Due to timing constraints, these MMS were designed during the broadcast period and not focus tested.

Intervention Implementation

The message broadcast schedule is displayed in Table 1. Messages were designed to be sent out approximately fortnightly over the summer period, to maximise relevance to the sun safety group. We had previously found fortnightly message frequency to be appropriate. Messages included an ‘opt out’ message (supplied by the telecommunications provider)
informing subscribers how they could cease receiving mobile advertising messages. Messages were broadcast in the afternoon on the same day and time to each group (with the exception of the broadcast of the first safer sex message, which was delayed by the telecommunications provider). During the intervention period, subscribers may have been receiving advertising messages from other advertisers, in addition to our intervention messages.

**Outcomes**

The primary outcome measures for the safer sex group were changes in sexual health knowledge, frequency of condom use and proportion recently seeking STI testing. Change in number of sexual partners was a secondary outcome for this group. The primary outcome measures for the sun safety group were changes in the frequency of using sun protection measures (sunscreen, hats, seeking shade, clothing), tanning preferences and belief about risk of skin cancer. Frequency of sunburn over summer was a secondary outcome for this group. Acceptability of the intervention was a secondary outcome for both groups. All outcome measures were dichotomised for statistical analysis.

Online baseline and follow-up surveys were used to collect the outcome measures. The questionnaires collected brief information about demographics, sexual health knowledge and behaviour, and usage frequency of sun protection measures and tanning preferences. The follow-up questionnaires also included questions relating to the SMS received and sunburn history over summer. The questionnaires were based on survey instruments used to collect data from young people recruited at music festivals and to monitor sun exposure and sun protection. The baseline survey was conducted in early December 2008, before the broadcast of the first message, and the follow up survey in May 2009, after the broadcast of the last message. All survey data was stored on secure network drives at the Burnet Institute, to which only the researchers had access.

Questionnaires were completed on subscribers’ mobile phones via WAP. Subscribers in our population (aged 16-29 years and residing in Victoria) were sent an SMS advertising the survey. Banner advertisements for the survey were displayed on the telecommunications WAP home site (that subscribers use when accessing the internet on their mobile phones) to individuals in our study population (Figure 1). Subscribers clicked on the link in the SMS or banner advertisement to access the survey WAP site.
### Table 4: Messages broadcast~

<table>
<thead>
<tr>
<th>Date Sent</th>
<th>Event</th>
<th>Sun Safety Group</th>
<th>Safer Sex Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 19th Dec 2008</td>
<td>Christmas</td>
<td>Rudolph the Red Nose Reindeer left his hat &amp; sunscreen @ home 🌞 Happy holidays!</td>
<td>On the 1st day of xmas my true love gave to me?? Most people with STIs have NO symptoms*^</td>
</tr>
<tr>
<td>2 1st Jan 2009</td>
<td>New Years</td>
<td>Make a NY resolution u can keep: protect your skin from sunburn this summer. Sunburn now, melanoma later?</td>
<td>Make a resolution! Get a test when changing partners. Chlamydia can cause infertility^</td>
</tr>
<tr>
<td></td>
<td>Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 16th Jan 2009</td>
<td>(summer)</td>
<td>Skin damage MMS (Photo of girls face: magnifying glass passes over face and shows damage being caused by the sun. Text appears ‘Don’t BBQ your skin this summer. UV rays cause wrinkles, blotches &amp; increase your risk of skin cancer)</td>
<td>Partner risk MMS (Scrolling image of two people’s feet protruding from a bed with text above ‘Do you know who you’re sleeping with?’ with the text ‘Your partner may have had partners, who’ve had partners” appearing as feet scroll. Then text appears ‘Use Condoms. Get Tested’)</td>
</tr>
<tr>
<td>4 26th Jan 2009</td>
<td>Australia Day</td>
<td>Enjoying the outdoors is Australian. Tanning shouldn’t be. We have the world’s highest rate of skin cancer.</td>
<td>Its no drama to get checked out ‘down under’. Urine tests can check for the most common STIs.</td>
</tr>
<tr>
<td>5 14th Feb 2009</td>
<td>Valentines Day</td>
<td>Roses are red, lobsters are redder. With a hat+shirt your skin will feel better. Happy Valentines Day!</td>
<td>Roses are red, daises are white, use a condom if you get lucky tonight. Happy Valentines Day!</td>
</tr>
<tr>
<td>6 6th Mar 2009</td>
<td>A tan = skin in</td>
<td>A tan = skin in trauma. Protect your skin use a hat, shirt, sunscreen, sunnies &amp; shade.</td>
<td>Summer loving, having a blast! Summer loving? Get an STI test fast (easy, quick, painless) ^</td>
</tr>
<tr>
<td></td>
<td>trauma. Protect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 20th Mar 2009</td>
<td>Tanning MMS</td>
<td>Tanning MMS (Video of female on a beach; camera zooms inside her body to show cells becoming cancerous due to sun exposure. Voice over describes the damage and closes with “there is nothing healthy about a tan”)</td>
<td>Testing MMS^ (Text ‘Chlamydia’ appears at top of screen, followed by an animation of urine jar filling with ‘easy to test’ at top. Then two tablets fall into the screen with ‘easy to treat’ appearing. Final screen displays ‘Chlamydia just requires a urine test...and if you’re infected its just two tablets to clear it’)</td>
</tr>
<tr>
<td>8 3rd Apr 2009</td>
<td>Footy season</td>
<td>Odds of your team drawing this weekend 100:1! Odds of melanoma 19:1! Don’t bet on it: cover up in the sun.</td>
<td>Odds Demons win the flag 126:1, odds a friend has an STI 20:1.Don’t bet on it: Most ppl have no symptoms. ^</td>
</tr>
</tbody>
</table>

* All messages also contained an opt out message at the end (see methods section for detail)
* The broadcast of this message was delayed by the mobile advertising provider until Monday 22nd December
* The original message intended for these dates were not broadcast; these messages include changes insisted on by the telecommunications provider
Figure 1: Banner ad advertising the survey on the telecommunication provider’s WAP site

Eligible subscribers who had not completed the survey a week after the invitation were sent a reminder SMS. Subscribers received AUD$5 mobile credit per completed questionnaire. To encourage subscribers to complete both questionnaires, those who completed the baseline questionnaire were offered AUD$10 mobile credit to complete the follow-up questionnaire. As this trial was conducted outside an artificial trial setting, we expected that only a proportion of the total population would complete the questionnaires.

Sample Size

Previous studies have shown around 7% of young people are tested for chlamydia each year.\(^{36}\) To detect a 5% increase in STI testing rates in the safer sex group compared to the control (sun) group with a two-sided 5% significance level and a power of 90%, a sample size of 761 individuals per group was necessary. However, as the study aimed to reach a population via mobile advertising, and the response rate to the questionnaires was unknown, we included all available participants in the analysis.

Randomisation and Blinding

The randomisation was performed by the telecommunications provider, who assigned groups by listing mobile phone numbers in numerical order and assigning alternate numbers to each group. No blinding was performed.

Statistical Methods

Initially we planned to compared baseline and follow-up measure of the primary outcomes both overall (as a population) and within individuals who completed both questionnaires (repeated measures analysis). Unfortunately, due to a technical error by the telecommunications provider, the baseline data did not contain information about which group individuals were assigned to, making the first analysis impossible. Thus we performed follow-up only analysis, to compare responses on the follow-up survey between the two
groups, as well as repeated measures analysis involving individuals who completed both questionnaires.

Differences in proportions between groups at baseline were assessed using the chi-square test. Differences in the retained proportion in each group during the intervention and completing the follow up survey were investigated using a two-sample test of proportion. For each outcome we investigated the association between the outcome variable and group assigned to using logistic regression. All results were also adjusted for potential confounding factors identified a priori (age, sex and if ever had sex (for the sex outcome variables)). The Hosmer and Lemeshow goodness of fit was used to assess each model fit. All reported p values are two-tailed and for each analysis p=0.05 was considered significant. All analyses were performed using STATA version 10.1.37

Ethics

Ethics approval for this study was obtained from the Human Research Ethics Committees of The Cancer Council Victoria and Monash University

Results

Participation

On the 1st of December 2008 there were 7,606 individuals aged 16-29 years residing in Victoria receiving mobile advertising from our telecommunications provider. These subscribers comprised our study population and were randomised to receive the intervention; 3,803 subscribers were assigned to receive messages about safer sex and 3,803 were assigned to receive messages about sun safety (Figure 2). Over the four month broadcast period the number of subscribers receiving the messages fluctuated, as individuals unsubscribed (and re-subscribed) to receive mobile advertising. At the study midpoint, the provider informed us that for the broadcast of the fifth message there were 3,380 individuals remaining in the safer sex group and 3,441 individuals remaining in the sun safety group (p=0.02). They were unable to provide equivalent data at the conclusion of the broadcast period.

The WAP banner advertising the baseline survey was displayed 46,193 times (‘impressions’) during the first two weeks of December 2008. These impressions, and the SMS advertising the survey, resulted in 2034 hits to the WAP site hosting the survey. Complete impression data were not provided for the follow up survey.

From the 7,606 individuals enrolled at baseline, we received 620 (8.2%) completed baseline and 395 (5.2%) completed follow up surveys. In total, 760 (10.0%) individuals completed one
or both surveys (Figure 2). After excluding individuals who reported residing interstate, there were 553 baseline surveys and 358 follow up surveys (158 from the safer sex group vs 200 from the sun safety group, \(p=0.02\)) available for analysis. One hundred and fifty one individuals completed both the baseline and follow up surveys (Figure 2).

**Population Characteristics**

Data provided by the telecommunications provider showed our overall study population (n=7,606) was 55% male with 100% residing in Victoria (based on postcode supplied at mobile phone activation). The population was evenly distributed between those aged 16-24 years and 25-29 years.

Sixty percent of those completing the baseline questionnaire were male (Table 2). The median age of baseline participants at 1st December 2008 was 25.3 years (range 17.9-29.9 years). Just over three-quarters (78%) reported residing in metropolitan Melbourne. To verify randomisation was successful, we examined if there were any differences between the sex and sun groups at baseline in regards to age, gender, region of residence (metropolitan Melbourne or regional Victoria) and skin type (Table 2). No significant differences were observed.

Table 2: Baseline characteristics

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<td>Male</td>
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<tr>
<td><strong>Age (as of 1st Dec 2008)</strong></td>
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<td></td>
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<tr>
<td>16-19 years</td>
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<tr>
<td>20-24 years</td>
<td>67</td>
<td>42.4</td>
<td>70</td>
</tr>
<tr>
<td>25-29 years</td>
<td>84</td>
<td>53.2</td>
<td>116</td>
</tr>
<tr>
<td><strong>Skin Type</strong>^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just burn</td>
<td>50</td>
<td>31.6</td>
<td>61</td>
</tr>
<tr>
<td>Burn then tan</td>
<td>61</td>
<td>38.6</td>
<td>86</td>
</tr>
<tr>
<td>Just tan</td>
<td>38</td>
<td>24.1</td>
<td>45</td>
</tr>
<tr>
<td>Nothing - born with dark skin</td>
<td>9</td>
<td>5.7</td>
<td>8</td>
</tr>
<tr>
<td><strong>Region of Residence</strong>^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan Melbourne</td>
<td>133</td>
<td>84.2</td>
<td>164</td>
</tr>
<tr>
<td>Regional Victoria</td>
<td>25</td>
<td>15.8</td>
<td>36</td>
</tr>
</tbody>
</table>

* This includes all individuals who completed the follow up questionnaire and are included in subsequent data analysis. Responses at follow up were used to extrapolate their characteristics at baseline where the baseline questionnaire was not completed. If individuals moved during the intervention period, their region of residence details may not be accurate.

^ This measure refers to what happens to an individual’s skin if they are exposed to the sun for 30 minutes at the beginning of summer for 30 minutes.
Figure 2: Participant flow chart

Mobile advertising subscribers meeting selection criteria (n=7,606)

Randomised to receive safer sex or sun safety intervention (n=7,606)

Completed baseline survey (n=620)
  Excluded from analysis as resided interstate (n=67)

Included in analysis of baseline data (n=553)

Allocated to receive safer sex messages (n=3,803)
  Withdrew from mobile advertising subscription by message five* (n=423)

Completed follow up survey (n=185)
  Excluded from analysis as resided interstate (n=27)

Included in analysis of follow up data (n=158)
  Includes n=64 who completed baseline survey

Allocated to receive sun safety messages (n=3,803)
  Withdrew from mobile advertising subscription by message five* (n=362)

Completed follow up survey (n=210)
  Excluded from analysis as resided interstate (n=10)

Included in analysis of follow up data (n=200)
  Includes n=87 who completed baseline survey

* This was the last message for which the telecommunications provider was able to provide us with subscriber information
Safer Sex Outcomes

Follow-up only analysis (n=358) showed that participants who received the sex messages had significantly higher sexual health knowledge than those who received the sun messages (Table 3). Individuals who received the sex messages were also less likely to report having multiple or new sex partners and were more likely to report always using condoms with new partners at follow up (Table 3).

Table 3: Safer Sex Outcomes – Analysis using follow up surveys only

<table>
<thead>
<tr>
<th></th>
<th>Sun (control) Group (n)</th>
<th>Sex (intervention) Group (n)</th>
<th>Unadjusted</th>
<th>Adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Overall</td>
<td>200</td>
<td>158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Health Knowledge (three questions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not all questions correct</td>
<td>174</td>
<td>128</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>All questions correct</td>
<td>26</td>
<td>36</td>
<td>1.9</td>
<td>1.1-3.4</td>
</tr>
<tr>
<td>Sexual partner/s, past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>26</td>
<td>20</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>174</td>
<td>138</td>
<td>1.0</td>
<td>0.6-1.9</td>
</tr>
<tr>
<td>Reported sexual partner, past six months</td>
<td>174</td>
<td>138</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STI test, past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>144</td>
<td>107</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>30</td>
<td>31</td>
<td>1.4</td>
<td>0.8-2.4</td>
</tr>
<tr>
<td>Always use condoms, past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>117</td>
<td>98</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>55</td>
<td>38</td>
<td>0.8</td>
<td>0.5-1.4</td>
</tr>
<tr>
<td>Multiple sexual partners, past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>111</td>
<td>102</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>36</td>
<td>0.6</td>
<td>0.4-1.0</td>
</tr>
<tr>
<td>Always use condoms if have multiple partners, past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>21</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>15</td>
<td>1.2</td>
<td>0.5-2.7</td>
</tr>
<tr>
<td>New sexual partner, past three months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>80</td>
<td>79</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>94</td>
<td>59</td>
<td>0.6</td>
<td>0.4-1.0</td>
</tr>
<tr>
<td>Always use condoms with new sexual partner/s, past three months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>19</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>47</td>
<td>40</td>
<td>2.1</td>
<td>1.1-4.2</td>
</tr>
</tbody>
</table>

* Adjusted for age, gender and if reported sexual partner in past six months
In the repeated measures analysis (n=151), those who received the sex messages (n=64) tended to be more likely to improve their sexual health knowledge from baseline to follow-up compared to those who received the sun messages (OR 1.9, 95% CI 1.0-3.8, p=0.06). After adjusting for age, gender and reporting a sexual partner in previous six months, this trend remained but was not statistically significant (AOR 1.8, 95% CI 0.9-3.5, p=0.1). There were no significant differences observed between groups in frequency of STI testing, improvement in condom use or reduction in partner numbers between time points.

**Sun Safety Outcomes**

In the follow-up only analysis (n=358), no significant differences were detected between the sun and sex groups in tanning preferences, frequency of use of sun protection measures (hats, sunscreen, shade, clothing), belief about risk of skin cancer (Table 4) and frequency of sunburn over summer.

Table 4: Sun Safety Outcomes – Analysis using follow up surveys only

<table>
<thead>
<tr>
<th></th>
<th>Sex (control) Group (n)</th>
<th>Sun (intervention) Group (n)</th>
<th>Unadjusted</th>
<th>Adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Preference for a dark tan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>144</td>
<td>180</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>20</td>
<td>1.1</td>
<td>0.6-2.3</td>
</tr>
<tr>
<td><strong>Believe about risk of skin cancer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>66</td>
<td>83</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>91</td>
<td>116</td>
<td>1.0</td>
<td>0.7-1.5</td>
</tr>
<tr>
<td><strong>Hat wearing frequency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never/rarely/sometimes</td>
<td>113</td>
<td>137</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Usually/always</td>
<td>45</td>
<td>63</td>
<td>1.2</td>
<td>0.7-1.8</td>
</tr>
<tr>
<td><strong>Sunscreen (SPF 30+) wearing frequency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never/rarely/sometimes</td>
<td>94</td>
<td>123</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Usually/always</td>
<td>64</td>
<td>77</td>
<td>0.9</td>
<td>0.6-1.4</td>
</tr>
<tr>
<td><strong>Frequency of seeking shade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never/rarely/sometimes</td>
<td>98</td>
<td>124</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Usually/always</td>
<td>160</td>
<td>76</td>
<td>1.0</td>
<td>0.7-1.5</td>
</tr>
<tr>
<td><strong>Frequency of wearing deliberately wearing skimpy clothing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never/rarely/sometimes</td>
<td>121</td>
<td>155</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Usually/always</td>
<td>37</td>
<td>45</td>
<td>0.9</td>
<td>0.6-1.6</td>
</tr>
</tbody>
</table>

* Adjusted for age and gender

^ When outside on a sunny day during summer for more than an hour between 11am and 3pm

# Hosmer and Lemeshow goodness of fit p=0.04
In the repeated measures analysis (n=151), those who received the sun messages (n=87) were significantly less likely to report at follow up that their hat wearing frequency had decreased since baseline compared to those who received the sex messages (OR 0.5, 95% CI 0.2-1.0, p=0.05). This relationship strengthened when age and sex were adjusted for (AOR 0.4, 95% CI 0.2-0.9, p=0.02). There were no significant differences observed between groups in frequency of wearing hats, skimpy clothing, seeking shade or tanning preferences.

**SMS Acceptability**

Just under half of the participants reported on the follow up questionnaire that they found the messages interesting or entertaining (48%), with 39% reporting they learnt something from the messages and 19% reported they showed the messages to others. Twenty two percent reported they found the messages annoying.

Participants who received the sex messages tended to be less likely to report they learnt something from the SMS (AOR 0.6, 95% CI 0.4-1.0, p=0.05) and significantly more likely to report they found the messages annoying (AOR 1.9, 95% CI 1.1-3.2, p=0.01) compared to those who received the sun messages. There was no difference between groups in reporting they found the messages interesting or entertaining or showing messages to others.

**Discussion**

This study is the first to report on the use of mobile advertising to deliver health promotion messages; a true ‘mass marketing’ approach that can be easily scaled up, with population size only limited by the number of subscribers to the channel chosen for delivery. We used an innovative randomised controlled trial design with simultaneous treatments to concurrently evaluate the use of SMS to promote beneficial change related to safer sex and sun safety. Consistent with our earlier pilot studies,17 18 this study showed SMS is a useful tool for sexual health promotion to young people. We were unable to identify a benefit from the sun safety messages, but this may be due to the challenges experienced during intervention implementation.

As individuals – and particularly young people – continue to increase their use of mobile phones, it is important that health promotion practitioners explore how this technology can be exploited to reach the largest possible audience. Mobile advertising offers a way of placing health promotion content on mobile phones, much as space is purchased by health promoters in ‘traditional’ media such as TV, radio and billboards. The advantage of mobile advertising is that messages can be sent directly to the target audience at a specified time with guaranteed message delivery. In addition, it is relatively simple to then access the same population for
evaluation purposes; although not all will participate in the evaluation (as with evaluations of interventions in ‘traditional’ media, where only a proportion are sampled), the intervention will still reach a large group of individuals.

Our analysis suggests our messages had a positive impact on knowledge and behaviour related to safer sex. Consistent with our earlier studies, we observed an increase in knowledge among individuals exposed to safer sex messages. We also observed a significant decrease in the number of sexual partners reported by our intervention group, which we have observed previously among males. Unlike our earlier studies, we did not detect an effect of the messages on STI testing. This may be because this study comprised fewer messages and a shorter time period, the challenges in intervention implementation, or differences in characteristics between study populations (compared to the previous studies, this population was older, included more males and had a higher proportion residing in metropolitan areas, having an STI test in the past six months and reporting a new sexual partner). Certainly, our inability to distinguish the group to which participants were assigned at baseline and the small numbers who completed both questionnaires limited our analysis, but it is heartening that despite these challenges, using SMS for sexual health promotion among young people is consistently successful in changing knowledge and (to some extent) behaviours. The current Australian Sexually Transmissible Infections Strategy aims to increase knowledge, increase testing and reduce the incidence of chlamydia; text messaging is one tool that could be employed to help meet these aims.

We observed limited impact of the messages on behaviours related to sun safety. The only observed difference between groups was a lower proportion of those in the sun group reporting a decrease in hat wearing over summer. We are unable to ascertain if the limited impact of our messages was due to difficulties experienced with study implementation and evaluation, or if the approach trialled may be less successful for sun protection than sexual health. Certainly, awareness and knowledge of sun protection measures is high among young Australians, with prominent and consistent sun protection campaigns in schools and media; unlike sexual health where knowledge is low and campaigns sporadic. Thus the messages related to sun safety may not be providing individuals with different information from what they have already been exposed to, and therefore have limited utility. Additionally, when designing the sun safety messages, we found it difficult to design messages that were funny, entertaining and/or had a different approach from ‘standard’ health promotion messages, all factors that we have previously found important for recall and impact of messages related to safer sex. Nevertheless, further exploration of how SMS could be used to promote sun safety is still warranted, particularly in the context of a recent study that found
SMS was successful in increasing daily use of sunscreen.\textsuperscript{19} It would be worthwhile investigating whether broadcasting messages at different times (e.g. earlier in the summer period or mornings rather than afternoons) would be a more successful approach for this behaviour.

Compared to our previous studies of using SMS for sexual health promotion,\textsuperscript{17,18} far fewer individuals found the messages entertaining or interesting and fewer showed the messages to others. This could be a reflection of the differences between the messages used in this study and those used in our previous research; some of the safer sex messages were censored by the provider, and (as noted earlier) we found designing appealing sun safety messages difficult. It may also reflect the context in which messages in this study were delivered, as these individuals were accustomed to receiving advertising on their mobile phones, thus our messages were less of a ‘novelty’ and may not have been noticed amongst the other advertising. Including a sign off (e.g., Love the Burnet Institute/Cancer Council) as originally intended may have added credibility,\textsuperscript{32} and helped differentiate the messages from other advertising, but was not possible due to space restrictions.

This study had several limitations. Firstly we were unable to fully implement our intervention as intended due to restrictions imposed by the telecommunications company and technical difficulties. This may have altered intervention effectiveness. Secondly, due to the nature of the recruitment it is difficult to determine if the 10% of participants who completed the surveys are representative of all those who received the message. We were unable to ascertain differences between subscribers who did and didn't complete the evaluation questionnaires, but those completing the baseline survey were very similar age and gender to the overall study population. However the small number of completed questionnaires limited the data analysis possible and the conclusions that could be drawn from the intervention. Use of more attractive incentives (e.g., prizes or larger payments), and additional promotional may have increased the survey participation rate. Thirdly, a number of individuals who completed the follow-up questionnaire reported receiving messages for the group to which they were not assigned. We attempted to verify these reports by contacting a subset of individuals once survey data had been examined in detail (August 2009) but were unable to clearly ascertain if contamination in groups had occurred. All statistical analyses were conducted based on both group assignment and the messages individuals stated they had received, and no major differences were observed. Fourthly, the baseline survey data did not contain a record of individuals’ group assignment, limiting the analysis and interpretation of intervention effects.

Fifthly, mobile advertising via SMS may be less successful in the few jurisdictions (e.g. the United States) where individuals are charged to receive incoming messages. However previous SMS based interventions to promote behaviour change in the US have not reported cost to be
a barrier. Finally, all data were self-reported and subject to recall and social desirability biases.

In conclusion, mobile advertising is an exciting new medium in which health promotion practitioners can accurately target and reach millions of individuals. We have repeatedly demonstrated that text messaging is an effective means of sexual health promotion to young people. While we should continue to explore how mobile advertising can be exploited for health-related purposes, we need to be mindful that the necessary involvement of a commercial provider brings its own difficulties and challenges. In a global context of greatly increased use of new technologies, we must continue exploring new avenues in which to deliver, and evaluate, health promotion to our audiences.

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References


When Public Health & the Private Sector Collide: A Cautionary Tale

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Abstract

There is increasing emphasis on involving the private sector in public health to harness the considerable resources and skills of the business world to address significant health issues. While such collaboration should be encouraged, the involvement of business in public health campaigns can raise unexpected challenges when the approaches and priorities of the public and private sectors clash. We report on difficulties experienced in implementing a health promotion intervention via mobile advertising with a commercial communications provider in the state of Victoria, Australia during 2008-2009. Despite a long planning phase involving frequent and comprehensive communications, during project implementation the provider censored the content of our messages, reduced our message length and mismanaged data related to message delivery and evaluation. We believe the difficulties we experienced significantly compromised the delivery and evaluation of our intervention. Our experience has implications for any public health practitioner considering involving a commercial entity in programme delivery.
**Introduction**

There is increasing emphasis on involving the private sector in public health, in order to harness the considerable resources and skills of the business world to address significant public health issues.\(^1\text{-}^5\) Involvement of business, big and small, can greatly increase the reach and effectiveness of public health.\(^6\) The corporate sector can contribute greatly to public health; one example is the public-private arrangement of the International AIDS Vaccine Initiative.\(^7\) Involvement may also be more direct and localised, such as partnerships with media organisations to deliver education messages and programming\(^8\) or involving local businesses in emergency preparedness\(^9\) or distribution of health related products.\(^10\) Nevertheless, involvement of business may raise unexpected challenges when the approaches and priorities of the public and private sector clash.

In mid-2008 we began a project designed to ‘scale up’ the use of mobile phone text messages (SMS) for health promotion to young people. We had conducted two initial studies in a research context to establish efficacy and effectiveness of this mode of communication for sexual health promotion\(^11\text{-}12\) and were seeking a method of accessing a much large number of young people, to emulate a true population based health promotion campaign. Our solution was to utilise the relatively new service of mobile advertising – advertising delivered directly to mobile phones. Despite its huge potential reach, to the best of our knowledge mobile advertising had never been exploited for health promotion purposes.

At the time, only one telecommunications provider with a large youth customer base offered a mobile advertising service in Australia. This service involved the provider broadcasting advertising messages from third parties to subscribers who had ‘opted in’ to receive mobile advertising. In return, subscribers were able to access selected internet sites via their mobile phone free of charge. We entered into a commercial arrangement with the provider to deliver safer sex and sun safety health promotion messages to thousands of young people.

Study findings have been reported separately. This paper focuses on the difficulties we encountered in collaborating with the telecommunications provider which almost certainly compromised our study outcomes. Our paper contains useful lessons for public health practitioners considering entering into arrangements with commercial entities for the delivery of health related programs.
Project Design

The study was a randomised controlled trial with simultaneous treatments designed to determine the impact of health promotion messages about sexual health and sun safety delivered via mobile advertising. We liaised with the telecommunications provider while applying for project funding and began formal discussions for collaboration once funding was secured (May 2008). As we had hoped, given the provider’s target demographic, the provider was very enthusiastic about the project and committed to providing substantial in-kind support in the form of website development. We were aware that our approach was quite different from other advertising contracts, and were careful to fully brief the provider on the study protocol, particularly the importance of the survey data and in ethical considerations such as consent and confidentiality. We were in regular communication with the provider during the message and survey design phase (Sept-Nov 2008) and throughout the message broadcast period (Dec 2008 – May 2009).

Censoring of Message Content

The first major difficulty we encountered in working with the telecommunications provider was their arbitrary censoring of our messages. On the date set for the first message, the sun safety message was broadcast but the sexual health message was not, compromising our simultaneous treatments design. When we contacted the provider for an explanation, we were told the message was ‘offensive’ and could generate complaints. In subsequent discussions, sometimes occurring only days before planned broadcasts, the provider identified another four messages which it insisted needed substantial changes, usually to reduce their ‘offensive’ nature. Despite several requests, the provider was unable to specify which aspects of our messages they deemed offensive, and no guidelines were ever supplied about what would and wouldn’t be deemed acceptable.

It remains unclear to us why the provider so belatedly and unpredictably censored our messages. They were aware that we had spent considerable time and effort focus testing the messages with four groups of young people in the months prior to broadcast, and were aware we had used some messages successfully in our previous studies.11 12 Furthermore, the overall study (including examples of proposed messages) had been approved by two Human Research Ethics Committees, and one of the censored messages was based on a successful mainstream television advertising campaign. The provider had been fully briefed about the nature of the project from the outset, including presentation of example messages, and no objections had been raised.
Although our previous work showed that the appeal of our messages was related very strongly to the informality of our approach,\textsuperscript{13} and no complaints had previously been received, we had no real recourse other than voicing our objections to the censorship verbally and in writing.

The contractual agreement retained the right of the provider to cease to display advertising content at its sole discretion if the material was deemed “indecent or obscene”. We (briefly) considered legal action, but with a study budget of less than AUD $70,000 (approx USD $58,000), limited project timelines, the financial imbalance between our non-profit organisations and the multinational provider, and the immediate and destructive effect of such an action on our project, this was not a practical option.

**Censoring of Message Length**

The second major difficulty we experienced related to the length of the messages. Standard text messages (SMS) are limited to just 160 characters. Months after we had entered into a commercial arrangement, and shortly before the planned broadcast of the first message, the provider informed us of the need for a compulsory 53 character ‘opt out’ message (to advise subscribers how to cease receiving mobile advertising messages). We had not been aware of this requirement, which was indeed a regulatory requirement of all commercial entities.\textsuperscript{14}

While the body responsible for enforcement suggest a much shorter (16 character) opt out message,\textsuperscript{15} the provider would not agree to use this more practical substitute. Three months into the broadcast schedule, the provider unilaterally increased the length of their opt out message to 70 characters, effectively reducing our total advertising ‘space’ by 44% overall. We believe these changes significantly compromised the appeal and utility of our messages; we had to alter them until they bore little resemblance to the original carefully designed and focus-tested ones and remove our intended ‘sign off’ (‘Love the Burnet Institute/Cancer Council’) which we knew was important in giving our messages credibility.\textsuperscript{13}

**Data (Mis)Management**

As part of the mobile advertising service, the provider manages the broadcast of all messages so that the mobile phone numbers of subscribers are not provided to third parties (in this case, the research team). The provider also managed data collection for the baseline and follow-up surveys that we used to evaluate the impact of our messages.

Our contract stipulated that the provider would collect and manage basic data about the subscribers who participated in our study and periodically extract datasets for us. The data supplied was of very poor quality, with datasets often missing important variables. Data about
hits to the survey website and number of subscribers remaining in each group were often incomplete and difficult to interpret. Despite repeated requests, data which our contract specified we were to receive after data collection ceased were either never supplied by the provider or was “no longer possible to extract”. Finally, we discovered too late that the provider had made a technical error which meant the group to which participants in the baseline survey were assigned (sex or sun) could not be determined, significantly compromising the analysis possible under our simultaneous treatments design.

**Implications**

Our experience has implications for any public health practitioner considering involving a commercial entity in programme delivery. We entered into an arrangement with the commercial entity in good faith, and the provider gave significant in-kind assistance to the project and was very supportive initially. We explained the nature and design of the study several times, including the topic areas, and were given the clear impression that they understood and supported our aims, design and approach. The last minute and ad-hoc censoring of our messages and reduction in message length significantly compromised delivery of our intervention, while mismanagement of data impeded our ability to evaluate the intervention.

If utilised effectively on a large scale, SMS could enable prompt, low cost per capita audience reach for public health communication and data gathering, and represent a significant business opportunity for telecommunications providers. Despite evidence of SMS being an effective tool for health promotion, the issues we experienced need to be considered carefully before further expansion is attempted. Our commercial collaborator made unilateral and ad-hoc decisions that greatly affected our project. The telecommunications provider’s priorities of attracting advertising revenue and maintaining a large customer base may have been at odds with our priorities of providing topical, health-orientated messages to our target audience, but we believe we made every effort to ensure that their personnel understood and supported our study.

Our recommendation for other researchers considering similar arrangements with commercial entities is to have very clear arrangements with providers from the outset. A detailed contractual agreement, specifying message content, delivery and data collection, may greatly assist in avoiding and alleviating any future disagreements. All arrangements and agreements, no matter how trivial, should be documented in writing, as our disputes with our provider often relied on a “he said, she said” report. Open lines of communication – which we
mistakenly believed we had – are critical to ensure that programs (particularly research protocols) are implemented correctly.

In conclusion, the priorities of public health and corporate partners are very different, and recourse in disputes is very limited in the legal sense due to the imbalance in financial resources. Although it is likely reliance on third party commercial entities will continue to increase, it is critical to ensure that public health action is not compromised by commercial objectives. The difficulties we experienced certainly compromised our methodological rigour, and probably had an impact on our study outcomes. We are not alone in having experienced difficulties relying on a commercial provider to deliver a health promotion intervention; unfortunately, our experience is unlikely to be the last. Ultimately, our advice is that public health practitioners need to be extremely careful when entering into commercial arrangements with corporate partners.

**Acknowledgements**

Judy Gold receives funding from the Australian Government through an Australian Postgraduate Award and a Monash University Faculty of Medicine Excellence Award. Megan Lim receives funding from a NH&MRC postdoctoral training fellowship. Melanie Wakefield is supported by an NH&MRC Principal Research Fellowship. Margaret Hellard receives funding from the NH&MRC as a senior research fellow. This work was supported by a VicHealth Discovery Grant [grant number 2008-0099] and received in-kind support from the telecommunications provider.
References


Chapter Six: Exploring Social Networking Sites for Sexual Health Promotion

Introduction

As outlined in Chapter One, alongside the rapid increase in the use of mobile phones in recent years has been the rapid increase in internet use. Even more recently, social networking sites have become very popular with many internet users, particularly young people. Given the reach of social networking sites, and the time users spend using these sites, they offer a potential setting to deliver health promotion messages. The functionality of social networking sites, particularly the interactivity, also offer a potentially effective and engaging means of interacting with target populations.

Although it is well recognised that health interventions can, and should, be delivered in this new setting of social networking sites, very little has been published reviewing the approaches that could be taken. This chapter presents a systematic review of published scientific literature, electronic data sources and social networking sites to examine sexual health promotion activities using social networking sites. The purpose of the review is to provide an overview of current health promotion activities using social networking sites, in order to guide the development of future activities in this emerging setting.
Declaration for Chapter Six

Monash University

Declaration by candidate

In the case of Chapter Six, the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
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<tbody>
<tr>
<td>Manuscript conception, literature review and analysis, manuscript preparation and review</td>
<td>70%</td>
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</table>

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

<table>
<thead>
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<th>Name</th>
<th>Nature of contribution</th>
<th>Extent of contribution (%) for student co-authors only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alisa Pedrana</td>
<td>Manuscript conception, analysis of literature, manuscript review</td>
<td>8%</td>
</tr>
<tr>
<td>Rachel Sacks-Davis</td>
<td>Manuscript conception, analysis of literature, manuscript review</td>
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<tr>
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<tr>
<td>Shanton Chang</td>
<td>Assistance with literature analysis, manuscript review</td>
<td>NA</td>
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<tr>
<td>Steve Howard</td>
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<td>NA</td>
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<tr>
<td>Louise Keogh</td>
<td>Assistance with literature analysis, manuscript review</td>
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<td>Jane Hocking</td>
<td>Assistance with literature analysis, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Mark Stoove</td>
<td>Manuscript conception, assistance with literature analysis, manuscript review</td>
<td>NA</td>
</tr>
</tbody>
</table>

Candidate’s Signature | Date 9/12/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.

(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(4) there are no other authors of the publication according to these criteria;

(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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Examining the Use of Online Social Networking Sites for Sexual Health Promotion

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Abstract

Objectives: To examine the current use of social networking sites (SNSs) for sexual health promotion

Methods: A systematic search of published scientific literature, electronic sources (general and scientific search engines, blogs) and SNSs (Facebook, MySpace) to identify existing sexual health promotion activities using SNSs

Results: 178 sexual health promotion activities were identified. Activities most commonly used one SNS and were conducted by not-for-profit organisations from high-income countries. Health promotion activities primarily targeted young people and involved information delivery. Many activities were inactive (no posts within the past month); among active sites there was a wide range in the number of end-users and number of recent posts by owners and end-users.

Conclusions: SNSs are being used for sexual health promotion, although the extent to which they are utilised varies greatly, and the vast majority of activities are unreported in the scientific literature. The key elements involved in developing and delivering interactive, engaging and effective health promotion activities using SNSs need to be identified and reported to guide future health promotion activities in this emerging setting.
Introduction

Social networking sites (SNSs), websites that enable individuals to maintain, form and visualise their social networks¹ – have rapidly become an established part of the online environment. Facebook, Twitter, LinkedIn and MySpace are the most popular SNSs globally.² Numerous other SNSs exist, although many are popular only among certain sub-groups or within particular geographic regions.¹ Most SNSs also facilitate public and private messaging photo, video and other content sharing, provide live updates, enable the formation of groups and organisational pages and include applications such as games, quizzes and polls.¹ ³ ⁵ SNSs are part of ‘Web 2.0’, a loose collection of web-based technologies and services where end-users interact and collaborate as content creators, rather than one-way information flow, which characterises the relatively static websites of ‘Web 1.0’.⁶ ⁸

Growth in the use of SNSs has been extremely rapid; in August 2010 Facebook reported over 500 million active users,⁹ compared to 200 million users in April 2009.¹⁰ A multi-country study conducted in 2008 found that two thirds of those who use the internet access SNSs.¹¹ Although young people are the most frequent users of SNSs, use by older adults is increasing.¹¹ ¹² The time that individuals spend on SNSs is also increasing; there was a 63% increase in use between 2007 and 2008 compared to an 18% increase in time spent online overall.¹¹ A 2007 study from the UK reported that 50% of SNS users visit their SNS profile at least every second day.¹³

The considerable increase in users of SNSs, their frequency of use, and the interactive functionality of SNSs have prompted calls for health-related interventions, including health promotion, to be delivered in these spaces.⁸ ¹⁴ ¹⁶ SNSs provide a medium of enormous potential for health promotion both in terms of audience reach and interactive functions that could be exploited for intervention delivery.

In this paper, we examine health promotion activities using SNSs. We focus on sexual health promotion, our own area of expertise, and also a critical public health issue where online health promotion interventions are already well established.¹⁷ ²³ The aim of this paper is to assess existing health promotion activities using SNSs - including which SNSs are being utilised, the organisations responsible and characteristics of the health promotion activities themselves - in order to guide the development of future activities in this emerging setting.
**Methods**

To examine the use of SNSs for health promotion we developed a novel search strategy covering published scientific literature, electronic sources and SNSs. The search strategy was developed after preliminary searching of published scientific literature revealed very few sexual health promotion activities using SNSs, despite our knowledge of examples from scientific conferences.24-31

The search strategy developed was informed by previous examples of searching electronic data,32-35 consultation with a subject librarian and our understanding of SNSs. We experimented with multiple electronic data sources and search terms before developing the final search strategy. All searches were conducted in November 2010.

**Search Strategy**

1. **Published Scientific Literature**

   Key medical and scientific databases (CINAHL, Embase, Ovid MEDLINE, PsycINFO, Scopus, Web of Science) were systematically searched. Relevant search terms were developed based on previously published literature24 36-39; the full list of search terms used for each database can be found in the supplementary material. Search terms for sexual health covered sexual behaviour, sex education, sexually transmitted infections (STIs), condoms and contraception. Search terms for SNSs were adapted from those used by Bardus et al24 and included social networking (web)sites, online social network(ing) as well as specific SNSs (Facebook and MySpace). These two SNSs were chosen as they are the two most well-established SNSs globally.1 Where possible, search terms were matched to appropriate subject headings and the ‘explode’ function used. One screener reviewed the titles and abstracts of all reports retrieved.

2. **Electronic Sources**

   As electronic sources did not permit the same level of complexity in search terms as the medical and scientific databases, simplified search terms were used, adapted from those used for searching the published scientific literature (see supplementary material).

   Three types of electronic sources were searched:

   1. **General internet search engines:** Google ([www.google.com](http://www.google.com)) and Bing ([www.bing.com](http://www.bing.com)). These search engines were chosen as they are two of the three most popular search engines globally;40 Yahoo! Search was not used as it is now powered by Bing.41

   2. **Scientific and medical internet search engines:** Mednar ([www.mednar.com](http://www.mednar.com)) and Scirus ([www.scirus.com](http://www.scirus.com)). Only results appearing in the ‘Preferred web sources’ and ‘Other web
sources’ categories in Scirus were reviewed, as it was expected that records appearing in the ‘Journal sources’ category would have already been retrieved in the search of published scientific literature.

3. Blog search engine – Google blog search (blogsearch.google.com)

To reduce the likelihood that the previous online activity would alter the results of the searches, the cache was cleared and all web applications closed before conducting each electronic search. As the number of records retrieved by searches of electronic sources is generally unmanageably large, only the first 100 results retrieved from each electronic source for each search term were reviewed for inclusion. Searches were conducted once only, on the same day for each electronic source.

One screener reviewed each result retrieved for inclusion. When reviewing the search results, the following rules were followed:

1. If a website would not open a second attempt was made to open the website on another day.
2. If the search results led to the homepage of a website, but the item referred to in the record was not directly accessible from the homepage, an attempt was made to locate the item by searching within the website.
3. If a record retrieved in the search (a primary link) referred to a health promotion activity that potentially met the criteria for inclusion, details of this activity were sourced (a secondary link) and reviewed for inclusion. However, when secondary links referred to additional health promotion activities (tertiary links), these were not followed.

3. Social Networking Sites

Searches were performed in two key SNSs, Facebook (www.facebook.com) and MySpace (www.myspace.com). These SNSs do not allow the use of ‘AND’ or ‘OR’ operators within searches, so searches used key terms only (see supplementary material).

As Facebook only permits searches by Facebook members, and search results may be influenced by members’ previous activity on Facebook, a user profile with no ‘friends’ or previous ‘likes’ of Facebook pages was used to conduct the search. As with the searches of electronic sources, the first 100 search results for each search term were reviewed for inclusion by one screener.

Inclusion Criteria

Search results from the published scientific literature, electronic sources and SNSs were included if they met all of the following criteria:
1. **Involved the use of SNS(s):** SNSs were defined as websites that functioned primarily for individuals to maintain, form and visualise their social networks (consistent with boyd’s definition of a SNS).\(^1\) Websites with other primary functions, such as online dating or content sharing were not included. SNSs could be pre-existing sites, or created specifically for the health promotion activity.

2. **Related to sexual health or behaviour** – Records were included if they involved some information or discussion related to sexual health or behaviour, sexual education, HIV and other sexually transmitted infections, condoms or contraception.

3. **Involved health promotion** – Health promotion was defined as any activity relating to awareness, education, service provision or advocacy related to sexual health or behaviour.

Health promotion activities hosted on multiple websites, including SNSs, were included, as were ‘general health’ promotion activities on SNSs that included a sexual health focus. Activities that aimed to facilitate communication among professionals were excluded as this communication was not considered a health promotion activity. Records retrieved that were not in English were excluded.

**Data Extraction and Analysis**

All records meeting the inclusion criteria were reviewed by viewing the health promotion activity on the SNS used. Information was collected about the organisation responsible for the health promotion activity (name, country of origin, organisation type), the health promotion activity itself (title, year created on SNS, type of SNS) and the content of the health promotion activity (primary sexual health topic, primary target group, purpose of the health promotion activity). The number of end-users (fans/likes/members/followers) of the health promotion activity was also recorded.

As a measure of site activity, we recorded when the most recent post (excluding spam) was made for each health promotion activity. We also recorded the number of posts by the owner and end-users of the health promotion activity, in the seven days prior to review of the health promotion activity. ‘Likes’ on Facebook were considered user posts. No user posts were reported from Twitter because user’s posts are not publically displayed on the owners’ Twitter profiles. Health promotion activities were defined as ‘active’ if there were any posts in the month prior to review.

Where the required information could not be sourced from the SNS, reasonable attempts were made to locate the information (for example, visiting the organisation’s web page). All details of the health promotion activities were entered into a Microsoft Access 2007 database. Health promotion activities using multiple SNSs were treated as one record.
Results

Search Results

Figure One displays the number of records retrieved and reviewed using the three search strategies. In total 2332 records were reviewed from the three search strategies; from these records, 293 (13%) health promotion activities were identified that met the inclusion criteria. An additional 27 health promotion activities appeared to meet the inclusion criteria but insufficient information was available to examine them (for example, the presence on a SNS could not be located, or the activity had not yet been conducted). The greatest number of health promotion activities were identified through direct links to SNSs (n=124, n=42%) and blogs (n=55, 19%), followed by news sites (n=40, 14%). Removal of duplicates resulted in 178 health promotion activities for inclusion (Table One).

The search of the published scientific literature identified 18 reports that met the first two inclusion criteria (used SNSs and were related to sexual health and behaviour) but did not meet the third (involved sexual health promotion). Among these 18 excluded reports, 10 examined aspects of SNSs (profiles, groups, networks, posts), four reported using SNSs to recruit participants and three examined the association between the use of SNSs and sexual health and behaviour. One report described an intervention to reduce references to personal sex practices and substance use on publically available user profiles.

Sexual Health Promotion Activities Using Social Networking Sites

Social Networking Sites Utilised

Among the 178 health promotion activities identified, 58% used one SNS and 42% used two or more SNSs (Table Two). Facebook was the most commonly used SNS, used by 71% of all health promotion activities. MySpace was used by 46% of activities and Twitter by 30%. Other commercial SNSs used were Ning (n=3), Bebo (n=2) and MyMysta (n=1). Ten health promotion activities used a custom SNS (Table Two).
Facebook does not supply total number of records found in a search, thus the total number of records retrieved from the searches in social networking sites is not available.

^ The first one hundred results for each search term in each electronic search were reviewed. For Scirus, all 28 results in the ‘Preferred web source’ category were reviewed, in addition to the first 100 results retrieved for each search term in the ‘Other Web Sources’ category.

~ This includes duplicate activities identified multiple times across the search strategies. Removing duplicates results in n=178 unique health promotion activities identified.
# Table One: Health Promotion Activities Identified

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<th>Sexual Health Focus</th>
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<td>NS</td>
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<td>Sex workers</td>
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<td>Who's Positive</td>
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- Page 191 -
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<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>Sexual Health Clinic</td>
<td>Unknown</td>
<td><a href="http://www.myspace.com/sexualhealthclinic">http://www.myspace.com/sexualhealthclinic</a></td>
<td>UNITED KINGDOM</td>
<td>Unidentified</td>
<td>2007</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Unclear/ NS</td>
</tr>
<tr>
<td>Sexual Health Empowerment Clinic</td>
<td>Midwest Health Centre for Women</td>
<td><a href="http://www.facebook.com/pages/Minneapolis-MN/Sexual-Health-Empowerment-Clinic/142485196767#!/pages/Minneapolis-MN/Sexual-Health-Empowerment-Clinic/142485196767!v=wall">http://www.facebook.com/pages/Minneapolis-MN/Sexual-Health-Empowerment-Clinic/142485196767#!/pages/Minneapolis-MN/Sexual-Health-Empowerment-Clinic/142485196767!v=wall</a></td>
<td>USA</td>
<td>Not for profit</td>
<td>2009</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Unclear/ NS</td>
</tr>
<tr>
<td>Title</td>
<td>Owner</td>
<td>Social Networking Site(s)</td>
<td>Country</td>
<td>Owner Type</td>
<td>Year Created</td>
<td>Site Purpose</td>
<td>Sexual Health Focus</td>
<td>Target Audience</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Sexual Health Information</td>
<td>Unknown</td>
<td><a href="http://www.myspace.com/sexualhealthinformation">http://www.myspace.com/sexualhealthinformation</a></td>
<td>USA</td>
<td>Individual</td>
<td>2009</td>
<td>Unclear/NS</td>
<td>SH</td>
<td>NS</td>
</tr>
<tr>
<td>Sexual Health Singapore</td>
<td>DSC Clinic, Department of STI Control</td>
<td><a href="http://www.facebook.com/pages/Sexual-Health-Singapore/157103270981291">http://www.facebook.com/pages/Sexual-Health-Singapore/157103270981291</a></td>
<td>SINGAPORE</td>
<td>Government</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>NS</td>
</tr>
<tr>
<td>SHAPE</td>
<td>Women’s Health Teen Clinic, Boulder County AIDS Project</td>
<td><a href="http://www.myspace.com/shaperocks">http://www.myspace.com/shaperocks</a></td>
<td>USA</td>
<td>Collaboration</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>SHFPACT (Sexual Health &amp; Family Planning ACT)</td>
<td>Sexual Health &amp; Family Planning</td>
<td><a href="http://www.facebook.com/shfpact#!/shfpact?v=info">http://www.facebook.com/shfpact#!/shfpact?v=info</a></td>
<td>AUSTRALIA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>NS</td>
</tr>
<tr>
<td>Title</td>
<td>Owner</td>
<td>Social Networking Site(s)</td>
<td>Country</td>
<td>Owner Type</td>
<td>Year Created</td>
<td>Site Purpose</td>
<td>Sexual Health Focus</td>
<td>Target Audience</td>
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<td>--------------------------------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>St John #5/Camp ACE HIV Program</td>
<td>St John Luthern Church</td>
<td><a href="http://www.myspace.com/campacehiv">http://www.myspace.com/campacehiv</a></td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>HIV</td>
<td>Unclear/ NS</td>
</tr>
<tr>
<td>Teen Sexual Health (TSH) Momentum Team</td>
<td>Multi-agency collaboration</td>
<td><a href="http://www.myspace.com/SS3619935">http://www.myspace.com/SS3619935</a></td>
<td>USA</td>
<td>Collaboration</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>TeenSource</td>
<td>California Family Health Council</td>
<td><a href="http://www.facebook.com/teensource">http://www.facebook.com/teensource</a>; <a href="http://twitter.com/teensource">http://twitter.com/teensource</a>;</td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>The Medical Institute for Sexual Health</td>
<td>The Medical Institute for Sexual Health</td>
<td><a href="http://www.myspace.com/medicalinstitute">http://www.myspace.com/medicalinstitute</a></td>
<td>USA</td>
<td>Academic institution</td>
<td>2008</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>The Native Youth Sexual Health Network</td>
<td>Native Youth Sexual Health Network</td>
<td><a href="http://www.facebook.com/pages/The-Native-Youth-Sexual-Health-Network/154777717651">http://www.facebook.com/pages/The-Native-Youth-Sexual-Health-Network/154777717651</a>; <a href="http://twitter.com/NYSHN">http://twitter.com/NYSHN</a>;</td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Young people</td>
</tr>
<tr>
<td>Title</td>
<td>Owner</td>
<td>Social Networking Site(s)</td>
<td>Country</td>
<td>Owner Type</td>
<td>Year Created</td>
<td>Site Purpose</td>
<td>Sexual Health Focus</td>
<td>Target Audience</td>
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</tr>
<tr>
<td>The Power To Be Strong</td>
<td>ActionEqualsLife</td>
<td><a href="http://www.facebook.com/ThePowerToBeStrong">http://www.facebook.com/ThePowerToBeStrong</a>;</td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Campaigns and interventions</td>
<td>HIV</td>
<td>Unclear/NS</td>
</tr>
<tr>
<td>The Practice Sexual Health</td>
<td>The Practice</td>
<td><a href="http://www.myspace.com/begoodinbed">http://www.myspace.com/begoodinbed</a>;</td>
<td>UNITED KINGDOM</td>
<td>Private</td>
<td>NS</td>
<td>Organisational presence</td>
<td>STI</td>
<td>Unclear/NS</td>
</tr>
<tr>
<td>The SafeGuards Project</td>
<td>The Family Planning Council</td>
<td><a href="http://www.myspace.com/safeguards">http://www.myspace.com/safeguards</a></td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>GH</td>
<td>LGBT/MSM</td>
</tr>
<tr>
<td>The Sexual Health Centre</td>
<td>The Sexual Health Centre, Cork</td>
<td><a href="http://www.myspace.com/thesexualhealthcentre">http://www.myspace.com/thesexualhealthcentre</a>;</td>
<td>IRELAND</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>SH</td>
<td>Unclear/NS</td>
</tr>
<tr>
<td>The Well Project</td>
<td>The Well Project</td>
<td><a href="http://www.facebook.com/thewellproject">http://www.facebook.com/thewellproject</a>; <a href="http://twitter.com/thewellproject">http://twitter.com/thewellproject</a>;</td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>HIV</td>
<td>PLWHA</td>
</tr>
<tr>
<td>Trojan Evolve for Sexual Health Awareness</td>
<td>Trojan</td>
<td><a href="http://groups.myspace.com/trojanevolve">http://groups.myspace.com/trojanevolve</a>;</td>
<td>USA</td>
<td>Private</td>
<td>2007</td>
<td>Campaigns and interventions</td>
<td>Condoms</td>
<td>Unclear/NS</td>
</tr>
<tr>
<td>Turn Facebook RED for 2 weeks for HIV/AIDS Awareness</td>
<td>AIDS Outreach Centre</td>
<td><a href="http://www.causes.com/causes/537134-turn-facebook-red-for-2-weeks-for-hiv-aids-awareness/about">http://www.causes.com/causes/537134-turn-facebook-red-for-2-weeks-for-hiv-aids-awareness/about</a></td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Campaigns and interventions</td>
<td>HIV</td>
<td>Unclear/NS</td>
</tr>
<tr>
<td>Title</td>
<td>Owner</td>
<td>Social Networking Site(s)</td>
<td>Country</td>
<td>Owner Type</td>
<td>Year Created</td>
<td>Site Purpose</td>
<td>Sexual Health Focus</td>
<td>Target Audience</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------------------</td>
<td>----------------------------------------------------</td>
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<td>--------------</td>
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<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Untold Stories</td>
<td>MTV, Viacom</td>
<td><a href="http://www.myspace.com/mtvuntoldstories">http://www.myspace.com/mtvuntoldstories</a></td>
<td>USA</td>
<td>Private</td>
<td>2008</td>
<td>Campaigns and interventions</td>
<td>HIV</td>
<td>Young people</td>
</tr>
<tr>
<td>Vista Community Clinic</td>
<td>Vista Community Clinic</td>
<td><a href="http://www.facebook.com/pages/Vista-Community-Clinic/94817677722">http://www.facebook.com/pages/Vista-Community-Clinic/94817677722</a></td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>GH</td>
<td>Unclear/ NS</td>
</tr>
<tr>
<td>Worlds AIDS Week 2010 UBC</td>
<td>University of British Colombia</td>
<td><a href="http://www.facebook.com/home.php?sk=group_123781784346968&amp;ap=1">http://www.facebook.com/home.php?sk=group_123781784346968&amp;ap=1</a>;</td>
<td>CANADA</td>
<td>Academic institution</td>
<td>2010</td>
<td>Campaigns and interventions</td>
<td>HIV</td>
<td>Young people</td>
</tr>
<tr>
<td>Youth Program @ the Center</td>
<td>San Francisco San Francisco Lesbian Gay Bisexual Transgender (LGBT) Community Center</td>
<td><a href="http://www.myspace.com/sfcenteryouth">http://www.myspace.com/sfcenteryouth</a>; <a href="http://www.facebook.com/sfcenteryouth">http://www.facebook.com/sfcenteryouth</a>;</td>
<td>USA</td>
<td>Not for profit</td>
<td>NS</td>
<td>Organisational presence</td>
<td>LGBT health</td>
<td>LGBT/MS M</td>
</tr>
</tbody>
</table>

SH Sexual health generally       GH General health       STIs Sexually transmitted infections (with/without HIV) NS Not Specified
Table 2: Characteristics of Included Health Promotion Activities

<table>
<thead>
<tr>
<th>Activity Characteristic</th>
<th>Number of Activities (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of SNSs used by activity</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>104 (58.4)</td>
</tr>
<tr>
<td>Two</td>
<td>50 (28.1)</td>
</tr>
<tr>
<td>Three</td>
<td>22 (12.4)</td>
</tr>
<tr>
<td>Four</td>
<td>2 (1.1)</td>
</tr>
<tr>
<td>SNSs used*</td>
<td></td>
</tr>
<tr>
<td>Facebook</td>
<td>126 (70.8)</td>
</tr>
<tr>
<td>MySpace</td>
<td>82 (46.1)</td>
</tr>
<tr>
<td>Twitter</td>
<td>54 (30.3)</td>
</tr>
<tr>
<td>Other site^</td>
<td>6 (3.4)</td>
</tr>
<tr>
<td>Custom site</td>
<td>10 (5.6)</td>
</tr>
<tr>
<td>Owner</td>
<td></td>
</tr>
<tr>
<td>Academic institution</td>
<td>20 (11.2)</td>
</tr>
<tr>
<td>Collaboration</td>
<td>11 (6.2)</td>
</tr>
<tr>
<td>Government</td>
<td>28 (15.7)</td>
</tr>
<tr>
<td>Individual</td>
<td>11 (6.2)</td>
</tr>
<tr>
<td>Not for profit</td>
<td>77 (43.3)</td>
</tr>
<tr>
<td>Private sector</td>
<td>22 (12.4)</td>
</tr>
<tr>
<td>Unknown</td>
<td>9 (5.1)</td>
</tr>
<tr>
<td>Country of Origin</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>126 (70.8)</td>
</tr>
<tr>
<td>Other</td>
<td>52 (29.2)</td>
</tr>
<tr>
<td>Main Purpose of Activity</td>
<td></td>
</tr>
<tr>
<td>Connect individuals</td>
<td>10 (5.6)</td>
</tr>
<tr>
<td>Campaigns and interventions</td>
<td>51 (28.7)</td>
</tr>
<tr>
<td>Organisation/programme presence</td>
<td>112 (62.9)</td>
</tr>
<tr>
<td>Unclear/not specified</td>
<td>5 (2.8)</td>
</tr>
<tr>
<td>Sexual Health Focus</td>
<td></td>
</tr>
<tr>
<td>General health <em>(including sexual health)</em></td>
<td>12 (6.7)</td>
</tr>
<tr>
<td>HIV</td>
<td>44 (24.7)</td>
</tr>
<tr>
<td>Sexual health</td>
<td>101 (56.7)</td>
</tr>
<tr>
<td>STIs <em>(with/without HIV)</em></td>
<td>12 (6.7)</td>
</tr>
<tr>
<td>Other*</td>
<td>9 (5.1)</td>
</tr>
<tr>
<td>Target Audience</td>
<td></td>
</tr>
<tr>
<td>Same-sex attracted individuals</td>
<td>10 (5.6)</td>
</tr>
<tr>
<td>People living with HIV</td>
<td>12 (6.7)</td>
</tr>
<tr>
<td>Young People</td>
<td>53 (29.8)</td>
</tr>
<tr>
<td>Other*</td>
<td>16 (9.0)</td>
</tr>
<tr>
<td>Unclear/not specified</td>
<td>87 (48.9)</td>
</tr>
</tbody>
</table>

*SNS Social Networking Site
*~ Not mutually exclusive
^ Includes Ning (n=3), Bebo (n=2), MyMsta (n=1)
* Includes abstinence (n=3), condoms (n=3) and those that focused on the health of same-sex attracted individuals (n=3)
+ Includes females (n=5), people infected with STIs (n=4) African Americans (n=3), males (n=2), HIV negative individuals (n=1), Indigenous (n=1) and sex workers (n=1)
Organisations Responsible

Of the 178 health promotion activities identified, just under half were conducted by not-for-profit organisations (43%), followed by government departments or agencies (16%) the private sector (12%) and academic institutions (11%; Table Two). Fifty-six (32%) of the health promotion activities were conducted by organisations that deliver clinical services (Table Two). Most health promotion activities did not report the year they commenced on SNSs (n=104, 58%); among those that did, 60 (81%) commenced in 2008 or later.

Health promotion activities were most commonly conducted by organisations or individuals based in the United States (71%), followed by the United Kingdom (n=20, 11%). Most activities were conducted by organisations or individuals from high income countries; 60 seven were from middle income countries (five from South Africa, one from each of Maldives and Mauritius) and none were low income countries. Two health promotion activities were conducted by multinational organisations while the country of origin of an additional four activities could not be identified.

Characteristics of Health Promotion Activities

Among the 178 health promotion activities, three purposes of using SNS were identified; connecting similar individuals (6%), delivering a campaign or intervention (29%) and having an organisational or programme presence on SNS (63%; Table Two). Most of the activities focused on sexual health in general (57%) or HIV specifically (25%). Among the 91 activities where the target audience in general (57%) or HIV specifically (25%) was known, the most common target audience was young people (30% of all activities; Table Two). Three quarters of all health promotion activities (n=139, 78%) provided information related to sexual health while 87 (49%) provided direct referrals to clinical services.

Table Three displays the level of site activity for health promotion activities using the three most popular SNSs (Facebook, MySpace and Twitter). The majority of health promotion activities using Facebook (68%) and Twitter (86%) were considered active as there had been new posts in the month prior to review, compared to 21% of health promotion activities using MySpace. The number of end-users and posts within the last seven days varied greatly between health promotion activities. Among the active sites, MySpace had the highest median number of end-users and Twitter the highest median number of owner posts within the seven days prior to review (Table Three). The most active health promotion activities are listed in the supplementary materials; often, but not always, the most popular activities had the highest numbers of user posts.
Table 3: Site Activity among Active^ Health Promotion Activities

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Number of Users</th>
<th>Number of Posts by Owner, past seven days*</th>
<th>Number of Posts by Users, past seven days*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%~</td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>Facebook</td>
<td>84</td>
<td>68.3</td>
<td>327</td>
<td>15-111,391</td>
</tr>
<tr>
<td>MySpace</td>
<td>17</td>
<td>21.3</td>
<td>655</td>
<td>1-20,869</td>
</tr>
<tr>
<td>Twitter</td>
<td>44</td>
<td>86.3</td>
<td>565</td>
<td>2-77,087</td>
</tr>
</tbody>
</table>

NA Not available

^ Posts within the 30 days prior to review

* Denominator is only including health promotion activities where posts could be publically viewed (Facebook n=126 (98% of all health promotion activities using Facebook)), MySpace n=80 (98%), Twitter n=51 (94%)

* In the seven days prior to review of the health promotion activity on the SNS used

Discussion

This study is the first published report of how SNSs are being used for health promotion, in this case, sexual health promotion. For the moment, it appears the use of SNSs for sexual health promotion is not widespread: it is restricted to high income countries, largely targeted at young people and primarily focuses on having an organisational or programme presence on SNSs. This is perhaps not surprising, given the greater internet access in high income countries, the initial young user-base of SNSs and the reality that many organisations may have viewed SNSs (at least initially) as simply an additional online location in which to have a presence, alongside their organisational website. However, as global internet penetration increases and SNSs become more widely used, it is likely that SNSs will be increasingly used in more diverse ways for health promotion, including for the delivery of campaigns and interventions (now that there is an established user base), for targeting sub-populations other than young people, and by organisations in a wider variety of countries.

The dominance of three SNSs (Facebook, MySpace and Twitter) within the health promotion activities identified is partly a reflection on our search strategy (which specifically sought out activities on Facebook and MySpace) and also a reflection of the current market share of these SNSs. The advantage of using these established SNSs is that the target audience is already present and interacting with their social networks, unlike creating a custom SNS that must first attract end-users before it can reach individuals for health promotion. However utilising an established SNS can restrict how the health promotion activity is presented, the content that can be provided under each SNS ‘acceptable use’ policies, and ownership of online content, which may affect the delivery and fidelity of health promotion activities.

Defining features of Web 2.0 include generation of content by end-users and online social engagement. There was great diversity in popularity and the extent of online interaction
among the health promotion activities identified. The most popular health promotion activities had thousands of end-users, with regular posts by owners and end-users each week. Nonetheless, many health promotion activities were inactive, particularly those using MySpace. There is little purpose in having a relatively ‘static’ presence on a SNS, with few posts and end-user interactions, in addition to an organisational or campaign ‘Web 1.0’ website.

From reviewing the health promotion activities identified, it appears that some organisations have simply broadened their online presence into SNSs with relatively minimal effort, using similar content to their existing websites and making little attempt to encourage social activity and engagement. However other organisations appear to have ‘purpose built’ their presence on SNSs, providing regular updates and delivering content specifically designed for each SNS used. Often, but not always, the most popular sites are also those with the most active online communities. Online social activity does not always happen naturally; future investigations should focus on the most popular and active health promotion activities on SNSs in order to better understand the content, features and approaches that successfully encourage social engagement. These elements could then be used to develop more engaging interventions, which may be more effective as interaction is known to promote deeper learning and understanding.

These features could then be used to develop more interactive campaigns and interventions.

SNSs are constantly evolving. This creates challenges for health promoters, for example when the functionality of SNSs change, or when end-users migrate from one SNS to another (the high proportion of dormant health promotion activities using MySpace may be a reflection of the more general migration of users from MySpace to Facebook). Organisations need to be flexible in responding to this evolution in order to maximise the value of health promotion activities using SNSs. For example, from 2009 Facebook allowed external websites to use Facebook logins and access content from Facebook which has been very popular. Thus it is possible to now deliver health promotion activities using functions (and audience reach) of SNSs, without the site actually being hosted on an external commercial platform.

A comprehensive examination of existing sexual health promotion activities using SNSs required us to search electronic sources and SNSs themselves, as well as the published scientific literature. That so little was available in the published scientific literature was most likely a reflection of the rapid emergence and uptake of SNSs, coupled with the time involved in obtaining funding, implementing and evaluating activities using SNSs, and publishing the results. However searches of electronic sources and SNSs bring their own challenges, such as the restricted search capabilities, the inability to replicate searches (see limitations), the incompleteness of information within health promotion activities identified and the
unmanageably large number of records retrieved. Given that the need to use electronic sources to produce comprehensive scientific reviews is unlikely to abate, it would be useful to establish ‘best practice’ guidelines to guide future searches of these contemporary information sources.

This review has several limitations. Primarily, the methods for searching electronic sources and SNSs are not well established, and it is likely that some sexual health promotion activities using SNSs were not identified due to the number of search terms and searches possible. As “sexual health” and “health promotion” involve a broad range of topics and activities, we were forced to make choices about which search terms could be used in each data source. However, we attempted to maximise coverage by searching within key SNSs as well as using multiple electronic data sources and multiple search terms. In addition, the searches conducted are not replicable because online content and search algorithms are constantly changing. The search strategy developed also limited the likelihood that campaigns using SNSs primarily for ‘viral marketing’ would be identified (although one such campaign was identified and included). Only English language sources were searched, which biased results towards health promotion activities from English speaking countries.

This study focused on providing an overview of the current use of SNSs for sexual health promotion; it does not provide a comprehensive process (or impact) evaluation of the health promotion activities identified. For practical reasons, measure of reach was limited to number of end-users of each health promotion activity, while the measure of online social engagement was limited to user posts within a short time period. These metrics, although relatively simple to collect, may not accurately reflect the reach or engagement of the intended target audience (which was often not specified). Health promotion activities may be popular without being engaging and/or may be engaging yet have no impact on health-related outcomes. More detailed evaluations of individual health promotion activities should consider measures of message spread (e.g. number of ‘shares’ and ‘retweets’), characteristics of end-users, and improved measures of interaction (e.g. content analysis of user posts). Measurement of the quantity, quality and impact of interactions from individual health promotion activities using SNSs would be useful to inform effectiveness evaluations of these activities.

In summary, this investigation presents the first published overview of how SNSs are being used for sexual health promotion. It appears that the call has been heeded,\(^8\)\(^ {14-16}\) SNSs are being used to deliver health promotion, even if these activities have not been described in the published scientific literature or evaluated for their effectiveness in improving health outcomes. The key elements highlighted in this study, such as SNSs used and levels of online social engagement provide a focal point for individuals and organisations considering using
SNSs for health promotion activities. SNSs offer an unparalleled medium for reaching and engaging with a huge number of individuals; the challenge now is how to maximise the reach and impact of health promotion delivered in this new setting.
Acknowledgements

We acknowledge the assistance of Katie Hall from the Burnet Institute with data searching, screening and entry. Judy Gold receives funding from the Australian Government through an Australian Postgraduate Award and a Monash University Faculty of Medicine Excellence Award. Alisa Pedrana receives funding from the Australia Government through a National Health and Medical Research Council (NH&MRC) Public Health Postgraduate Scholarship and the Sidney Myer Health Scholarship. Rachel Sacks-Davis receives funding from the Australian Government through a NH&MRC Public Health Postgraduate Scholarship. Margaret Hellard receives funding from the NH&MRC as a senior research fellow.
References


42. Moreno MA, Brockman L, Christakis DA. oops, I did it again: A content analysis of adolescents’ displayed sexual references on myspace. *Journal of Adolescent Health* 2009;44(2(Suppl)):S22-S23.

43. Moreno MA, Brockman LN, Wasserheit LN, Christakis DA. Adolescents’ display of sexual references on a social networking web site is associated with intention to become sexually active. *50th Annual Midwest Society for Pediatric Research - Scientific Meeting* Chicago, 2009.


Supplementary Material: Search Terms Used

1. Published Scientific Literature

Note: in all searches, the OR operator was used to combine alternative terms for sexual health and social networking sites (SNS) and the AND operator to combine the sexual health and SNS terms

CINAHL

Sexual Health Terms

1. (TX "Sexually Transmitted Diseases") OR (TX "Sexually Transmitted Diseases, Bacterial")
   OR (TX "Sexually Transmitted Diseases, Fungal") OR (TX "Sexually Transmitted Diseases, Protozoal") OR (TX "Sexually Transmitted Diseases, Viral")
2. (TX "Chlamydia") OR (TX "Chlamydia Infections") OR (TX "Chlamydia Trachomatis")
3. (TX "Gonorrhea")
4. (TX "Syphilis")
5. (TX "Papillomaviruses") OR (TX "Papillomavirus Infections")
6. (TX "Herpes Genitalis") OR (TX "Herpes Simplex")
7. (TX "Human Immunodeficiency Virus")
8. (TX "Trichomonas Infections") OR (TX "Trichomonas Vaginitis")
9. (TX "Hepatitis B")
10. TX "sexual behav**"
11. (TX "Sex") OR (TX "Safe Sex") OR (TX "Unsafe Sex")
12. (TX "Contraception") OR (TX "Contraceptives, Postcoital") OR (TX "Contraceptive Agents, Male") OR (TX "Contraceptives, Oral") OR (TX "Contraceptives, Oral Combined") OR (TX "Contraceptive Agents") OR (TX "Contraceptive Devices") OR (TX "Diaphragms, Contraceptive")
13. (TX "Female Condoms") OR (TX "Condoms")
14. (TX "Coitus")
15. (TX "Sex Education")
16. (TX "Sexual Health")

SNS Terms

17. TX "social network* sit*"
18. TX "social network* websit*"
19. TX facebook
20. TX myspace
21. TX "online social network*"
EMBASE

Sexual Health Terms

1. exp sexually transmitted disease/
2. exp CHLAMYDIA/ or exp CHLAMYDIA TRACHOMATIS/
3. exp GONORRHEA/
4. exp SYPHILIS/
5. exp Papilloma virus/
6. exp HERPES SIMPLEX/ or exp GENITAL HERPES/
7. exp Human immunodeficiency virus/
8. exp TRICHOMONAS VAGINALIS/ or exp TRICHOMONAS/
9. exp hepatitis B/
10. exp sexual behavior/
11. exp SEX/ or exp UNSAFE SEX/ or exp SAFE SEX/
12. exp CONTRACEPTION/ or exp ORAL CONTRACEPTION/ or exp BARRIER CONTRACEPTION/ or exp HORMONAL CONTRACEPTION/ or exp EMERGENCY CONTRACEPTION/ or exp VAGINA CONTRACEPTION/
13. exp CONDOM/
14. exp COITUS/
15. exp sexual education/
16. exp sexual health/

SNS Terms

17. social network* sit*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]
18. social network* websit*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]
19. facebook.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]
20. myspace.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]
21. online social network*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]
Ovid MEDLINE 1996 to Present with Daily Update

Sexual Health Terms

1. exp Sexually Transmitted Diseases/
2. exp Chlamydia Infections/ or exp Chlamydia/ or exp Chlamydia trachomatis/
3. exp Neisseria gonorrhoeae/ or exp Gonorrhea/
4. exp Syphilis/
5. exp Papillomavirus Infections/
6. exp Herpes Genitalis/ or exp Herpes Simplex/
7. exp HIV/ or exp HIV Infections/
8. exp Trichomonas/ or exp Trichomonas Infections/ or exp Trichomonas Vaginitis/ or exp Trichomonas vaginalis/
9. exp Hepatitis B/
10. exp Sexual Behavior/
11. exp Safe Sex/ or exp Unsafe Sex/ or exp Sex/
12. exp Contraception Behavior/ or exp Contraception/ or exp Contraception, Barrier/
13. exp Condoms, Female/ or exp Condoms/
14. exp Coitus/
15. exp Sex Education/
16. sex* health.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]

SNS Terms

17. social network* sit*.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
18. social network* websit*.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
19. online social network*.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
20. facebook.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
21. myspace.mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
PsycINFO 1806 to October Week 4 2010

Sexual Health Terms

1. exp Sexually Transmitted Diseases/
2. chlamydia.mp. [mp=title, abstract, heading word, table of contents, key concepts]
3. exp Neisseria gonorrhoeae/ or exp Gonorrhea/
4. exp Syphilis/
5. exp Human Papillomavirus/
6. exp Herpes Genitalis/
7. exp HIV/ or exp HIV Infections/
8. trichomonas.mp. [mp=title, abstract, heading word, table of contents, key concepts]
9. hepatitis B.mp. [mp=title, abstract, heading word, table of contents, key concepts]
10. exp Sexual Behavior/
11. exp Safe Sex/ or exp Unsafe Sex/ or exp Sex/
12. exp Contraception Behavior/ or exp Contraception/ or exp Contraception, Barrier/
13. exp Condoms, Female/ or exp Condoms/
14. exp Coitus/
15. exp Sex Education/
16. sex* health.mp. [mp=title, abstract, heading word, table of contents, key concepts]

SNS Terms

17. social network* sit*.mp. [mp=title, abstract, heading word, table of contents, key concepts]
18. social network* websit*.mp. [mp=title, abstract, heading word, table of contents, key concepts]
19. facebook.mp. [mp=title, abstract, heading word, table of contents, key concepts]
20. myspace.mp. [mp=title, abstract, heading word, table of contents, key concepts]
21. exp Online Social Networks/

Scopus

(ALL(chlamydia) OR ALL(gonorrhoea) OR ALL(gonorrhea) OR ALL(syphilis) OR ALL(papillomavirus) OR ALL(herpes) OR ALL(hiv) OR ALL(trichomonas) OR ALL("hepatitis B") OR ALL("sexually trans* dis*") OR ALL("sexually trans* infect*") OR ALL("sexual behav*") OR ALL("safe sex") OR ALL("unsafe sex") OR ALL(intercourse) OR ALL(coitus) OR ALL(contraception) OR ALL(condom) OR ALL("sex* education") OR ALL("sex* health")) AND (ALL("social network* sit*") OR ALL("social network* websit*") OR ALL("online social network*") OR ALL(facebook) OR ALL(myspace))
Web of Science

Sexual Health Terms
Topic=(chlamydia) OR Topic=(gonorrhea) OR Topic=(gonorrhoea) OR Topic=(syphilis) OR Topic=(herpes) OR Topic=(hiv) OR Topic=(trichomonas) OR Topic=(hepatitis B) OR Topic=("sexually trans* dis") OR Topic=("sexually trans* infect") OR Topic=("sexual behav") OR Topic=("safe sex") OR Topic=("unsafe sex") OR Topic=(intercourse) OR Topic=(coitus) OR Topic=(contraception) OR Topic=(condom) OR Topic=("sex* education") OR Topic=("sex* health")

SNS Terms
Topic=("social network* sit") OR Topic=("social network* websit") OR Topic=("online social network") OR Topic=(facebook) OR Topic=(myspace)

2. Electronic Sources

General Search Engines – Google and Bing
1. “social networking site” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)
2. “facebook” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)
3. “myspace” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)

Scientific Search Engines – Mednar
1. Full Text: "social networking site" AND ("sexually transmitted” OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health")
2. Full Text: ("sexually transmitted” OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health") / Title: facebook*
3. Full Text: ("sexually transmitted” OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health") / Title: myspace*
Scientific Search Engines - Scirus

1. "social networking site" AND ("sexually transmitted" OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health")
2. title:facebook ("sexually transmitted" OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health")*
3. title:myspace ("sexually transmitted" OR HIV OR chlamydia OR "sexual behaviour" OR "sexual health")*

Google Blog Search

1. “social networking site” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)
2. “facebook” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)
3. “myspace” AND (“sexually transmitted” OR HIV OR chlamydia OR “sexual behaviour” OR “sexual health”)

3. Social Networking Sites

Facebook, MySpace

1. Sexual health
2. Sexual behaviour^*
3. Sexual behavior^*

* The searches in Mednar and Scirus restricted mentions of Facebook and MySpace to the title of the record, as using the full text search retrieved many results where the only mention of SNS was a button allowing the user to ‘share’ the contents of the page retrieved via SNS.
^ The UK and US spellings of behaviour were not recognised as the same word when searching social networking sites, thus a search for each variant was conducted
### Supplementary Material: Most Active Health Promotion Activities

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<th>Highest Number of Posts By Owner ^</th>
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<tr>
<td><strong>Facebook</strong></td>
<td></td>
<td></td>
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<tr>
<td>2. Planned Parenthood</td>
<td>2. EmpowHER</td>
<td>2. AIDS Healthcare Foundation</td>
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<tr>
<td>5. EmpowHER</td>
<td>5. POZ Magazine</td>
<td>5. UNAIDS</td>
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<tr>
<td><strong>MySpace</strong></td>
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<td></td>
</tr>
<tr>
<td>1. Planned Parenthood</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Get Live, Stay Live</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Sex, etc</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. AIDS in Africa....57000 people die each day...</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. GMFA UK</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Twitter</strong></td>
<td></td>
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<tr>
<td>1. CDC</td>
<td>1. UNAIDS</td>
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<td>2. AIDS.gov</td>
<td>2. Netdoctor</td>
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<td>3. Sex, etc</td>
<td>3. EmpowHER</td>
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<td>4. UANIDS</td>
<td>4. Planned Parenthood</td>
<td>-</td>
</tr>
<tr>
<td>5. Status is everything</td>
<td>5. TheBody.com</td>
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</tbody>
</table>

^ This was determined by reviewing the number of posts made by owners and users in the seven days prior to review. The health promotion activities using MySpace contained a low number of posts so are not reported. User posts on Twitter are not available (see methods section)
Chapter Seven: Developing a Sexual Health Promotion Intervention Using Social Networking Sites

Introduction

As already outlined in Chapters One and Six, social networking sites offer a novel setting to deliver sexual health promotion to a large number of young people. However the limited number of previously published examples of health interventions in this setting can make it challenging to even start to develop such interventions.

During 2008, several informal discussions were held internally and externally regarding the potential uses of social networking sites for sexual health promotion. This concept was also discussed in focus groups with young people when evaluating an SMS intervention (see Chapter Four) to explore potential options for how to deliver health promotion messages in this setting.

This chapter presents lessons learnt from "The FaceSpace Project", a sexual health promotion intervention using social networking sites we developed and implemented. The aim of this paper is to present our experiences and provide recommendations for others developing health promotion interventions on social networking sites.
Declaration for Chapter Seven

Monash University

Declaration by candidate

In the case of Chapter Seven, the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
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</thead>
<tbody>
<tr>
<td>Study design and management, manuscript conception, manuscript preparation and review</td>
<td>60%</td>
</tr>
</tbody>
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The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
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<tr>
<td>Alisa Pedrana</td>
<td>Study design and management, manuscript conception, manuscript preparation and review</td>
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<tr>
<td>Mark Stoove</td>
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<tr>
<td>Shanton Chang</td>
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<td>Steve Howard</td>
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<td>Jason Asselin</td>
<td>Study design, manuscript review</td>
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<tr>
<td>Olivia Ilic</td>
<td>Study design and management, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Colin Bartrouney</td>
<td>Study design, manuscript review</td>
<td>NA</td>
</tr>
<tr>
<td>Margaret Hellard</td>
<td>Study design, manuscript conception, manuscript preparation and review</td>
<td>NA</td>
</tr>
</tbody>
</table>

Candidate’s Signature ____________________________ Date 3/12/10
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.

(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(4) there are no other authors of the publication according to these criteria;

(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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Developing Health Promotion Interventions on Social Networking Sites: Recommendations from The FaceSpace Project

Judy Gold¹,², Alisa Pedrana¹,², Mark Stoove¹,², Shanton Chang³, Steve Howard³, Jason Asselin⁴, Olivia Ilic⁵, Colin Batrouney⁴, Margaret Hellard¹,²,⁶

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2. Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria, Australia
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4. Victorian AIDS Council/Gay Men’s Health Centre, Melbourne, Victoria, Australia
5. X:MACHINE Productions, Melbourne, Victoria, Australia
6. The Nossal Institute for Global Health, The University of Melbourne, Melbourne, Victoria, Australia
Abstract

Internet use has grown exponentially in recent years, and the internet is increasingly used for health-related purposes. Social networking sites offer a novel setting for the delivery of health promotion interventions due to their potential to reach a large population and the two-way engagement possible. However, few groups have attempted to host interventions on social networking sites, or use the range of interactive functions available to enhance the delivery of health related messages. This paper presents lessons learnt from “The FaceSpace Project”, a sexual health promotion intervention hosted on social networking sites targeting two key at-risk groups. Based on our experience, we make recommendations for developing and implementing health promotion interventions on social networking sites. Elements crucial for developing interventions include establishing a multi-disciplinary team, allowing adequate time for obtaining approvals, securing sufficient resourcing for building and maintaining an online presence and developing an integrated process and impact evaluation framework. With two-way interaction an important and novel feature of health promotion interventions in this medium, we also present strategies trialled to generate interest and engagement in our intervention from our target populations. Social networking sites are now an established part of the online environment; our experience in developing and implementing a health promotion intervention using this medium are of direct relevance and utility for all health organisations creating a presence in this new environment.
Introduction

Over the past 20 years the internet has dramatically changed how individuals access information and communicate. Global internet use has grown exponentially, with an estimated 1.6 billion internet users in 2008, up from 318 million users in 1998. The internet is increasingly used for health purposes; one survey reported 83% of American internet users source health information online. Numerous internet-based health interventions have been developed, with several reviews concluding that such interventions generally have positive effects for a range of behaviours.

‘Web 2.0’ is a relatively recent development that refers to a loose collection of web-based technologies and services that allow end-users to interact and collaborate as content creators, rather than the one-way information flow on relatively static ‘Web 1.0’ websites. The term ‘social media’ is used interchangeably with Web 2.0 to describe sites and applications that allow information sharing and interactive activities among online communities; examples include blogs, wiki’s, content-sharing sites, virtual worlds and social networking sites.

Social networking sites allow individuals to maintain, form and visualise their social networks, and often offer additional functions such as public and private messaging and photo, video and other content sharing. Facebook, Twitter, LinkedIn and MySpace are the most popular social networking sites globally, with others largely popular only within certain sub-groups or geographical regions. Growth in usage has been extremely rapid, with Facebook reporting 500 million active users, up from 200 million in April 2009.

Commercial organisations have been quick to capitalise on the utility of using Web 2.0 to attract, retain and engage end-users, while health organisations have lagged behind. Very little has been published about how social networking sites might be exploited for health promotion interventions. A recent review of the use of social media for social marketing identified just four examples, none of which used the most common social networking sites listed earlier. Some health organisations have begun extending their presence into social networking sites, however this has often been used as an additional form of marketing to promote services rather than intervention delivery. Other work has focused on the public display of risky behaviour on these sites. However there are few published examples of organisations actually delivering health promotion interventions through social networking sites.

The lack of published examples describing intervention delivery using social networking sites makes it very difficult for others to realistically consider if and how they might approach developing interventions in these spaces. Moreover, the lack of evidence for evaluating such
interventions makes it difficult to determine if health promotion interventions using social networking sites are effective.

During 2009 and 2010 we implemented a novel health promotion intervention using social networking sites; “The FaceSpace Project”. This pilot intervention trialled the delivery of sexual health promotion via social networking sites to two key at-risk groups, young people aged 16-29 years and men who have sex with men (MSM). The project concept was to use fictional characters that post content (primarily videos) and interact on various social networking sites, with sexual health promotion messages embedded within some postings. The young people’s arm was developed and implemented first, with learning’s from this arm informing the development of the MSM arm. The aim of this paper is to use our experience to provide recommendations for developing health promotion interventions on social networking sites.

Recommendations

#1 Create and nurture a multi-disciplinary team with all the skills required – just because you can drive a car and change the oil doesn’t make you a mechanic

Unlike standard health promotion interventions where many organisations have the in-house expertise required for implementation, interventions on social networking sites require additional expertise in social media and knowledge of how end-users interact and engage in online environments. Familiarity with social networking sites from personal experience is insufficient to build and maintain an organisation presence or design a health promotion intervention in these spaces. Teams require a broad range of skills and knowledge, including an adequate understanding of potential sites and their functionality.

We formed a multi-disciplinary project team that involved public health researchers (Burnet Institute), experts in how end-users interact with technology (Department of Information Systems, University of Melbourne), a creative productions company experienced in online performances (X:MACHINE) and a community organisation experienced in sexual health promotion (Victorian AIDS Council/Gay Men’s Health Centre). An advisory group comprised of experts in various fields related to the project was also convened to provide ongoing advice.

Although our multi-disciplinary project team was successfully established, such collaborations bring difficulties of their own, including ensuring timely and adequate communications, clear delineation of roles and responsibilities and interdisciplinary tensions including different
philosophies underpinning approaches to design and implementation (e.g. user led vs creative-led design). This was the first time this team had worked together, and we had not anticipated the resources (time, financial) required to build and maintain this collaboration. Such resourcing is vital to ensure a healthy and vibrant collaboration to support the development of effective interventions.

**#2 Anticipate delays getting approval (ethical, legal, organisational); it’s a new medium and sometimes the waters haven’t been tested**

The use of social networking sites for health promotion interventions can raise ethical, legal and organisational concerns. In addition, individuals and boards who are responsible for approving interventions may not be familiar with social networking sites, or how they are used by individuals. Potential concerns include privacy, consent, intervention access, duty of care, organisational reputation, data collection and management, and reduced control over message delivery compared to other settings.

In our case, while legal approval was relatively straightforward, we had some challenges negotiating intellectual property ownership between the collaborating organisations. In addition, we underwent a lengthy review process before being granted approval by our ethical review board. One positive outcome of this review included development of a clearer and more detailed protocol for responding to ‘inappropriate’ posts on our pages. However, we were required to significantly modify the delivery of our intervention in several ways. For example, the board required prominent disclaimers on the page and regular reminders to fans that reinforced to end-users that our characters were fictional and warnings to not post information that individuals ‘may regret later’. We believe these requirements may have negatively impacted on our credibility on social networking sites and thus reduce end-users’ willingness to participate and engage with our intervention.

Social networking sites are a new and challenging environment for many organisations. This should be anticipated in project timelines, as applying and obtaining ethical, legal and organisational approval can be time-consuming and difficult. Content areas considered socially ‘sensitive’ (such as ours) or related to illicit behaviour (e.g. drug use) may attract additional scrutiny, given the public nature of social networking sites. Including a “Social Networking 101” education component for approval bodies during the development period may be a useful strategy to minimise delays obtaining approval.
#3 Resource, resource, resource – you will need time, money, human and brain power to develop and maintain sites (without forgetting the rest)

One of the advantages of delivering health interventions online is they can reach a large number of people relatively cheaply, and at a reduced cost compared to other approaches.2 27 However, although hosting pages on social networking sites is free, the time creating, developing and maintaining them isn’t. The time to upload posts can be collectively substantial when multiple sites need to be updated, and posts monitored and responded to. Sourcing and developing the content of posts also requires resources; even if sites are largely reliant on existing content, this must be sourced and reviewed for accuracy and appeal. We used an ‘edutainment’ (education and entertainment) approach to maximise appeal to our target audience, which required substantial investment to develop.

As our project involved a novel approach, we were unsure at the outset of the resources required. As the project evolved, we realised we had substantially under-estimated the time and effort required to develop the sites initially, and maintain them for the duration of the project. Given the amount of information on social networking sites, and the speed at which information changes (on Facebook alone 30 billion pieces of content are shared each month 14), we potentially needed to be posting content several times a day, rather than every few days. We found that the resources required to maintain sites detracted from attending to other key tasks, such as exploring alternative approaches to engage end-users, maintaining our collaboration and project evaluation. Upon reflection, it would have been ideal to have had the capacity to employ an individual with the time and interest to maintain the pages (e.g. an avid social media user), rather than using a combination of creative professionals and researchers, whose primary project roles were not online maintenance.

#4 Generate interest (buzz) and do it early; just because you’ve built it, doesn’t mean they’ll come.

One of the greatest challenges for health promotion interventions using social networking sites is being noticed amongst the huge amount of content online. Unlike traditional advertising, being visually appealing is not sufficient to attract attention. It helps to have an established base of end-users when the site is launched; feedback from our initial IT laboratory testing with end-users indicated sites need to look active to attract interest from others. We attempted to do this by ‘soft launching’ our pages via word-of-mouth through personal and
professional networks. However this approach risked having an initial fan base different to the
target demographic, which may limit the appeal of the intervention to the intended audience.

Promotion of the intervention is also critical – while we utilised ‘traditional’ methods of
promotion such as print and broadcast media coverage and advertising, by far the most
successful was using Facebook advertisements (although ours had an incentive attached) and
uploading and tagging photos of end-users at public events. Others have also noted the
success of using online advertisements and photo tagging to attract end-users.22 28 Resources
for promotion are most effectively spent in online strategies that allow end-users to
immediately ‘click through’ to sites, rather than a two-step process of viewing the
advertisement and finding the site online. Having an defined offline community to reach (as
we did for the second arm) also assists with targeting promotion.

**#5 Keep your audience engaged – don’t fall off the newsfeed!**

Users frequently connect with pages and groups and download applications, never to take
notice of them again. Facebook alone has 900 million pages, groups, events and community
pages.14 This presents a difficulty for the delivery of health promotion online, especially when
sustained engagement over time is required to deliver the intervention.

We were conscious at the outset that we did not want to deliver a Web 1.0 intervention using
a Web 2.0 site. We aimed to truly interact and engage with our target group, not just
broadcast information. The challenge was to maintain interest and engagement over a four-
month intervention period with sufficient audience reach. We attempted to do this by using
different delivery mechanisms such as posting regular updates (both text and videos), posing
questions and encouraging comments on posts and launching quizzes and polls, with varying
success. However it was clear from site usage data that interest and interaction on our pages
declined considerably over time in both project arms. In addition, the use of multiple delivery
mechanisms may have ‘fragmented’ our key health messages; even if an individual had been
exposed to one delivery mechanism, they may not have received the full message if they did
not view other content on the site.

In retrospect, we may have been able to increase (or simply maintain) engagement by
delivering the intervention over a shorter time frame, focusing on a single core message,
ensuring all posts could act as ‘stand alone’ messages and creating more opportunities for end-
users to generate and manipulate content themselves.
#6 Go viral (and if you find the formula, you’re a millionaire)

Ultimately, the greatest success one can have on a social networking site is “going viral” – where enough people are sufficiently interested in a post to share it with their friends, who then share it with their friends and so on, resulting in exponential connections. This spread of information has been termed ‘internet meme’; the most common examples are when videos go viral and attract millions of views (e.g. “Dancing Matt”, “Obama Girl”, “Diet Coke + Mentos”). Even some videos containing health-related content have managed to achieve this – for example “Kicesie’s Sex Ed” YouTube channel has attracted over 240 million views.

The challenge for those developing interventions on social networking sites, is that no formula exists for achieving viral spread, and we certainly didn’t achieve this with our project (our most popular video to date has 2,071 views). Investigations in this area are in early stages, and there is no consensus regarding the critical factors required for viral spread. Suggestions to increase the likelihood of content going viral include making emotional connections, mimicking real life situations, being unique, having strong characters and narrative, including celebrity, controversy or comedy, including content in multiple online locations and targeting individuals who are well connected to promote your content. The limited empirical data available suggests positive content and content inspiring emotion (particularly awe) is more likely to be shared with others, as well as the connectivity of the person transmitting the content.

Additionally, viral spread alone may not be enough: while it may increase viewing of one piece of content, this may not translate into sustained interest and engagement. Currently our best suggestion is to keep trialling different strategies targeted to your audience; hopefully you’ll be lucky and hit the jackpot!

#7 Define success, and how you will measure it

There is little point developing health promotion interventions on social networking sites if it is not possible to measure if they are successful. This brings about two challenges, how to define success and how to best measure it.

As our project was a pilot we had both ‘process’ and ‘impact’ evaluation aims – they included whether we could develop an intervention on social networking sites and attract and engage end-users whilst delivering health promotion messages that would have a positive effect on sexual health knowledge and behaviour. As with any approach in its infancy, it is appropriate to focus on process as well as impact evaluation outcomes.

An appropriate methodology is of critical importance when evaluating interventions on social networking sites. Not only may we wish to evaluate traditional process and impact outcomes
for health interventions (e.g. reach, dose delivered and received, knowledge and behavioural changes), the usability and appeal of the sites is also of key importance. Evaluations of interventions using social networking sites need to appropriately define and measure end-user engagement, and developing ways of measuring if and how engagement assists with achieving intervention aims. Evaluation in this setting is complicated further by the fragmenting of health messages across delivery mechanisms; it can be complex to measure which messages and delivery mechanisms end-users were exposed to, and whether this exposure translated into any degree of positive behaviour change.

For our project, we integrated evaluation methods derived from both the health (questionnaires, focus groups, diaries) and information technology (user laboratory testing, expert review) spheres. This is consistent with O’Grady’s proposed ‘dynamic framework’ that suggests incorporating technology (e.g. system robustness, reliability, usage statistics) and computer-mediated interaction (e.g. usability, accessibility, interactivity) elements within system evaluations. To establish the evidence-base for how best to use social networking sites for health promotion interventions, it is critical to move beyond simply collecting end-user statistics and integrate evaluation methods from multiple disciplines.

**Conclusion**

Although there is much discussion and interest about using social media for health promotion interventions, our experience suggests this is far easier said than done, particularly if the intervention aims to truly use Web 2.0 functions to engage end-users. Developing an intervention on social networking sites requires consideration of additional aspects beyond more traditional methods of health promotion. Developers need to consider the online environment and the nature of human interaction online including Web 2.0 functionality, the characteristics of the target audience and their preferred social networking site(s), and how end-users interact and engage in these spaces. Additionally, obtaining ethical, legal or organisational approval and developing effective evaluation strategies may be challenging. These aspects require additional expertise not typically found in health-focused organisations, and the investment of considerable time and resources.

Social networking sites are now an established part of the online environment – despite being less than ten years old, they are among the most frequently accessed sites globally. While the particular site that is most popular may change over time, these sites share common functions that have fundamentally changed how individuals communicate and interact both on- and off-line. Although these sites are primarily used to communicate with social networks, the increasing amount of time individuals spend in these settings suggests that health
organisations need to develop effective strategies for reaching individuals in these spaces, whether delivering interventions in these spaces or using these sites to promote interventions delivered elsewhere.

The FaceSpace Project was our first attempt to develop a health promotion intervention using social networking sites. At the time of project conception there was no information in the published health literature to guide our project development, and undoubtedly we made several mistakes throughout the process. However our staged implementation approach ensured we could incorporate learning’s from the first arm into the second (and now into the extension of the MSM arm), and we were able to develop an appropriate evaluation strategy.

As the popularity of social networking sites continues to increase, we hope that our experience is able to inform the development and evaluation of future health promotion interventions in these spaces. Developing health promotion interventions in this setting and making mistakes and learning from them is certainly far better than doing nothing at all.30 With the continuing change in communications media, health organisations must embrace these technologies or risk being left behind.

**Links to Project Pages**

**Young People’s Arm** (no longer actively maintained)

[www.facebook.com/thefacespaceproject](http://www.facebook.com/thefacespaceproject) (contains links to the characters Facebook pages where the project narrative was delivered), [www.youtube.com/thefacespaceproject](http://www.youtube.com/thefacespaceproject)

**MSM Arm**

[www.facebook.com/QAFxxk](http://www.facebook.com/QAFxxk), [www.youtube.com/queerasfxxk](http://www.youtube.com/queerasfxxk) (Season 1 was part of ‘The FaceSpace Project’, Season 2 and beyond is led by the Victorian AIDS Council/Gay Men’s Health Service as a health promotion campaign)
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Chapter Eight: Integrated Discussion and Conclusion

The sexual health of young people in Australia is of considerable concern due to the high prevalence and long term consequences of infections with STIs, particularly chlamydia. Young people frequently report having multiple sexual partners and using condoms inconsistently, often have poor knowledge and perception of risk, and are infrequently tested for STIs.

While promotion of safer sexual behaviour is a key strategy in improving sexual health among this population, it is critical that any approaches used to promote sexual health are appropriately evaluated to determine their effectiveness.

This thesis presents three different approaches to delivering sexual health promotion for young people in Australia – mass media, mobile phone text messages (SMS) and social networking sites. The evaluation of the ‘You never know who you will meet’ campaign highlighted the limitations of using mass media, with the evaluation finding no increase in chlamydia testing attributable to the campaign. Conversely, the two SMS projects presented (SMS 2008 and S²) found positive impacts of the intervention on sexual health knowledge and behaviour.

Finally, the emergence of social networking sites and their potential to deliver health promotion interventions was examined, with an overview of the current sexual health promotion activities using these sites and the example of The FaceSpace Project. An underlying theme throughout this thesis is evaluation, with established and novel evaluation designs and tools used to determine what is most effective in the ‘real world’.

New Approaches to Sexual Health Promotion

Established methods of delivering community- and group- based sexual health promotion for young people, such as mass media campaigns and sex education programs, have substantial limitations including the time and cost involved and the limited evidence of success. While mass media campaigns have shown some utility for sexual health promotion to young people in Australia, the evaluation of a mass media campaign presented in this thesis...
(Chapter Two) is just one of several examples reporting the limited impact of such approaches.\textsuperscript{199,200,206,207}

Communications technologies such as mobile phones and the internet offer an additional approach to reaching young people. These technologies are now very widely used,\textsuperscript{217} and thus offer the potential of large audience reach, including individuals that may be geographically remote, or otherwise unreach ed by alternative health promotion efforts. The delivery of messages via these technologies can be directly targeted to sub-populations, and offer the potential for two-way interaction, which may increase engagement with the messages and thus their impact.\textsuperscript{320}

**SMS**

There is now substantial evidence that SMS is a useful tool for a variety of sexual health related applications, including health promotion.\textsuperscript{253,353} The two SMS projects presented in this thesis (Chapters Three to Five) built on the success of an earlier ‘proof of concept’ randomised controlled trial which found positive effects of text messages on sexual health knowledge and behaviour.\textsuperscript{267} The projects included in this thesis confirmed these findings at a population level, and delivered messages to far greater numbers of individuals compared to most previous SMS health promotion interventions.\textsuperscript{238,240} In addition, the S\textsuperscript{5} project (Chapter Five) is the first study to trial the use of mobile advertising to deliver text message interventions. Mobile advertising presents a true ‘mass marketing’ approach to delivering these interventions, enabling the delivery of targeted health related SMS on a scale far larger than previously possible.

The qualitative evaluation of the SMS 2008 project (Chapter Four) presented the first detailed report examining the characteristics of health promotion text messages which impact upon message acceptability and utility. There was a clear preference for messages that were positive, personally relevant, concise and that covered a wide variety of topics. These findings can be directly applied to future health promotion interventions using SMS (for any health behaviour), as well as to promotion in other media requiring short formats. Of particular relevance to sexual health campaigns, the preference for positive messages provides further support to move beyond the ‘risk focused’ messages commonly used for sexual health promotion to young people.\textsuperscript{364,365}

The process and impact evaluation results from the SMS projects in this thesis, as well as results from other ongoing work in other settings,\textsuperscript{363,366-370} should be applied to future implementation of wide-scale SMS sexual health promotion campaigns delivered by
governments and other large organisations. In addition, examination of the cost-effectiveness of using SMS and the utility of message tailoring by participant characteristics is warranted, as is the use of longer-term follow up and biological outcome, rather than self-report, indicators.231

**Social Networking Sites**

Beyond SMS, internet-based communication tools present unique opportunities to deliver sexual health promotion messages. Of particular interest are social networking sites, due to their huge, and rapidly growing, audience, and the time spent by individuals on these sites.314 Social networking sites are grounded within Web 2.0, which focuses on two-way communication with, and between, users.303 This presents an exciting opportunity in which to truly interact and thus engage with audiences, unlike many traditional approaches to health promotion.

Although the potential of social networking sites for health promotion is well recognised,303 321-323 there are very few published examples of how these sites can be exploited for these purposes. The examination of social networking sites presented in Chapter Six provided the first global overview of how these sites are being used for sexual health promotion. This study found that the sites are primarily being used for organisational promotion, with great diversity in site popularity, activity and interactivity. Lessons learnt from The FaceSpace Project (Chapter Seven), one of the first health promotion interventions delivered by social networking sites, highlighted some of the complexities inherent in developing and evaluating health promotion interventions in this setting, as well as recommendations for how these difficulties can be overcome.

**Evaluation**

It is important to appropriately evaluate the implementation of sexual health promotion interventions in order to assess their benefits (if any), as well as potential harms. Evaluations can be time consuming, complex and costly,334 and many sexual health interventions are never evaluated.335 Despite this, evaluation designs and strategies can – and should – be adapted to suit the intervention itself, the stage(s) of evaluation required, and the context in which the intervention is being delivered.

Throughout this thesis a variety of innovative approaches to evaluation design and implementation were used. These included:
• Conducting a retrospective impact evaluation using multiple sources of routinely collected data to evaluate an intervention where no robust evaluation mechanism had been established at the outset (Chapter Two);
• Using multiple data collection tools (questionnaires completed onsite, online and via mobile phone and focus groups) to enable timely data collection appropriate to the evaluation aims and stage (Chapters Three to Five);
• Designing a randomised controlled trial with simultaneous treatment to concurrently measure the utility of SMS to promote behaviour change for two important health behaviours (Chapter Five); and
• Incorporating evaluation strategies from the information technology sector (user laboratory testing, expert review) alongside methods more common to health promotion evaluations (questionnaires, focus group, diaries) to evaluate an intervention delivered via social networking sites (Chapter Seven).

These evaluation strategies provided a practical means of measuring intervention effectiveness, and the factors impacting on effectiveness, for both ‘traditional’ and newer approaches to sexual health promotion

**Sexual Health Promotion Challenges**

While new approaches to sexual health promotion using communication technologies show great promise, they are not without their challenges. As well as existing barriers to sexual health promotion, the nature of the media themselves present difficulties for the delivery and evaluation of health promotion messages.

All promotion efforts related to sexual health faces the challenge of “making sexual health as sexy as sex”.371 Delivering sexual health promotion for young people requires careful consideration of message structure, style, content and delivery. Simultaneously, messages must be visible, attract attention and engage individuals, as well as delivering some form of information or persuasion related to improving sexual health. The imposed length limitations in many communication technologies – and the individuals’ attention span – require a very concise format. Yet, as the experience of the SMS projects presented in this thesis demonstrated, messages of 160 characters or less, delivered over time, can be sufficient to result in positive sexual health related changes. ‘Reminder’ type messages may be a particularly effective strategy,231 372 however they risk being seen as (too) repetitive, and thus dismissed.189

Nevertheless, designing a ‘good’ health promotion message is not enough. In order to be effective the message must reach the intended recipient. For SMS interventions, the challenge
is to obtain (ideally in an efficient manner) the phone numbers of individuals in the target audience. Utilisation of existing subscriber lists may be a useful strategy, such as those held by telecommunications’ providers themselves, or by other large organisations (for example, governments or universities).

For online interventions, particularly those using social networking sites, message delivery is challenging due to the huge amount of existing content and traffic competing for individuals’ attention. While in many cases the intended audience as a whole can be targeted (e.g. by demographics), the health promotion message must reach the individual by being noticed amongst the information flow, and usually clicked on and viewed, read or watched. Ideally viral spread – where enough individuals share the content resulting in exponential growth in views – would be achieved. However there is no consensus or formula for how this can be achieved. In addition, many health promotion interventions require sustained participation over time to exert their impact, which may conflict with the typical short ‘bursts of use’ pattern of usage on many websites. Strategies such as incentives, competitions and ‘photo-tagging’ of individuals at public locations may be useful in initially attracting the attention of individuals, but may not be sufficient to retain their interest and engagement over time.

Theories and models related to behaviour change and communication can assist in developing effective interventions using communication technologies. Within this thesis, several theoretical frameworks informed the design and delivery of interventions, including the Precaution Adoption Process Model, the Theory of Planned Behaviour, the concept of self-efficacy, the Communication-Persuasion model, and principles of social marketing. A combination approach was used, as no one single model adequately addressed all factors relevant to delivering sexual health promotion interventions to young people. Further work is required to increase the practical utility of these models, as well as to explore how these models are best adapted for the delivery of interventions via communications technologies.

For all health promotion interventions, appropriate evaluation is critical to determine the interventions’ effectiveness. Existing evaluation designs and tools can be adapted when evaluating interventions using communications technologies, however this is not without difficulty. The experiences of the S intervention and The FaceSpace Project presented in this thesis (Chapters Five and Seven) highlighted some of these challenges, including target audience participation in evaluation components, retention of individuals over time, and the feasibility of the evaluation design.

In addition to the overall evaluation framework, specific evaluation methods and tools may need to be considered when evaluating health promotion interventions using communication
technologies. Existing evaluation tools, such as questionnaires and focus groups, can be adapted to suit the medium; for example, short questions answered via SMS or using instant chat applications to conduct focus groups online.\textsuperscript{355, 359} Furthermore, collection of additional information is often necessary, such as usage statistics and interaction measures. Many sites, and third parties, offer tools and applications to measure some factors of interest to health promoters, but their functionality and utility varies greatly.\textsuperscript{305} Measurement of interaction (and thus engagement) online is particularly challenging; while quantity can be measured to a degree, depending on the site or tool used, it is very difficult to assess the quality, and impact, of online interactions.\textsuperscript{304, 358, 383}

**Future Directions**

Communication technologies, by their very nature, are continually evolving. For example, since the commencement of this body of research ‘smartphones’ (mobile phones with built in applications and internet access\textsuperscript{384}) have become widely available and used in Australia. This is changing the dynamics of internet use and greatly increasing flexibility in where and how individuals go online; 14\% of Australians aged 14 years and over are now accessing the internet via their mobile phone.\textsuperscript{219} In addition, internet access in the developing world is expected to dramatically increase as mobile broadband internet eliminates the need for physical wiring for online access.\textsuperscript{222} Mobile phones are no longer just a communication device, they are a mini-computer providing information and entertainment.\textsuperscript{385}

The reach and features of smartphones offer novel health promotion applications. One example is location-based services; as the location of smartphone users is known (via in-built global positioning systems or cellular tower location), location-based health promotion interventions can be developed e.g. automated delivery of health promotion text messages when individuals enter a particular geographical area at a particular time of day. Another feature of smartphones that may be amenable for adaption for health promotion purposes are applications (‘apps’), programs that can be downloaded and used on the phone itself. Examples of health-focused apps already exist,\textsuperscript{386, 387} and are likely to become more widespread as smartphone penetration increases.

The dynamic nature of communication technologies is important to consider when designing and evaluating health promotion interventions. The use and popularity of sites and applications may change over time (for instance, MySpace is now focusing on entertainment rather than social networking due to the global dominance of Facebook\textsuperscript{388}), and ongoing changes to commercial site design and functionality may affect intervention delivery and evaluation (as happened during The FaceSpace Project). Beyond Web 2.0 is Web 3.0, the
This ever-changing environment requires those delivering health promotion interventions to “keep up” - which may be conflict with the desire to develop evidence-based interventions. By the time a comprehensive evaluation (particularly those using experimental designs) can be designed, conducted, analysed and published, sites, applications and technologies may have evolved so far as to render the intervention and/or evaluation relatively obsolete. Flexible frameworks are required to design, deliver, evaluate and fund health promotion interventions using communication technologies to ensure timeliness and thus utility and relevance.

Unlike more traditional methods of sexual health promotion, where individuals are passive observers of messages, communication technologies offer the potential for active user interaction. This permits detailed tailoring of messages to individuals, and promotes higher engagement of individuals. With SMS based interventions, one-to-one interaction predominates, as the individual can usually only reply to the sender of the message (if they can reply at all). Social networking sites and other social media on the hand, permit interaction with and between individuals, which may increase the engagement with, and thus effectiveness of, health promotion messages. The challenge for health promoters is how to encourage this interaction, beyond just attracting individuals to the campaign initially. The process and impact evaluation of The FaceSpace Project (currently underway) may provide some insight into maximising, and evaluating, interaction and engagement with health promotion interventions using social networking sites.

In all cases – whether health promotion interventions are delivered via SMS, social networking sites, apps or others – the health promotion message must be both delivered to and noticed by the intended recipient in order to have any impact on behaviour. Ongoing challenges in designing appealing and useful sexual health promotion messages exist, alongside where and how to deliver these messages in a world crowded with information. The private sector invests much time and resources in designing and delivering messages that will be noticed, recalled and utilised by their audiences; health promoters need to do the same.

**Thesis Strengths and Limitations**

A key strength of this thesis is evaluating the delivery of sexual health promotion messages to young people within the ‘real world’. This practical approach ensures that the success and lessons learnt from the studies presented can be directly applied into practice, along with the evaluation designs used.
Several methodological approaches were used to explore design, delivery and impact of sexual health promotion messages delivered via mass media, text messages and social networking sites. The approaches included analysis of routinely collected data sources, pre- and post- test designs, focus group discussions, randomised controlled trials and literature reviews. Particular emphasis was given to exploring what was, and was not, successful in the novel approaches trialled, and the reason for these outcomes.

There are some limitations to the studies presented. A variety of strategies were used to recruit participants, including population-based approaches (Chapter Two and Five) and convenience sampling at a music festival (Chapter Three and Four). Thus the results of these studies may not be generalisable to the wider population of young people in Victoria or Australia. In addition, not all participants completed the evaluation components of the two SMS studies (Chapters Three to Five), and there may be some bias in those that chose to complete these components. Where possible, attempts were made to adjust the analyses accordingly. The incomplete response to evaluation components also limited the analyses that could be undertaken, particularly within the S5 study (Chapter Five) where the small sample size limited the analysis of changes over time within individuals. The impact of the SMS interventions was only measured at the intervention end-point, thus the sustained impact of this intervention over time is not known.

Although the evaluation of the mass media campaign (Chapter Two) used objective assessment of testing rates, the two studies involving SMS (Chapters Three and Five) relied on self-report, which may be subject to recall and social desirability biases. Two studies (Chapter Two and Three) did not use control groups, thus we cannot be sure that the observed impact of the messages were not due to external factors to the intervention. Only preliminary detail regarding the evaluation of The FaceSpace Project (Chapter Seven) was included in this thesis; analysis of process and impact evaluation data from this project is currently underway.

All research designs involve a trade-off between randomisation (internal validity), representation (external validity) and realism. While all three aspects were explored within this thesis, realism – the practicality and utility of the approach trialled – was paramount in designing and evaluating sexual health promotion interventions that could be effectively used in the ‘real world’.
Conclusion

Communications technologies such as text messages and social networking sites offer an exciting new avenue for the delivery of sexual health promotion for young people. Not only do these technologies have wide audience reach, they offer additional features, such as interactivity, well beyond the traditional methods of sexual health promotion.

This thesis provided evidence of the success of using SMS for sexual health promotion on a population basis, as well as trialling a strategy (mobile advertising) to deliver SMS on a scale far larger than previously possible. The qualitative evaluation of the messages highlighted the key stylistic and content elements important in ensuring message acceptability and utility. In addition, this thesis presented the first overview of the extent to which social networking sites are being used for sexual health promotion, as well as lessons learnt from the delivery of one of the first sexual health promotion interventions using these sites. Throughout this thesis a variety of innovative evaluation designs and tools were used to assess the effectiveness of the sexual health promotion strategies, as well as factors impacting upon effectiveness.

Many challenges remain in implementing and evaluating sexual health promotion for young people remain, regardless of the delivery mechanism. These include design of appropriate, appealing and useful messages, reaching the intended target audience and designing practical evaluation strategies. Future areas of interest include designing interventions for use on smartphones and creating truly interactive interventions using social networking sites.
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The following appendices are included:

**Appendix One: SMS 2008 Baseline Questionnaire**

This questionnaire was completed on paper by participants at the 2008 Melbourne Big Day Out music festival. Data collected via this questionnaire are reported in Chapter Three.

**Appendix Two: SMS 2008 Follow Up Questionnaire**

This questionnaire was completed online. The appendix contains the list of questions as they are stored by the online survey tool used (Lime Survey); this is not the view of the questionnaire seen by participants. Data collected via this questionnaire are reported in Chapter Three.

**Appendix Three: SMS 2008 Theme Guide**

This theme guide was used to conduct the SMS 2008 evaluation focus groups; results from these focus groups are described in Chapter Four.

**Appendix Four: S$^5$ Baseline Questionnaire**

This questionnaire was completed by participants using their mobile phones. The appendix contains a visual representation of how the questionnaire appeared on participants mobile phones, as well as a full list of the questions asked. Data collected via this questionnaire are reported in Chapter Five.

**Appendix Five: S$^5$ Follow Up Questionnaire**

As with the baseline questionnaire (Appendix Four), this questionnaire was completed via mobile phones. This appendix contains the list of questions asked on this questionnaire; data collected via this questionnaire are reported in Chapter Five.
Appendix One: SMS 2008 Baseline Questionnaire

**SMS TO PROMOTE SEXUAL HEALTH TO YOUNG PEOPLE**

**ID Number:**

1. What is your gender?  
   - Female  
   - Male

2. Date of birth
   
3. Postcode

4. Which country were you born in?  
   - Australia  
   - Other (specify)

**SEXUAL HEALTH**

7. Have you visited a GP (doctor) for your health in the last 12 months?  
   - Yes  
   - No

8. When did you last have an STI test?  
   - Never had one  
   - 6-12 months ago  
   - 2-3 months ago  
   - 1-2 years ago  
   - 3-4 months ago  
   - More than 2 years ago

9. What was tested on your last STI test? (if at all applicable)  
   - Blood  
   - Urine  
   - Swab or smear of vagina/penis  
   - Don’t remember what was tested  
   - No

10. These questions are to test your knowledge of STIs:

   - People infected with STIs often don’t have any symptoms and won’t know they are infected.
   - Chlamydia can be diagnosed by a urine test.
   - Gonorrhea, syphilis, and chlamydia can all be easily treated with antibiotics.
   - The pap smear can be used to diagnose all the main STIs.
   - Chlamydia can cause women to miscarry (unable to become pregnant).
   - If you treated chlamydia infection can last for years.

   - TRUE  
   - FALSE  
   - DON’T KNOW

**RISK BEHAVIOUR**

11. Have you ever used illicit drugs?  
   - Yes  
   - No

12. Which drugs have you used in the last month? (tick all that apply)  
   - Acetaminophen  
   - Cocaine  
   - Ecstasy/MDMA  
   - Heroin  
   - Inhalants/chronic glue  
   - Marijuana/cannabis/joint  
   - Speedball/crystal meth  
   - Other (specify):__________

   - Never have used any drugs in last month

13. Alcohol: In the last 12 months how often have you drunk...  
   - Girls: 5 or more drinks in a day  
   - Boys: 7 or more drinks in a day

   - At least once a week  
   - At least once a month  
   - At least once a week  
   - Less than once a week

14. How many sexual partners have you had in your lifetime?  

15. In the last 12 months how many MALES have you had sex with?  
   - No MALE sex partners in last 12 months  
   - One male partner  
   - 2-5 male partners  
   - 6-10 male partners  
   - More than 10 male partners

16. In the last 12 months how many FEMALES have you had sex with?  
   - No FEMALE sex partners in last 12 months  
   - One female partner  
   - 2-5 female partners  
   - 6-10 female partners  
   - More than 10 female partners

NOTE: If you had no male or female sex partners in the past 12 months, do not continue.

In the next questions: “regular partner” means boyfriend/girlfriend/partner; “sexual partner” means any other partner.

17. How often did you use a condom with REGULAR sex partner in the last 12 months?  
   - No  
   - Always used a condom  
   - Sometimes (<50%)  
   - Never used a condom with regular partners

18. How often did you use a condom with CASUAL sex partner in the last 12 months?  
   - No  
   - Always used a condom  
   - Usually (>50%)  
   - Sometimes (<50%)  
   - Never used a condom with regular partners

19. How many new sexual partners (someone you had not had sex with before) have you had in the last 3 months?  

20. How often did you use a condom with NEW sex partner in the last 3 months?  
   - No  
   - Always used a condom  
   - Usually (>50%)  
   - Sometimes (<50%)  
   - Never used a condom with new partners

Thank you for completing this survey and enjoy your Big Day Out.
Appendix Two: SMS 2008 Follow Up Questionnaire

**SMS 2008 Follow Up Survey**

* MobileNum: Please enter your mobile number

Note: To be eligible for the prize draw, you MUST enter the same mobile number you gave us at the Big Day Out (the one you have been receiving the Burnet Institute SMS on)

Please write your answer here:

* Q01Gender: What is your gender?
  
  Please choose *only one* of the following:
  
  - Female
  - Male

* Q02DOB: What is your date of birth?
  
  Please enter a date:

* Q03Postcode: What is your postcode?
  
  Please enter 0000 if you do not currently live in Australia

Please write your answer here:

* Q04COB: Where were you born?
  
  Please choose *only one* of the following:
  
  - Australia
  - Other Country

[Only answer this question if you answered ‘Other Country’ to question ‘Q04COB’]

* Q04aCOB: Please specify your country of birth
  
  Please write your answer here:

* Q05Live: Who do you live with?
  
  Please choose *all* that apply:
  
  - Alone
  - Parent(s)
  - Your Partner
  - Housemates
  - Other Family
  - Child(ren)

* Q06Doctor: Have you visited a GP (doctor) for your own health in the last six months?
  
  Please choose *only one* of the following:
  
  - Yes
  - No

[Only answer this question if you answered ‘Yes’ to question ‘Q06Doctor’]
**Q06a Doctor Sex: Did you discuss sexual health and/or contraception with your GP (doctor)?**
- Yes
- No

**Q07STI Test When: When did you last have an STI test?**
*(STI=sexually transmitted infection)*
- Never had one
- 0 to 3 months ago
- 3 to 6 months ago
- 6 to 12 months ago
- 1 to 2 years ago
- More than 2 years ago

[Only answer this question if you have NOT answered 'Never had one' to question 'Q07STI Test When']
**Q08STI Test What: What was tested on your last STI test?**
- Blood
- Urine
- Swab or smear of vagina/penis
- Don't remember what was tested

**Q09 Know: The following questions test your knowledge of STIs**
Please choose the appropriate response for each item:

<table>
<thead>
<tr>
<th>People infected with STIs often don't have any symptoms and won't know they are infected</th>
<th>True</th>
<th>False</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia can be diagnosed by a urine test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonorrhoea, syphilis and chlamydia can all be easily treated with antibiotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The pap smear can be used to diagnose all the main STIs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlamydia can make women infertile (unable to become pregnant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If left untreated, chlamydia infection can last for years</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Filter1: Have you ever had sex? (vaginal and/or anal sex)**
- Yes
- No

[Only answer this question if you answered 'Yes' to question 'Filter1']
**Q10 Sex Life: How many sexual partners have you had in your lifetime?**
Please write your answer here...

[Only answer this question if you answered 'Yes' to question 'Filter1']
**Q11 Male 12: In the last 12 months how many MALES have you had sex with?**

Please choose "only one" of the following:
- No male partners in last 12 months
- One male partner
- 2-5 male partners
Appendix Two

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- 6-10 male partners
- More than 10 male partners

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you have NOT answered 'No male partners in last 12 months' to question 'Q11Male12'.]

* Q12Male6: In the last 6 months how many MALES have you had sex with?

Please choose 'only one' of the following:
- No male partners in last 6 months
- One male partner
- 2-5 male partners
- 6-10 male partners
- More than 10 male partners

[Only answer this question if you answered 'Yes' to question 'Filter1'.]

* Q13Female12: In the last 12 months how many FEMALES have you had sex with?

Please choose 'only one' of the following:
- No female partners in last 12 months
- One female partner
- 2-5 female partners
- 6-10 female partners
- More than 10 female partners

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you have NOT answered 'No female partners in last 12 months' to question 'Q13Female12'.]

* Q14Female6: In the last 6 months how many FEMALES have you had sex with?

Please choose 'only one' of the following:
- No female partners in last 6 months
- One female partner
- 2-5 female partners
- 6-10 female partners
- More than 10 female partners

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'More than 10 male partners' or '2-5 male partners' or '6-10 male partners' or 'One male partner' to question 'Q11Male12' and if you answered 'More than 10 male partners' or '6-10 male partners' or '2-5 male partners' or 'One male partner' to question 'Q12Male6'.]

* Q15CondReg1: How often did you use a condom with REGULAR sex partner/s in the last six months?

(A regular partner means a boyfriend/girlfriend/partner)

Please choose 'only one' of the following:
- N/A: No regular sex partner/s in last six months
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with regular partner/s

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'One male partner' or '2-5 male partners' or '6-10 male partners' or 'More than 10 male partners' to question 'Q11Male12' and if you answered 'No male partners in last 6 months' to question 'Q12Male6' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or
'6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6'

* **Q15CondReg2**: How often did you use a condom with REGULAR sex partner/s in the last six months?

(A regular partner means a boyfriend/girlfriend/partner)

Please choose "only one" of the following:

- N/A: No regular sex partner/s in last six months
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with regular partner/s

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'No male partners in last 12 months' to question 'Q11Male12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6']

* **Q15CondReg3**: How often did you use a condom with REGULAR sex partner/s in the last six months?

(A regular partner means a boyfriend/girlfriend/partner)

Please choose "only one" of the following:

- N/A: No regular sex partner/s in last six months
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with regular partner/s

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'More than 10 male partners' or '2-5 male partners' or '6-10 male partners' or 'One male partner' to question 'Q11Male12' and if you answered 'More than 10 male partners' or '6-10 male partners' or '2-5 male partners' or 'One male partner' to question 'Q12Male6']

* **Q16CondCas1**: How often did you use a condom with CASUAL sex partner/s in the last six months?

(A casual partner means a partner other than a boyfriend/girlfriend/partner)

Please choose "only one" of the following:

- N/A: No casual sex partner/s in last six months
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with casual partner/s

[Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'One male partner' or '2-5 male partners' or '6-10 male partners' to question 'Q11Male12' and if you answered 'No male partners in last 6 months' to question 'Q12Male6' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6']

* **Q16CondCas2**: How often did you use a condom with CASUAL sex partner/s in the last six months?

(A casual partner means a partner other than a boyfriend/girlfriend/partner)

Please choose "only one" of the following:

- N/A: No casual sex partner/s in last six months
- Always used a condom
Appendix Two

Usually (<50%) used a condom
Sometimes (<50%) used a condom
Never used a condom with casual partner(s)

[Only answer this question if you answered 'Yes' to question 'Filter1: and if you answered 'No male partners in last 12 months' to question 'Q11Male12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6'.]

* Q16CondCas3: How often did you use a condom with CASUAL sex partner(s) in the last six months?

(A casual partner means a partner other than a boyfriend/girlfriend/partner)

Please choose "only one" of the following:

- N/A: No casual sex partner(s) in last six months
- Always used a condom
- Usually (<50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with casual partner(s)

[Only answer this question if you answered 'Yes' to question 'Filter1: and if you answered 'One male partner' or '6-10 male partners' or '2-5 male partners' or 'More than 10 male partners' to question 'Q11Male12' and if you answered 'One male partner' or '2-5 male partners' or 'More than 10 male partners' to question 'Q12Male6'.]

* Filter2Type1: Have you had any new sexual partners in the past 3 months? (A new sexual partner is someone who you had not had sex with before)

Please choose "only one" of the following:

- Yes
- No

[Only answer this question if you answered 'Yes' to question 'Filter1: and if you answered 'One male partner' or '6-10 male partners' or '2-5 male partners' or 'More than 10 male partners' to question 'Q11Male12' and if you answered 'No male partners in last 6 months' to question 'Q12Male6'. and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6'.]

* Filter2Type2: Have you had any new sexual partners in the past 3 months? (A new sexual partner is someone who you had not had sex with before)

Please choose "only one" of the following:

- Yes
- No

[Only answer this question if you answered 'Yes' to question 'Filter1: and if you answered 'No male partners in last 12 months' to question 'Q11Male12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6'.]

* Filter2Type3: Have you had any new sexual partners in the past 3 months? (A new sexual partner is someone who you had not had sex with before)

Please choose "only one" of the following:

- Yes
- No
[Only answer this question if you answered 'Yes' to question 'Filter1 ' and if you answered 'Yes' to question 'Filter2Type1 ' and if you answered 'More than 10 male partners' or '2-5 male partners' or '6-10 male partners' or 'One male partner' to question 'Q11Male12' and if you answered 'More than 10 male partners' or '6-10 male partners' or '2-5 male partners' or 'One male partner' to question 'Q12Male6']

* Q17SexNewType1: How many new sexual partners have you had in the last three months?

Please write your answer here:

[Only answer this question if you answered 'Yes' to question 'Filter1 ' and if you answered 'One male partner' or '2-5 male partners' or '6-10 male partners' or 'More than 10 male partners' to question 'Q11Male12' and if you answered 'No male partners in last 6 months' to question 'Q12Male6' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6']

* Q17SexNewType2: How many new sexual partners have you had in the last three months?

Please write your answer here:

[Only answer this question if you answered 'Yes' to question 'Filter1 ' and if you answered 'No male partners in last 12 months' to question 'Q11Male12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6' and if you answered 'Yes' to question 'Filter2Type2']

* Q17SexNewType3: How many new sexual partners have you had in the last three months?

Please write your answer here:

[Only answer this question if you answered 'Yes' to question 'Filter1 ' and if you answered 'Yes' to question 'Filter2Type1 ' and if you answered 'More than 10 male partners' or '2-5 male partners' or '6-10 male partners' or 'One male partner' to question 'Q11Male12' and if you answered 'More than 10 male partners' or '6-10 male partners' or '2-5 male partners' or 'One male partner' to question 'Q12Male6']

* Q18CondNewType1: How often did you use a condom with NEW sex partner/s in the last three months?

Please choose "only one" of the following:

- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with new partner/s

[Only answer this question if you answered 'Yes' to question 'Filter1 ' and if you answered 'One male partner' or '2-5 male partners' or '6-10 male partners' or 'More than 10 male partners' to question 'Q11Male12' and if you answered 'No male partners in last 6 months' to question 'Q12Male6' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6' and if you answered 'Yes' to question 'Filter2Type2']

* Q18CondNewType2: How often did you use a condom with NEW sex partner/s in the last three months?
Appendix Two

Please choose "only one" of the following:
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with new partner/s

* Only answer this question if you answered 'Yes' to question 'Filter1' and if you answered 'No male partners in last 12 months' to question 'Q11Male12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q13Female12' and if you answered 'One female partner' or '2-5 female partners' or '6-10 female partners' or 'More than 10 female partners' to question 'Q14Female6' and if you answered 'Yes' to question 'Filter2Type3'.

* Q18CondNewType3: How often did you use a condom with NEW sex partner/s in the last three months?

Please choose "only one" of the following:
- Always used a condom
- Usually (>50%) used a condom
- Sometimes (<50%) used a condom
- Never used a condom with new partner/s

* Q19SMSget: As part of this study, you may have received some SMS (text messages) about sexual health or STIs over the last six months. How many SMS did you receive?

Please choose "only one" of the following:
- None
- One or two
- Three or four
- Five to 10
- 10 to 15
- More than 15

* Only answer this question if you have NOT answered 'None' to question 'Q19SMSget'.

* Q20SMSOpinion: Regarding the SMS you received.....

Please choose the appropriate response for each item:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree or Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>You found something from them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They were interesting or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>entertaining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They were annoying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Only answer this question if you have NOT answered 'None' to question 'Q19SMSget'.

* Q21SMSshow: Did you show any of the SMS you received to other people?

Please choose "only one" of the following:
- Yes
- No

* Only answer this question if you have NOT answered 'None' to question 'Q19SMSget' and if you answered 'Yes' to question 'Q21SMSshow'.

* Q22: Who did you show the SMS to?

Please choose "all" that apply:
- Friends
Sex partner/s  
Workmates  
Housemates  
Parent/s  
Other family members (brother, cousin etc)  
Other

[Only answer this question if you have NOT answered 'None' to question 'Q19SMSget' and if you answered 'Yes' to question 'Q21SMSshow']

* Q23SMSnum: Approximately how many other people did you show the SMS to?
  Please choose *only one* of the following:
  - One or two people
  - Three or four people
  - Five to 10 people
  - 10 to 20 people
  - More than 20 people

[Only answer this question if you have NOT answered 'None' to question 'Q19SMSget']

* Q24Future: Hypothetically, if SMS about sexual health and safer sex were to be used in future health promotion campaigns, would you be happy to receive them?
  Please choose *only one* of the following:
  - Yes
  - No
  - Don't know

[Only answer this question if you have NOT answered 'None' to question 'Q19SMSget']

Q25Comments: Do have any other comments about the SMS you received?
Please write your answer here:

Q26Email: Please enter your email address below if you wish to receive a copy of the overall project results (expected October 2008)
Please write your answer here:

* Q27Contact: Thank you for getting this far in the survey!

Second last question before you are entered in the prize draw - would you be interested in being contacted about future evaluations of this project and other research projects conducted by the Burnet Institute?
Please choose *only one* of the following:

- Yes
- No

* MobileNumConfirm: Survey Complete!

Please confirm your mobile number below to be entered into the prize draw. Winners will be notified by the end of July 2008.

Thanks for being in this study & completing this follow up survey.

Please write your answer here:

<table>
<thead>
<tr>
<th>Submit Your Survey.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thank you for completing this survey.</td>
</tr>
</tbody>
</table>
**Appendix Three: SMS 2008 Theme Guide**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Minutes (approx)</th>
<th>Question</th>
</tr>
</thead>
</table>
| Opinions of the SMS received       | 10              | In general, what did you think of the messages you received during the SMS project?  
  - Were they funny?  
  - Were they annoying?  
  - Were they silly?  
  - Were they informative?  
  - Were they useful?  
  Are there any particular messages that you remember receiving?  
  Which one(s)?  
  - Why do you remember that message in particular?  
  - What was different about that message that made you remember it specifically compared to the other messages? |
| Effect of SMS on behaviour         | 10              | Did any of the messages result in you changing your behaviour e.g. prompting you to get an STI test or use a condom?  
  - *(If yes)* Are you happy to tell us what that effect was? What was it?  
  - *(If yes)* Do you remember which message had that effect?  
  - *(If yes)* Why do you think that message had an effect on you?  
  - *(If no)* Why do you think the messages didn’t have a direct effect on you? |
| Opinions of the SMS received       | 10              |  
  Option to show messages on powerpoint here and get direct feedback on messages if have plenty of time/discussion not going well. Will have all messages ready on the powerpoint and focus on the ones that hadn’t yet been discussed by the group  
  Questions  
  - *Do you remember receiving this message?*  
  - *Did you like this message? What did you like about this message? What didn’t you like about this message?*  
  - *Do you think the message is telling you something important? Why/why not?*  
  - *Did this message prompt you to change anything? Why do you think it prompted you*  
  - *How could this message be improved?* |
| Reach of SMS Opinions of SMS received | 5              | Only if have time: Did you show the messages to any other people?  
  - *(If yes)* Why?  
  - *(If yes)* Who did you show the messages to?  
  - *(If yes)* What did they think of the messages?  
  - *(If no)* Why didn’t you show the messages to anyone? |
| Future implementation              | 10              | In terms of using SMS for similar health promotion campaigns in the future, how could they be improved?  
  - Change how often they come?  
  - Change time of day/day of week sent?  
  - Change key messages?  
  - Include more/less topics?  
  - Use MMS with graphics/colours?  
  - Have associated website/Facebook page etc?  
  - Tailor messages to individuals e.g. based on gender, relationship status, where live  
  Have contact numbers for clinic etc? |
<table>
<thead>
<tr>
<th>Theme</th>
<th>Minutes (approx)</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context – where and how sexual health fits into young people’s lives</td>
<td>5-10</td>
<td>Now I’d like you move away from this SMS project and think more generally about sexual health and young people&lt;br&gt;Do you think young people think about their sexual health much?&lt;br&gt;- <em>(If yes)</em> When do they think about it?&lt;br&gt;- <em>(If no)</em>, why not?&lt;br&gt;Apart from the SMS you received, where do you and your friends get information about sex and sexual health?&lt;br&gt;- Do you....read magazines? Talk to friends? Talk to family? Look on internet sites? Ask a doctor/nurse/other health professional?&lt;br&gt;- What sort of information do you get from magazines/internet/friends/dr nurse..&lt;br&gt;- Which sources of information do you use most often?&lt;br&gt;Which sources of information do you think are the most reliable/believe the most?</td>
</tr>
<tr>
<td>Future implementation</td>
<td>10</td>
<td>Now I’d like you to think back to a time where something made you or your friends change behaviour related to sexual health&lt;br&gt;Firstly, has anything ever made you/your friends change if/how often you used condoms? What made you make this change?&lt;br&gt;- What triggered this change?&lt;br&gt;- Did a person contributed to making this change?&lt;br&gt;- How could this kind of change be incorporated into a health promotion message, via text or other means? Could it be incorporated?&lt;br&gt;What about attending a clinic for an STI test - can you remember anything that inspired you or your friends to do this?&lt;br&gt;- A person? An experience?&lt;br&gt;- How could this kind of change be incorporated into a health promotion message, via text or other means? Could it be incorporated?</td>
</tr>
<tr>
<td></td>
<td>5-10</td>
<td>Can you think of any other ways we could use, apart from SMS, for similar health promotion messages?&lt;br&gt;- Facebook?&lt;br&gt;- YouTube?&lt;br&gt;- Chat sites?&lt;br&gt;- Websites?&lt;br&gt;- Email?</td>
</tr>
</tbody>
</table>
Appendix Four: $S^5$ Baseline Questionnaire
1. Are you
   - Male
   - Female

2. What is your date of birth?
   ____________________________ / ____________________________ / 19____

3. What is your postcode?
   ____________________________

4. Suppose your skin was exposed to strong sunshine at the beginning of summer with no protection at all. If you stayed in the sun for 30 minutes, would your skin:
   - Just burn or go red
   - Burn/go red, then tan afterwards
   - Just tan
   - Stay the same, I was born with dark skin

5. Do you like to get a suntan?
   - No
   - Yes, a light tan
   - Yes, a moderate tan
   - Yes, a very dark tan

6. Thinking about sunny days in summer when you are outside for more than an hour between 11am and 3pm, how often would you….
   | a. Wear a hat? | Never | Rarely | Sometimes | Usually | Always |
   | b. Deliberately wear less or briefer clothing so as to get some sun on your skin? | Never | Rarely | Sometimes | Usually | Always |
   | c. Wear maximum protection sunscreen? (SPF 30+) | Never | Rarely | Sometimes | Usually | Always |
   | d. Stay mainly in the shade? | Never | Rarely | Sometimes | Usually | Always |

7. In the last six months did you discuss sexual health and/or contraception with your GP (Doctor)?
   - No - didn’t go to Dr
   - No - went to Dr but didn’t discuss sexual health
   - Yes - went to Dr and discussed sexual health
8. When did you last have a test for a sexually transmitted infection (STI)? *(excluding a pap smear)*

- Never had one
- 0-3 months ago
- 3-6 months ago
- 6-12 months ago
- 1-2 years ago
- More than 2 years ago

9. These questions are to test your knowledge of STIs

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People infected with STIs usually have symptoms e.g. discharge, itching, rash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Gonorrhoea, syphilis and chlamydia can all be easily treated with antibiotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Chlamydia can make women infertile (unable to become pregnant)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. In the last six months, how many people have you had sex with? (vaginal and/or anal sex)

- None
- One
- 2-3
- 4-5
- 6-10
- More than 10

11. How often did you use a condom when having sex in the last six months?

- N/A: no sex partner in last six months
- Usually
- Always
- Half the time
- Sometimes
- Never used a condom

12. How often did you use a condom with NEW sex partner/s in the last three months? *(a new partner is someone you hadn’t had sex with before)*

- N/A: no new sex partner in last three months
- Usually
- Always
- Half the time
- Sometimes
- Never used a condom with new partner/s
Appendix Five: S\textsuperscript{5} Follow Up Questionnaire

1. Are you
   - [ ] Male
   - [ ] Female

2. What is your date of birth?
   - [ ]/[ ]/19[ ]

3. What is your postcode?
   - [ ] [ ] [ ] [ ] [ ]

4. Suppose your skin was exposed to strong sunshine at the beginning of summer with no protection at all. If you stayed in the sun for 30 minutes, would your skin:
   - [ ] Just burn or go red
   - [ ] Burn/go red, then tan afterwards
   - [ ] Just tan
   - [ ] Stay the same, I was born with dark skin

5. Do you like to get a suntan?
   - [ ] No
   - [ ] Yes, a light tan
   - [ ] Yes, a moderate tan
   - [ ] Yes, a very dark tan

6. Thinking about sunny days over the past summer when you were outside for more than an hour between 11am and 3pm, how often did you.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Wear a hat?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>b. Deliberately wear less or briefer clothing so as to get some sun on your skin?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>c. Wear maximum protection sunscreen? (SPF 30+)</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>d. Stay mainly in the shade?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

7. How many times did you get sunburnt last summer? By sunburnt we mean any reddening of the skin after being outside

   - [ ] Never
   - [ ] 1-2 times
   - [ ] 3-5 times
   - [ ] 6-10 times
   - [ ] 11 or more times
   - [ ] Can’t say
8. Do you agree or disagree with the statement “There is little chance that I’ll get skin cancer”.

☐ Disagree strongly  ☐ Agree mildly
☐ Disagree mildly  ☐ Agree strongly
☐ Neither disagree nor agree

9. In the last six months did you discuss sexual health and/or contraception with your GP (Doctor)?

☐ No - didn’t go to Dr
☐ No - went to Dr but didn’t discuss sexual health
☐ Yes - went to Dr and discussed sexual health

10. When did you last have a test for a sexually transmitted infection (STI)? (excluding a pap smear)

☐ Never had one  ☐ 6-12 months ago
☐ 0-3 months ago  ☐ 1-2 years ago
☐ 3-6 months ago  ☐ More than 2 years ago

11. These questions are to test your knowledge of STIs

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People infected with STIs usually have symptoms e.g. discharge, itching, rash</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b. Gonorrhoea, syphilis and chlamydia can all be easily treated with antibiotics</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c. Chlamydia can make women infertile (unable to become pregnant)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

12. In the last six months, how many people have you had sex with? (vaginal and/or anal sex)

☐ None  ☐ 4-5
☐ One  ☐ 6-10
☐ 2-3  ☐ More than 10

13. How often did you use a condom when having sex in the last six months?

☐ N/A: no sex partner in last six months
☐ Always
☐ Usually
☐ Half the time
☐ Sometimes
☐ Never used a condom
14. How often did you use a condom with NEW sex partner/s in the last three months? *(a new partner is someone you hadn’t had sex with before)*

- N/A: no new sex partner last 3 months
- Always
- Usually
- Half the time

14. You may have received some SMS over the last four months about either sexual health or sun protection. Did you receive any SMS like this?

- Yes – sexual health ONLY
- Yes – sun protection ONLY
- Yes – both sexual health AND sun protection
- No – did not receive these messages (skip to end)

15. Regarding the SMS that you received...

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>You learnt something from them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They were interesting or entertaining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They were annoying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. Did you show any of the SMS to other people?

- No
- Yes – to one or two people
- Yes – to three or four people
- Yes – to five to ten people
- Yes – to more than ten people

17. Do you agree to be contacted about future evaluation of this project?

- No
- Yes → *If yes*

Please enter your mobile number: ____ ____ ____ ____ ____