Research

Development of a theory and evidence-based sex education intervention on Chlamydia for secondary school students

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This article describes the process taken to develop a Relationship and Sex Education (RSE) intervention, for students in years 9 to 11 (aged 14 to 16) in the UK, targeting risk perceptions of Chlamydia Trachomatis. RSE lessons are a good vehicle for intervention delivery as they can reach large numbers of the target audience and evidence suggests sex education can have a positive impact on sexual risk taking (Kirby, 2007). The intervention was developed in collaboration with Public Health England (PHE; previously known as the Health Protection Agency [HPA]) to complement existing, free to download resources for teachers hosted on their educational website: www.e-bug.eu. This paper describes the concept of Intervention Mapping and proceeds to briefly present each stage of this process.

INTERVENTION MAPPING (IM) was used as a framework to develop the current intervention (Bartholomew et al., 2011. IM is a logical process of sequential and iterative steps in which multiple methods are applied to build understanding of, and generate solutions for, the health problem of interest. Relationship and Sex Education (RSE) is often developed on the premise that information provision leading to knowledge change alone will be sufficient for behaviour change. However, evidence suggests that this is not the case (e.g. Abraham et al., 1992; Henderson et al., 2007; Richard, van der Pligt & de Vries, 1991). Indeed, successful sexual health interventions usually include content targeting the psychosocial determinants of behaviour (Kirby, 2007). IM produces educational programmes grounded in theory and evidence. IM also requires the application of robust methods and detailed planning including a needs assessment, use of the logic model approach, and pilot testing of materials, which have also been identified as characteristics of success (Kirby, 2007). The IM process followed to develop the current sexual health intervention is briefly described below. For an in-depth description of IM please refer to Bartholomew et al. (2011).

Step 1: Needs assessment

The needs assessment involves a thorough analysis of the health problems including assessment of behavioural and environmental factors and the personal and external determinants of these. The methods used to conduct the needs assessment and the findings are briefly described below. Readers interested in a more detailed description are invited to read the full report on intervention development (Newby & Joshi, 2011) and content available at: www.healthinterventions.co.uk.

Literature reviews focussing on chlamydia/sexually transmitted infections (STIs), sexual health behaviour, and risk perception theory, along with new empirical research, were used to better understand the health problem and its determinants.

The health problem: Chlamydia is the most common bacterial STI in the UK (HPA, 2012) and is spread through unprotected sex. Incidence is highest amongst young

people aged 16 to 24 years with an estimated one-in-10 young people in this age group infected (HPA, 2008). In the majority of cases chlamydia is asymptomatic and repeat or untreated infections can lead to more serious health concerns such as Pelvic Inflammatory disease, infertility and ectopic pregnancy (HPA, 2012a).

Behavioural and environmental determinants: Evidence suggests that the main contributing factors to chlamydia infection are early first sex, having multiple partners, having concurrent sexual partners, having unprotected sex, and failure to use testing/ screening services (Kirby, 2007; Simms et al., 2007)

Personal and external determinants: There are numerous determinants of adolescent sexual behaviour, some of which are more amenable to change than others (Kirby, 2007). Given the focus of the lesson on chlamydia, developers decided to focus on determinants of behaviour related to knowledge and risk perception of chlamydia and excluded other potentially important determinants of behaviour, this was a pragmatic decision based on the constraints of the project and was considered a sound decision based on theory and evidence which identifies risk perception as potentially the most important determinant of behaviour. Risk perception is a key construct in a number of theories of behaviour change including the Health Belief Model (Rosenstock, 1974), the precaution adoption process (Weinstein, 1988) and protection motivation theory (PMT; Rogers & Prentice-Dunn, 1997). Evidence from meta-analyses suggests that risk perception has a small but significant association with intentions and behaviour (e.g. Milne, Sheeran & Orbell, 2000; Witte & Allen, 2000). Estimates of these relationships may be smaller than is actually the case due to measurement and study design issues (Wright, 2010).

Knowledge and perceived risk of chlamydia: Evidence suggests that adolescents possess a good awareness of the existence of chlamydia but have limited knowledge regarding the specifics of the infection, that is, its presentation and treatment (Zakher & Kang, 2008; Garside et al., 2001). There is also evidence that chlamydia is seen as one of the less serious STIs (Chaudhary et al., 2008). Adolescents may underestimate the risk of infection due to unhelpful beliefs (Newby, Wallace & French, 2012) and may not perform protective behaviour because they do not understand the physiological link between infection and its long-term health consequences (Lord, Brown & Newby, in preparation).

Review of existing teaching materials and young people's preferences for content and delivery of RSE: Resources for current RSE lessons about STIs (e.g. lesson plans and exercises) were evaluated to identify good practice and stimulate ideas. Resources were identified using Google search engine. The majority of lessons reviewed consisted of naming the different STIs and identifying their symptoms using graphic images of the STI.

Two focus groups with secondary school pupils (N=12; nine female and three male) aged 13 to 14 years, and interviews with RSE teachers (N=2) were conducted to ascertain their preferences for content and delivery of the proposed intervention. This was supplemented by consulting secondary sources of information on young people's views of existing provision of RSE (e.g. Sex Education Forum, 2008; UK Youth Parliament, 2007). Broadly speaking, adolescents were critical of RSE lessons for not reflecting the reality of their lives and also for using materials that were not engaging. On the basis of this review, it was agreed that the intervention would be semi interactive to engage pupils, and make use of e-resources that could operate as stand-alone materials on the e-Bug website and thus continue to support delivery after the lesson. It was further agreed to include scenarios and characters relevant to young people and that reflected their lives.

Step 2: Intervention objectives

Upon completion of the needs assessment the behavioural outcome to be targeted was agreed to be: an increase in consistent condom use. Whilst other important behavioural factors were acknowledged (e.g. delay of sex, reduction in number of sexual partners), the decision to focus on condom use was made on the basis that it would enable provision of a single clear message, be feasible within the timeframe available for delivery, and because this is the dominant message within RSE delivery regarding risk behaviour. It was, however, agreed that the contribution that other behaviours could make to reducing risk would be conveyed within the lesson, albeit not directly targeted.

The performance objectives, which represent a sub-set of behaviours required to achieve these outcomes, were:

1. Decide to use condoms at every sexual intercourse;
2. Buy condoms;
3. Use condoms.

Determinants to be the focus of change: Chlamydia knowledge and risk perception, and self-efficacy for condom purchasing and use, were selected as the determinants of behaviour on which to focus the intervention. The decision to focus on risk perceptions has been discussed above. Self-efficacy was also included as some theories, such as the Protection Motivation Theory (Rogers & Prentice-Dunn, 1997) and the Extended Parallel Processing Model (Witte, 1992, 1998) which explain the relationship between risk perception and intentions/behaviour suggest that raising threat appraisals in the absence of a coping response could be counterproductive.

Matrices of change objectives: Mapping performance objectives against determinants creates change objectives which represent the immediate focus for the intervention. The final matrix for this intervention is presented within the full report on intervention development and content available at: www.healthinterventions.co.uk (Newby & Joshi, 2011). Change objectives included: (1) Understand both the immediate and long-term negative consequences of infection; (2) Understand the fallibility of using external cues to judge the likelihood that a partner has a STI; and (3) Have basic understanding of the physiological link between infection and physiological consequences.

Step 3: Theoretical methods and practical strategies

Theoretical methods and corresponding practical strategies were selected to address each of the change objectives. This is one of the most challenging steps within IM because there is at present no established nomenclature of Behaviour Change Techniques (BCTs; akin to theoretical methods). Despite progress in this area led by Michie and colleagues (Michie et al., 2013), early versions of such taxonomies developed for specific health behaviours describe techniques but do not link these to theoretical components (e.g. exercise by Michie et al., 2011). Whilst guidance on the development and evaluation of complex interventions exists, such as the Medical Research Council (MRC) framework for complex interventions (Craig et al., 2000), and IM (Bartholomew et al., 2011), information on how to select techniques to change behavioural determinants is either absent or implicit. Furthermore, theoretical frameworks largely do not provide any help with this. One notable exception is Social Cognitive Theory (Bandura, 1997) which specifies how to change self-efficacy using the techniques of mastery experiences. Turning to the evidence base to identify the components of successful interventions is of little help either. Interventions are typically poorly specified and reported, making it difficult or impossible to identify what techniques were used to target which determinants, and via which causal pathways change was brought about. Michie and colleagues are in the process of

responding to this problem (Michie et al., 2013). Until this nomenclature is complete, intervention developers are required to use the best evidence and indexes available. For this intervention, the developers used the most detailed and refined taxonomy available at the time which was the CALO-RE taxonomy developed for physical activity and healthy eating behaviours (Michie et al., 2011). KN identified BCTs to target knowledge, risk perception and self-efficacy based on theoretical understanding and an earlier piece of work by Michie and colleagues (Michie et al., 2008) which mapped an early version of the BCT taxonomy onto behaviour determinants. Decisions were corroborated by a second health psychologist, KB. Creative ways to deliver the BCTs which enabled change objectives to be accomplished were then identified. Further detail on the selection of BCTs and selection of practical strategies to deliver these (Newby & Joshi, 2011) can be found on the health interventions website.

A professional animator created a series of semi-interactive, computer-based exercises following a detailed sequence from the intervention developers. A lesson plan for teachers which outlines the lesson objectives accompanied the four exercises. To promote accurate perceptions of vulnerability, numeric information on the risk of chlamydia infection was accompanied with a visual aid, and pupils were encouraged to personalise the information Animated characters, designed to reflect a diverse range of adolescents, are featured within the exercises (see www.e-bug.eu for images). One of the exercises is an interactive animated movie and depicts chlamydia bacterium travelling through the female reproductive organ. The exercise demonstrates the level of damage chlamydia can cause within the body and highlights potential long-term consequences such as infertility if left untreated. The exercise aims to encourage the development of accurate perceptions of the severity of chlamydia and enable young people to understand the link between infection and its long-term consequences. The final image of the animation depicts a condom blocking the chlamydia bacterium from entering the body thus providing a simple and powerful image for students to take away. Another of the exercises aims to reveal how easily chlamydia can be transmitted through sexual partners if protection is not used. This exercise includes the affected animated characters telling the story of how they contracted chlamydia. The class is encouraged to discuss each character's scenario and how they could have avoided/reduced the likelihood of becoming affected. As a whole the intervention attempts to enhance risk perceptions of chlamydia whilst highlighting behaviours that help to prevent infection. These behaviours include where to access condoms, negotiating how to say no to sex and how to correctly put on a condom. Students are also provided with information about sexual health clinics that provide testing for STIs.

Step 4: Intervention plan

The intervention plan was a culmination of Steps 1 to 3, in that a workable prototype was developed. This process required creativity and was time consuming. Content had to be considered from a user perspective, streamlining and ordering messages for maximum impact and monitoring development in line with theory requirements. Input from the user group was sought to refine the content and design. Difficulties during this step included ensuring the theory base was correctly operationalised, and overseeing the fidelity of delivery during piloting of the intervention. Although costly, the expertise of relevant technology professionals was vital to produce and test the prototype. To ensure fidelity of the prototype to the overall intervention goal, each performance objective was mapped against a section of the intervention to ensure each one had been addressed.

The intervention materials and facilitators manual were piloted with secondary

schools pupils (*N*=26) and RSE teachers (*N*=2). Feedback from the pilot testing was positive. Students engaged well with the interactive elements of the lesson and understood the information being presented. Suggestions for changes were taken on board. These included making changes to one of the activities to make it more interactive.

Step 5: Programme implementation

Plans for the successful adoption and implementation of the programme were developed. Unique selling points, (e.g. grounded in evidence, incorporates behaviour change techniques, is computer-based, semi-interactive and was developed with users), were identified and highlighted alongside the lesson on the e-Bug website. The e-Bug team will promote the lesson upon its launch using their usual dissemination routes. Following the completion of the on-going randomised control trial evaluation of the lesson (see below) developers will investigate the potential for some of the activities to be used as educational resources within the National Chlamydia Screening Programme. Delaying this process will avoid contamination within the control groups (i.e. if the lesson was being promoted before the evaluation some pupils within the control groups may have already had/seen the lesson).

Step 6: Evaluation

A process and outcome evaluation of this intervention is currently on-going using a two-arm cluster RCT using a waiting-list control design. Both evaluations will be completed late 2013. Further details on the design can be found in the evaluation protocol (Newby et al., in press).

Conclusion

IM was employed to develop a sexual health intervention aimed at year 9 to 11 students in the UK. IM provided a logical foundation for the development based on empirical evidence and psychological theory. Conducting a needs assessment allowed the intervention aims to directly address the user's needs. The intervention was computer based and semi-interactive in order to engage and enhance students learning, however, this should not overshadow educational content. Effect and process evaluations of the intervention are currently on-going within schools throughout the Midlands and the south-west and will conclude in late 2013.

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