

# A review of current practices to increase Chlamydia screening in the community – a consumer-centred social marketing perspective

Lyn Phillipson PhD,\* Ross Gordon PhD,† Joanne Telenta MPH,‡ Chris Magee PhD§ and Marty Janssen MPH¶

\*Associate Director, Centre for Health Initiatives, University of Wollongong, Wollongong, NSW, †Senior Lecturer, Marketing and Managements, Macquarie University, Sydney, NSW, ‡Project Manager, §Senior Research Fellow, Centre for Health Initiatives, University of Wollongong, Wollongong, NSW and ¶Project Officer, Illawarra Shoalhaven Local Health District, HIV/AIDS and Related Programs (HARP) Unit, Wollongong, NSW, Australia

## Abstract

**Background** Chlamydia trachomatis is one of the most frequently reported sexually transmitted infections (STI) in Australia, the UK and Europe. Yet, rates of screening for STIs remain low, especially in younger adults.

**Objective** To assess effectiveness of Chlamydia screening interventions targeting young adults in community-based settings, describe strategies utilized and assess them according to social marketing benchmark criteria.

**Search strategy** A systematic review of relevant literature between 2002 and 2012 in Medline, Web of Knowledge, PubMed, Scopus and the Cumulative Index to Nursing and Allied Health was undertaken.

**Results** Of 18 interventions identified, quality of evidence was low. Proportional screening rates varied, ranging from: 30.9 to 62.5% in educational settings ( $n = 4$ ), 4.8 to 63% in media settings ( $n = 6$ ) and from 5.7 to 44.5% in other settings ( $n = 7$ ). Assessment against benchmark criteria found that interventions incorporating social marketing principles were more likely to achieve positive results, yet few did this comprehensively. Most demonstrated customer orientation and addressed barriers to presenting to a clinic for screening. Only one addressed barriers to presenting for treatment after a positive result. Promotional messages typically focused on providing facts and accessing a testing kit. Risk assessment tools appeared to promote screening among higher risk groups. Few evaluated treatment rates following positive results; therefore, impact of screening on treatment rates remains unknown.

**Discussion** Future interventions should consider utilizing a comprehensive social marketing approach, using formative research to increase insight and segmentation and tailoring of screening

### Correspondence

Lyn Phillipson PhD  
Associate Director  
Centre for Health Initiatives  
University of Wollongong  
Wollongong  
NSW 2500  
Australia  
E-mail: lphillip@uow.edu.au

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Correction added on 10 February 2015, after first publication: Ross Gordon's affiliation should read as Senior Lecturer, Marketing and Managements, Macquarie University, Sydney, NSW, Australia

interventions. Easy community access to both screening and treatment should be prioritized.

## Introduction

Chlamydia trachomatis (CT) is one of the most frequently reported sexually transmitted infections (STI) in Australia,<sup>1</sup> the UK<sup>2</sup> and in Europe.<sup>3</sup> International prevalence studies highlight that sexually active adults under the age of 30 years are most at risk of infection.<sup>3</sup> If CT is left untreated, it can lead to serious conditions such as pelvic inflammatory disease and tubal infertility in females; epididymitis, urethritis and proctitis in males.<sup>4</sup> Reducing the rates of STIs such as Chlamydia is therefore an important public health and social priority across the world.<sup>5</sup>

The main risk factors for CT in sexually active females are as follows: age (<25 years), inconsistent use of barrier contraceptives (e.g. condoms), multiple sexual partners, cervical ectopy and a history of STI or a co-existing STI.<sup>4</sup> Many existing strategies to reduce infection rates have focused on awareness raising and behaviour changes relating to condom use. Because CT is asymptomatic in about 80% of cases, screening can also provide an effective method of early detection. In the US and Australia, sexual health guidelines recommend annual CT screening in primary care for all sexually active females aged between 15 and 25 years, and for sexually active young males in high risk groups or clinical settings (e.g. adolescent clinics, correctional facilities, STD clinics).<sup>6–8</sup> However, only a limited number of countries have taken a systematic approach to effect Chlamydia control and only 13 of 29 countries in Europe have national guidelines for screening, diagnosis and management.<sup>9</sup>

Chlamydia trachomatis screening is non-invasive and typically involves a urine test or swab for females, and a urine test for males. In Australia, CT screening most commonly occurs through opportunistic screening during a GP consultation. The 2007/2008 national GP CT testing rate per 100 sexually active individuals

was 8.0%, although it was considerably higher in females (12.5%) compared with males (3.7%).<sup>10</sup> In the US, significant improvements in the Chlamydia screening rates have been achieved through targeted programmes with effective rates of 45% for insured and 58% for Medicaid-covered sexually active women aged 16–24 years.<sup>11</sup> Whilst there are significant variations internationally in screening and surveillance programmes, what is clear is that screening rates remain lower in younger adults and at risk groups than the desired target rates.<sup>9–12</sup>

Despite the availability of non-invasive testing methods and highly effective medical treatments, rates of screening for STIs remain low in younger adults.<sup>10</sup> Whilst screening in primary care settings may be improved by the universal offer of screening to some patients,<sup>13</sup> Low *et al.*<sup>14</sup> found that there was little evidence to support opportunistic CT screening across settings for young people aged less than 25 years. This creates an imperative to develop insight and evaluate the features of interventions that can more effectively promote CT screening and engage this younger demographic.

Previous sexual health research<sup>15</sup> and current government sexual health policies in countries such as the UK<sup>16</sup> have highlighted that gaining the consumer (or participant) perspective is central to understanding how to increase the utilization of sexual health screening programmes. This mirrors a wider recognition of the importance of consumer orientation in public health service delivery.<sup>16,17</sup> Social marketing is a strategic framework that has successfully utilized a consumer-centred approach to support attitudinal and behaviour change at a group or community level across numerous health issues.<sup>18,19</sup> Therefore, it may have utility in facilitating access and use of Chlamydia screening among young people in the community.

This article presents the findings from a systematic literature review that examines current

evidence regarding the nature and effectiveness of consumer approaches to promote opportunistic CT screening within a range of community settings to engage young people (<30 years). Whilst a recent review investigated home-based Chlamydia and gonorrhoea screening strategies and outcomes,<sup>20</sup> this study is the first to evaluate the approaches within a variety of 'non-clinical' community settings. Furthermore, although current CT interventions use a variety of frameworks and approaches, social marketing has been suggested as a particularly relevant and promising approach to sexual health programmes. The present systematic review also assesses included interventions against recognized social marketing benchmark criteria.<sup>21</sup> Whilst it is important to acknowledge that included interventions may not have been planned using the social marketing framework, this assessment can help identify strengths and weaknesses in current approaches and identify useful strategies for future interventions. This approach has been used in previous reviews on the effectiveness of behaviour change interventions for other health issues.<sup>19,22</sup>

Social marketing is a systematic framework that uses marketing principles to promote socially beneficial behaviour change.<sup>23</sup> It is distinctive from other approaches as it is consumer orientated and facilitates change by enhancing the benefits associated with the behaviour and minimizing the costs.<sup>23</sup> Well-designed social marketing programmes have been effective in promoting health behaviour change in relation to substance misuse, food and nutrition and physical activity;<sup>19,22</sup> and other screening behaviours, for example, colorectal cancer.<sup>24</sup> Given the effectiveness of social marketing in other health behaviours, it is appropriate to investigate the utility of its principles to promote CT screening. Whilst the majority of interventions in the systematic review were not conceptualized according to social marketing principles, the social marketing benchmarking criteria provide insight into the relative strengths and weaknesses of existing interventions from this perspective. Furthermore, this allows for recommendations for the

development of future CT screening that could utilize social marketing as a framework.

## Method

A systematic literature search using the databases Medline, Web of Knowledge, PubMed, Scopus and the Cumulative Index to Nursing and Allied Health was conducted to identify published behavioural interventions to increase Chlamydia screening. The following terms were used to search for academic peer-reviewed published articles published in English from January 2002 to June 2012: 'Chlamydia AND (screen or screening or intervention\* or social marketing or program\* or campaign)'. Titles and abstracts were screened by two reviewers to identify potentially relevant articles. Reference lists of identified articles were also searched to identify any additional relevant papers. Full-text articles were read independently by two of the authors to ensure consensus was reached on the final articles to be included. Studies were included if they measured CT screening behaviour (not just knowledge or beliefs), targeted CT screening only<sup>a</sup>, targeted people under 30 years of age and were implemented in non-clinical settings. Whilst it is noted that national population screening rates are often provided for a more limited age range (15–24 years), many of the relevant research studies included people aged from 15 to 30 years and were included to ensure all relevant literature was reviewed.

Exclusion criteria were as follows: educational or awareness raising programmes with no behaviour change objectives, poster presentations and review articles, and non-academic and unpublished grey literature. Whilst included studies may have also aimed to change knowledge or beliefs, the focus of this study was on reviewing interventions in relation to their effectiveness in promoting CT screening and follow-up in at-risk segments, and investigating the settings and strategies used. The three primary behavioural

<sup>a</sup>Interventions targeting Chlamydia in addition to other health issues were excluded, as Chlamydia is largely asymptomatic and therefore the focus of interventions is distinct.

outcome measures reported included number of tests (as a proportion of those exposed to the intervention), positivity rate (as a proportion of those tested) and treatment rates were reported (as a proportion of those who tested positive). Behaviours such as 'logging on to a website' or 'downloading' information or forms were also noted if reported. Finally, consistent with the objectives of the systematic review, an overall consensus about the interventions was reached by two of the reviewers. All interventions were judged against three primary behavioural outcomes: the proportional screening rates, the number of positive tests and the ability of the intervention to support treatment in participants who tested positive (also reported as a proportional rate). Interventions included in the systematic review were also assessed against the UK National Social Marketing Centre's Social Marketing National Benchmark Criteria.<sup>16</sup> The benchmark criteria present eight integrated elements that

should be featured in a comprehensive social marketing intervention (see Table 1). Interventions were also evaluated for quality on the basis of study design and outcome measures using the GRADE protocol.<sup>25</sup> Coders met periodically during the process, and intercoder reliability checks were conducted on the entire sample between the two researchers. The coefficient of agreement [the total number of agreements ( $n = 17$ ) divided by the total number of coding decisions ( $n = 20$ )] was 85%, and a third researcher resolved any disagreements.

## Results

The search strategy yielded a total of 10 593 references (see Fig. 1). After excluding duplicates and papers not fulfilling the inclusion criteria, 30 full-text articles were reviewed with a further seven studies identified from references list searches. Of these 37 articles, 17 papers in

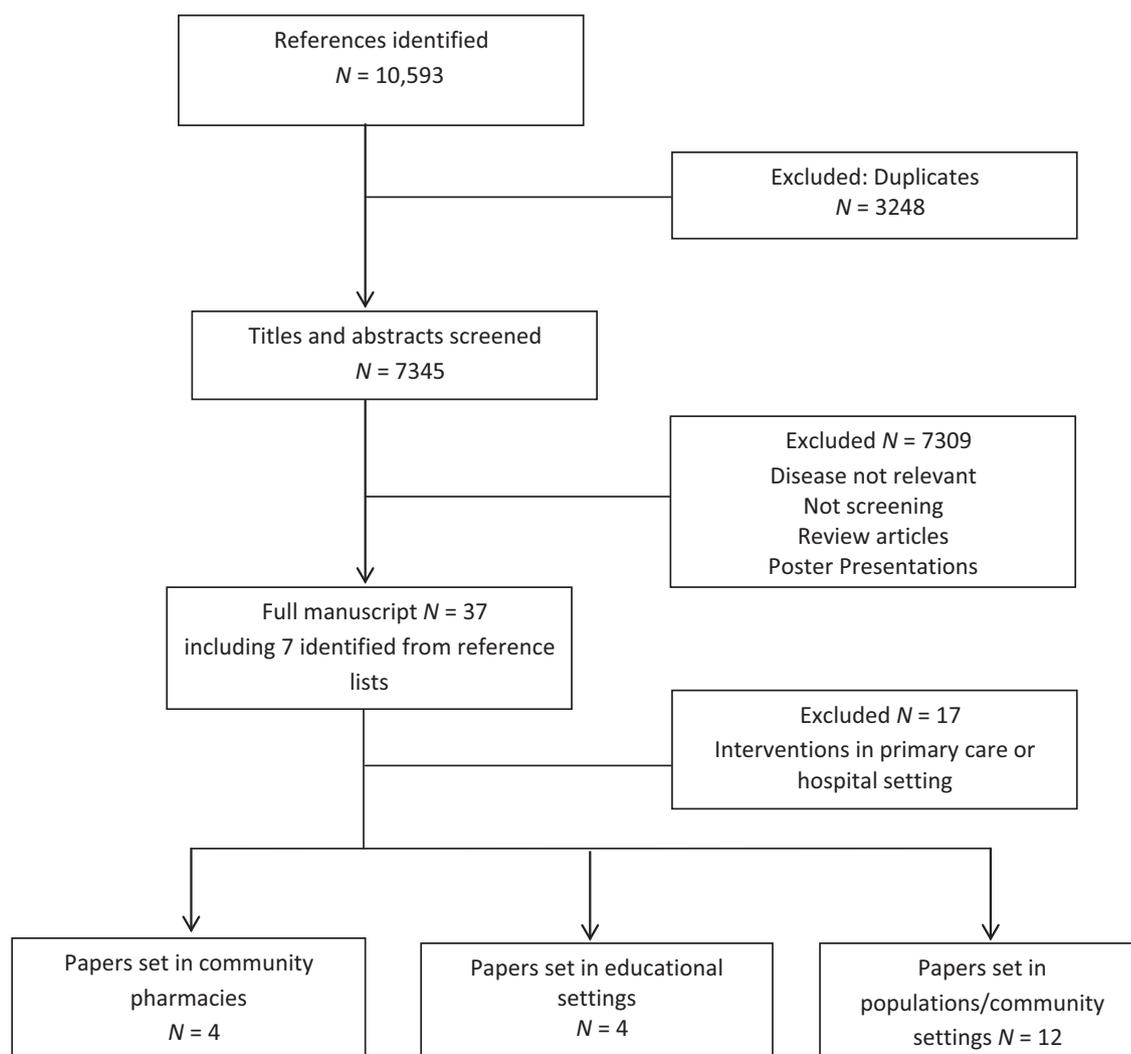
**Table 1** Outline of the social marketing national benchmark criteria (French, Blair-Stevens, 2005)

Benchmark	Description
Behaviour	The intervention needs to have a clear focus on a specific behaviour (e.g. CT screening), not merely psychological factors such as attitudes or intentions. There needs to be a detailed understanding of the 'problem' and 'desired' behaviours.
Customer Orientation	The intervention should be informed by a broad and robust understanding of the customer. Formative research and pre-testing are important in identifying consumer characteristics and needs.
Theory	Interventions should be informed by relevant behavioural theories that are used to understand the target behaviour (e.g. beliefs, barriers).
Insight	Formative research should lead to an insight into the factors that influence behaviour (e.g. psychological and physical barriers). This insight is important for developing the intervention, and in particular addressing issues surrounding exchange and competition.
Exchange	This involves understanding the benefits and costs to the individual of behaviour change and maintenance. In particular, there is a need for the intervention to maximize the benefits and minimize the costs to make the behaviour change attractive to the individual.
Competition	This element recognizes that lots of different factors compete for the individual's time and attention; these can impede behaviour change. The intervention therefore needs to minimize the impact of competition, which could be achieved through maximizing the value of the exchange. Development of strategies that aim to minimize the potential impact of the competition.
Segmentation	The target 'audience' is not homogeneous and may have different attitudes, beliefs and barriers which have the potential to influence intervention success. As a result, it is important to identify subpopulations (i.e. segments) that share similar geographic, psychological and behavioural characteristics. Interventions should be tailored according to the distinct characteristics of these segments.
Methods Mix	This final element emphasizes the importance of using a range of different methods to promote behaviour change. That is, interventions cannot merely rely on education and also need to incorporate elements of the marketing mix (i.e. product, place, promotion and price).

primary care or hospital settings were excluded. However, two programmes which offered a choice of clinic or community-based screening were included.<sup>26,27</sup> A final total of 20 papers were included in the systematic review.

From the 20 papers, 18 interventions were reported on (two papers from Gaydos *et al.*<sup>28,29</sup> were both reporting results from the same intervention, and van Bergen *et al.*<sup>30</sup> and van den Broek *et al.*<sup>31</sup> were also two papers reporting on the same intervention). The interventions were conducted in the following settings: pharmacies,<sup>32–35</sup> high schools,<sup>36,37</sup> universities,<sup>38,39</sup> Internet-based<sup>28,29,40</sup> and media-based campaigns.<sup>26,27</sup>

However, these are difficult to strictly categorize as many interventions were conducted across settings. Intervention designs included one RCT,<sup>41</sup> two quasi-experimental studies,<sup>39,42</sup> two pre- and post (no control)-evaluations designs<sup>31,34,43</sup> and six cross-sectional/post-test designs.<sup>27,32,33,38,44,45</sup> The remaining eight interventions did not explicate study designs, but could be described as observational or descriptive designs.<sup>28,29,35–37,40,46,47</sup> Most targeted adolescents and young adults (14–29 years) although some only specified an adult target group, or no target group (as they were observational studies). Five had specific gender tar-



**Figure 1** Flowchart.

get groups, three females only<sup>28,35,36</sup> and two males only.<sup>40,45</sup> Audiences were also targeted within particular settings or groups, for example. pharmacy customers,<sup>32,33,35</sup> music festival attendees,<sup>44</sup> high-school students<sup>36,37</sup> and men who were members of a private health fund<sup>45</sup> or those living within specific geographic regions. Three interventions targeted disadvantaged communities one multicultural neighbourhood,<sup>34</sup> one disadvantaged school<sup>37</sup> and one rural high school.<sup>36</sup> Three interventions also targeted people performing other non-STI-related health behaviours, for example those attending a health clinic<sup>38</sup> and young women buying oral contraceptives from a pharmacy (Table 2).<sup>34,35</sup>

#### Effectiveness of interventions on screening, positivity rates and treatment rates

In relation to uptake of CT screening, nine were judged as having a high impact,<sup>28,29,32,36–42</sup> three a moderate impact<sup>27,34,35,44</sup> and five a low impact on screening rates.<sup>30,31,33,45–47</sup> Three of the four interventions that achieved a higher positivity rate included a formal risk assessment for participants as part of their strategy to promote testing in higher risk groups.<sup>27,40,43</sup> None of the interventions with lower rates of positive tests included such a formal risk assessment.

Of the 11 interventions where participants had a positive test result, only four reported the number of those who accessed treatment.<sup>32,35,39,43</sup> This ranged from 47.1 to 91% of those who had tested positive for Chlamydia following participation in the intervention.

#### Social marketing benchmark criteria

Each of the included interventions was evaluated against the social marketing benchmark criteria (see Table 3). Of the nine interventions found to have a positive impact, two<sup>36,39</sup> met seven of the eight social marketing benchmark criteria, but did not report the theory utilized, and one met six criteria, but did not report the use of theory or segmentation.<sup>29</sup> Another inter-

vention met five benchmark criteria omitting customer orientation, theory and competition,<sup>43</sup> one met five criteria but did not report against customer orientation, theory or insight,<sup>37</sup> one met five criteria but did not report against theory, insight or exchange<sup>38</sup> and one met five criteria: but did report use of theory, competition and segmentation.<sup>32</sup> Finally, one intervention met four of the eight benchmarks, whilst not reporting against theory, insight, exchange and segmentation.<sup>40</sup>

Of the interventions that had low-modest impact, one met seven criteria but did not report use of theory,<sup>35</sup> one met six criteria but did not report the use of theory or competition<sup>44</sup> and one met six criteria but not competition and segmentation.<sup>46</sup> Two of these interventions met four criteria but did not report customer orientation, theory, competition or segmentation,<sup>45,47</sup> and another met four criteria but did not feature the use of theory, insight, competition or segmentation.<sup>30</sup>

#### Behaviour

All 20 interventions had a specific behaviour goal of increasing participation in Chlamydia screening. Four interventions promoted opportunistic on-site CT testing in clinics, in educational settings, in two universities<sup>38,39</sup> and in two high schools.<sup>36,37</sup> Another intervention randomized participants to on-site testing at a youth centre or community health centre as part of a clinical trial<sup>42</sup>. All of these interventions promoted urine CT tests, except Aldeen *et al.*<sup>38</sup> who offered a vaginal swab. Two interventions promoted screening at community health clinics and/or with a GP.<sup>26,27</sup>

Fourteen interventions promoted home CT screening behaviours, via purchased<sup>32</sup> or free CT kits from community pharmacies,<sup>33–35</sup> at a music festival,<sup>44</sup> a youth centre participating in a clinical trial,<sup>42</sup> direct mail to participants<sup>41,45</sup> or online.<sup>28–31,40,46,47</sup> Fifteen interventions promoted the use of urine CT tests kits. Three promoted use of vaginal swabs,<sup>28,29,41,42</sup> while one<sup>43</sup> provided urine tests for men and vaginal swab tests for women. Only one intervention

**Table 2** Summary of articles Chlamydia trachomatis (CT) screening interventions in community settings

Study	Description	Outcomes
Aldeen <i>et al.</i> (2010) UK <sup>38</sup>	Target: University students CT tests: Urine(males), Vaginal swab (females) Setting: University clinic Design: Cross-sectional	Overall: Mixed results Outcomes measures* Number of tests: 88 (35.2%) Positivity: 4.2% Treatment: N/A
Alicea-Alvarez <i>et al.</i> (2011) US <sup>36</sup>	Target: Adolescent females CT tests: Urine test Setting: High-school clinic Design: Cross-sectional	Overall: Mixed Results Outcomes measures Number of tests: 51/165 (30.9%) Positivity: N/A Treatment: N/A
Andersen <i>et al.</i> (2002) Denmark <sup>41</sup>	Target: Males and females aged 21–23 years CT tests: Home vaginal swab Setting: Country region Design: Randomized control trial	Overall: Mixed results Outcome measures Number of tests: 771 (38.6%) and 659 (33%) Positivity: 42 (6.5%) and 42 (8%) Treatment: N/A
Anderson <i>et al.</i> (2011) UK <sup>32</sup>	Target: Adults CT tests: Home urine test Setting: Pharmacy Design: Cross-sectional	Overall: Positive effect Outcome measures: Number of tests: 14 378 (2 years) Positivity: 1131/14 378 (0.8%) Treatment: 533/1131 (47.1%)
Barry <i>et al.</i> (2008) US <sup>37</sup>	Target: Adolescents (male and female) CT tests: Urine test Setting: High-school clinic, disadvantaged area Design: Cross-sectional	Overall: Mixed results Outcomes measures Number of tests: 537/967 (63%) Positivity: 1.3% (identified at risk) Treatment: N/A
Brabin <i>et al.</i> (2009) UK <sup>35</sup>	Target: Females <25 years requesting contraception CT tests: Home Urine Test Setting: Pharmacy Design: Quasi-experimental	Overall: Mixed results Outcome measures Number of tests: 264/1348 (17.6%) Positivity: 24/264 (9.1%) Treatment: 22/24 (91.7%)
Chai <i>et al.</i> (2010) US <sup>40</sup>	Target: Males >14 CT tests: Home urine test Setting: Internet based Design: Cross-sectional	Overall: Positive results Outcomes measures Number of tests: 512 (31%) Positivity: 64/501 (13%) Treatment: N/A
Chen <i>et al.</i> (2007) Australia <sup>26</sup>	Target: 16–29 years CT tests: Existing services Setting: Media campaign. Design: Cross-sectional	Overall: Mixed results Outcomes measures Number of tests: 2842 (men) and 6049 (women) Not reported Positivity: 1.9% (men) and 4.3% women Treatment: N/A
Emmertson <i>et al.</i> (2011) Australia <sup>33</sup>	Target: Adults CT Tests: Home urine test Setting: Pharmacy Design: Cross-sectional	Overall: Mixed Results Outcomes measures Number of tests: 18/156 (12%) Positivity: N/A Treatment: N/A
Gaydos <i>et al.</i> (2006, 2009) US <sup>28,29</sup>	Target: Females >14 years CT Test: Home vaginal swab Setting: Regional, Internet Campaign	Overall: Positive effect Outcomes measures Number of tests: 1254 <sup>†</sup> (32%) (Wave 1) 3774 <sup>†</sup> (32.4%) (Wave 2)

**Table 2.** Continued

Study	Description	Outcomes
Jones <i>et al.</i> (2007) South Africa <sup>42</sup>	Design: Cross-sectional/ Observational Target: Women – aged 14–25 years CT Test: Clinic or home vaginal swab Setting (s): Mail and clinic Design: Quasi-experimental	Positivity: N/A Treatment: N/A Overall: Positive effect Outcomes measures CT tests: Clinic 131 <sup>†</sup> (42%); Home 143 <sup>†</sup> (47%) Positivity: 22% Treatment: N/A
Kwan <i>et al.</i> (2012) Australia <sup>43</sup>	Target: Not specified CT Tests: Urine test (males), vaginal swab (females) Setting: Website Online intervention to promote self-risk assessment, testing and referral for treatment (n = 675)	Overall: Positive effect Outcomes measures CT Request form downloaded: 675 CT Tests: 378/675 (56%) Positivity: 378 <sup>†</sup> (18%) Treatment: 50% <sup>†</sup> within 7 days
Novak and Karlsson (2006) Sweden <sup>47</sup>	Target: Not specified CT Test: Home Urine Test Setting: Website Design: Cross-sectional	Overall: Low-moderate results Outcomes measures 19 518 website visits CT Test Requests: 1405/256, 886 (0.4%) CT Tests: 906/1405 (62.5%) Positivity: N/A Treatment: N/A
Oh <i>et al.</i> (2002) US <sup>46</sup>	Target: Males and Females 15–25 years CT Test: Home Urine Test Setting: Media Campaign Design: Cross-sectional	Overall: Low-moderate results Outcomes measures Hotline use: 642 calls (Average 99 calls/week vs. 9 calls per week pre-campaign) CT tests: 31/642 callers (4.8%) Positivity: N/A Treatment: N/A
Sacks-Davis <i>et al.</i> (2010) Australia <sup>44</sup>	Target: males and females aged 16–29 years CT Test: Home-Urine Test (males); Home – vaginal swab (females) Setting: Music festival Design: Cross sectional study	Overall: Low-moderate results Outcomes measures Number of tests: 67/313 (21%) Positivity: 1/67 (1%) Treatment: N/A
Scholes <i>et al.</i> (2007) US <sup>45</sup>	Target: Men CT Test: Home Urine Test Setting: Health fund members Design: RCT	Overall: Low results Outcomes measures CT Tests: 5.7% Positivity: N/A Treatment: N/A
van Bergen <i>et al.</i> (2004) Netherlands <sup>34</sup>	Target: Females (15–29 years) collecting contraceptives CT Test: Home Urine Test Setting: Pharmacy, Low income area Design: Cross-sectional	Overall: Moderate results Outcomes measures Number of tests: 73/270 (27%) Positivity: 4.2% Treatment: N/A
Vaughan <i>et al.</i> (2010) Ireland <sup>39</sup>	Target: 18–29 years CT Test: Clinic Urine Test Setting: University Design: Quasi-experimental	Overall: Positive effect Outcomes measures Number of tests: 592/1249 (47.5%) Positivity: 21/358 (3.9%) Treatment: 18/21 (87%)

**Table 2.** Continued

Study	Description	Outcomes
van Bergen <i>et al.</i> (2010) <sup>†30</sup>	Target: 16–29	Overall: Low results
van den Broek <i>et al.</i> (2010) Netherlands <sup>‡31</sup>	CT Test: Home-Urine Test (males); Home – vaginal swab (females) Setting: Website Design: Cross-sectional	Outcomes measures CT Tests: 73/270 (27%) Positivity: 4.2% Treatment: N/A
Wilkins and Mak (2007) Australia <sup>27</sup>	Target: 15–24 years Clinic urine test (males), clinic vaginal swab (females) Setting: Media Design: Cross-sectional	Overall: Moderate – positive effect Outcomes measures: CT Tests: females (21% <sup>†</sup> ); males (29% <sup>†</sup> ) Positivity: Females (12% <sup>†</sup> ); males (4% <sup>†</sup> ) Treatment: N/A

\*Studies may have also reported changes in knowledge or attitudes etc; however, only behavioural outcomes are reported.

<sup>†</sup>Only percentages reported.

<sup>‡</sup>For interventions with more than one publication, the most recent results are reported.

(reported in two papers) provided users a choice of vaginal or urine testing.<sup>30,31</sup>

how these theories were applied to the design, conduct or evaluation of the interventions.

### Customer orientation

Only eight interventions reported the conduct of primary formative research with the target audience prior to design and implementation. This included the use of interviews,<sup>33</sup> surveys,<sup>44</sup> focus groups,<sup>26,28,29,46</sup> pre-testing of campaign messages<sup>26,46</sup> and the conduct of pilot interventions.<sup>30–32,35,46</sup> Three others interventions demonstrated limited customer orientation during and after the intervention via the conduct of process and audience impact evaluation.<sup>26,39,42,44,46</sup> Only one study reported on data collected from those who both participated in screening and those who did not.<sup>28,29</sup> The remaining interventions reported very limited customer orientation via their reference to secondary sources to inform design.<sup>36–38,40</sup>

### Theory

According to this benchmark, interventions should be informed by relevant behavioural theories that are used to understand the target behaviour. Only two included interventions identified the use of theory. Sacks-Davis *et al.*<sup>44</sup> referred to the Health Belief Model and Oh *et al.*<sup>46</sup> to the Theory of Reasoned Action and the Media Practice Model as theoretical frameworks. However, neither explicitly stated

### Insight

Those interventions that conducted formative research highlighted the following insights into their target audiences: difficulty accessing issues to medical settings and the appeal testing in non-medical environments,<sup>32,39</sup> the attitudes of clientele attending music festivals<sup>44</sup> and barriers to staff delivering CT screening in the pharmacy setting.<sup>33</sup>

Other interventions referenced only existing research to provide insight into target audience barriers and motivators to undertaking the CT screening. For example, barriers to testing in young people, such as costs, clinic waiting times, inconvenience, fear of medical procedure, stigma, and lack of privacy, stigma, embarrassment and a lack of routine testing by GPs<sup>27–29</sup> and the need to correct misinformation about CT.<sup>46</sup> Motivators for seeking CT testing such as exposure of adolescents to information on CT and a young person's sense of self and lived experience were also identified in a single study.<sup>46</sup>

### Exchange

All of the reviewed studies sought to minimize costs associated with behaviour change to make it more attractive to the individual.

**Table 3** Community base Chlamydia trachomatis (CT) interventions evaluated utilizing social marketing benchmark criteria

Study	Coding against benchmark criteria
Aldeen <i>et al.</i> (2010) UK <sup>38</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Clinic urine test (males), clinic vaginal swab (females)</li> <li>2. Customer Orientation: Literature search conducted on CT screening studies.</li> <li>3. Theory: N/A</li> <li>4. Insight: N/A</li> <li>5. Exchange: N/A</li> <li>6. Competition: Addressed barriers of access to screening by utilizing an alternative setting</li> <li>7. Segmentation: 18 + , sexually active, attendees of university health centre.</li> <li>8. Methods Mix: Promotion –posters, flyers, information sheets; Place – convenience and accessibility.</li> </ol>
Alicea-Alvarez <i>et al.</i> (2011) US <sup>36</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Clinic urine test</li> <li>2. Customer Orientation: Literature review of similar CT screening programmes in high schools.</li> <li>3. Theory: N/A</li> <li>4. Insight: Analysis and review of literature to support intervention and understand barriers and motivators</li> <li>5. Exchange: Gift voucher incentives.</li> <li>6. Competition: Soft drinks and water provided to aid participants to give a sample. Students excused from classes to provide samples, screening process designed to maximize confidentiality and privacy.</li> <li>7. Segmentation: Materials designed for adolescent girls in rural setting</li> <li>8. Methods Mix: Promotion – education including PowerPoint presentation delivered by research team to students in class, Q&amp;A session, incentives; Place – convenience</li> </ol>
Anderson <i>et al.</i> (2002) Denmark <sup>41</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Home vaginal swab</li> <li>2. Customer Orientation: N/A</li> <li>3. Theory: N/A</li> <li>4. Insight: N/A</li> <li>5. Exchange: 6. Competition:</li> <li>6. Segmentation: N/A</li> <li>7. Methods Mix: Leaflets, home sampling kit.</li> </ol>
Anderson <i>et al.</i> (2011) UK <sup>32</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Home urine test</li> <li>2. Customer Orientation: Informed by pilot intervention data</li> <li>3. Theory: N/A</li> <li>4. Insight: From pilot data – understanding issues of access; male utilization of this mode of testing</li> <li>5. Exchange: Oering benefit (finding out if positive) by reducing costs (i.e. barriers) to testing</li> <li>6. Competition: N/A</li> <li>7. Segmentation: N/A</li> <li>8. Methods Mix: Trained pharmacist consultations, email/text/phone results service, information booklets.</li> </ol>
Barry <i>et al.</i> (2008) US <sup>37</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Clinic urine test</li> <li>2. Customer Orientation: N/A</li> <li>3. Theory: N/A</li> <li>4. Insight: N/A</li> <li>5. Exchange: Prizes (from \$10-\$80) issued randomly, treatment services oered at times and locations convenient to students.</li> <li>6. Competition: Addressed barriers of access, confidentiality, privacy</li> <li>7. Segmentation: Non-sexually active students were discouraged from testing.</li> </ol>

**Table 3.** Continued

Study	Coding against benchmark criteria
Brabin <i>et al.</i> (2009) UK <sup>35</sup>	<p>8. Methods Mix: Promotion – education: 10 minute presentation on CT and screening, incentives; Place – convenience: Price – parents not informed of the results. Steering committee (nurses, teachers, students, parents) for intervention. STD factsheets.</p> <p>1. Target behaviour: Home urine test</p> <p>2. Customer Orientation: Informed by pilot intervention data</p> <p>3. Theory: N/A</p> <p>4. Insight: From pilot data – understanding of whether screening was acceptable to pharmacies</p> <p>5. Exchange: Oering benefit (finding out if positive) by reducing costs (i.e. barriers) to testing</p> <p>6. Competition: Addressed barriers of access, cost and convenience.</p> <p>7. Segmentation: Females →25 requesting Emergency Hormonal Contraception at pharmacies</p> <p>8. Methods Mix: Trained pharmacist consultation, home kit and free postage, fact sheet, information on local treatment services</p>
Chai <i>et al.</i> (2010) US <sup>40</sup>	<p>1. Target behaviour: Visit website and home urine test</p> <p>2. Customer Orientation: Some scoping of literature – identified lack of research in internet based interventions targeting men</p> <p>3. Theory: N/A</p> <p>4. Insight: N/A</p> <p>5. Exchange: N/A</p> <p>6. Competition: Address barriers of access to screening such as transport, cost, no health insurance, confidentiality</p> <p>7. Segmentation:</p> <p>8. Methods Mix: Free kits, testing and treatment, information booklet, flyers, radio, campaign website: <a href="http://www.iwantthekit.org">www.iwantthekit.org</a>. sampling kit.</p>
Chen <i>et al.</i> (2007) Australia <sup>26</sup>	<p>1. Target behaviour: CT test using existing services</p> <p>2. Customer Orientation: Formative – focus groups, pre-testing of campaign messages. Qualitative evaluation via intercept + survey</p> <p>3. Theory: N/A</p> <p>4. Insight: N/A</p> <p>5. Exchange: N/A</p> <p>6. Competition: N/A</p> <p>7. Segmentation: Gender specific messages</p> <p>8. Methods Mix: Promotion – Print Ads, Take-Away Cards in bars, clubs, hotels and tertiary institutions, newspapers, magazines, local press, transport, website.</p>
Emmertson <i>et al.</i> (2011) Australia <sup>33</sup>	<p>1. Target behaviour: Home urine test</p> <p>2. Customer Orientation: Interviews with pharmacy sta.</p> <p>3. Theory: N/A</p> <p>4. Insight: Commitment issues relating to workload, issues with sta member taking responsibility for driving the distribution of specimen collection kits, sta discomfort at verbally introducing the screening concept.</p> <p>5. Exchange: N/A</p> <p>6. Competition: N/A</p> <p>7. Segmentation: N/A</p> <p>8. Methods Mix: Trained pharmacy sta, Self-collection postal kit, text/phone results service, in-store posters and leaflets.</p>
Gaydos <i>et al.</i> (2006, 2009) US <sup>28,29</sup>	<p>1. Target behaviour: Visit website and home vaginal swab</p> <p>2. Customer Orientation: Formative – focus groups to inform internet delivery. Quantitative results from those who sent kit in (via survey) and those who didn't.</p>

**Table 3.** Continued

Study	Coding against benchmark criteria
Jones <i>et al.</i> (2007) South Africa <sup>42</sup>	<p>3. Theory: N/A</p> <p>4. Insight: Address barriers to access and screening such as fear of pelvic exam, embarrassment, cost, parental involvement/privacy and stigma. Understanding of women and the internet for getting info on STDs.</p> <p>5. Exchange: Encouraged women to adopt behaviour (CT testing) by offering benefit (test result) and reducing barriers (collection of urine in own home)</p> <p>6. Competition: Address internal (fear of pelvic exam, embarrassment) and external (time to visit clinic, costs, parental involvement) competition by providing alternatives to access (home based kit) and screening test (self test).</p> <p>7. Segmentation: N/A</p> <p>8. Methods Mix: Promotion – flyers, radio, newspapers, magazines, website: <a href="http://iwantthekit.org">iwantthekit.org</a></p> <p>1. Target behaviour: Clinic or home vaginal swab</p> <p>2. Customer Orientation: Interviews conducted with participants on enrolment regarding their socio-demographic characteristics and their sexual history. Interviews were conducted with participants post intervention on the feasibility and acceptability of the intervention.</p> <p>3. Theory: N/A</p> <p>4. Insight: N/A</p> <p>5. Exchange: Free screening equipment, educational materials and treatment services in exchange for performing screening tests.</p> <p>6. Competition: Educational materials and provision of free testing kits, and free screening and treatment services attempted to overcome financial barriers to CT screening among a poor population.</p> <p>7. Segmentation: All participants were interviewed at enrolment on socio-demographic and sexual history.</p> <p>8. Methods Mix: General information sessions on STs and study description sessions held at four community based youth groups and two public health clinics. Home kits contained instruction booklet, educational materials testing kit (product), and a toll-free phone-line number. Women in the clinic received a bag containing condoms, educational materials and a clinic appointment card.</p>
Kwan <i>et al.</i> (2012) Australia <sup>43</sup>	<p>1. Target behaviours: Urine test (males), vaginal swab (females)</p> <p>2. Customer Orientation: N/A</p> <p>3. Theory: N/A</p> <p>4. Insight: Barriers to testing in young people – costs, clinic waiting times, inconvenience, fear of medical procedure, stigma, and lack of privacy. Also no routine testing by GPs (especially men and young people in rural areas). Low uptake of home tests – fear? Suspicion? embarrassment</p> <p>5. Exchange: Home based tests overcome some barriers</p> <p>6. Competition: N/A</p> <p>7. Segmentation: Community</p> <p>8. Methods Mix: “Get the facts’ Website – Online risk self-assessment, Mass media (print, radio, convenience ads in pubs, clubs, cafes and unis); Printout referral to Path West Labs; Advice about the test and what will happen, and that it is covered by Medicare; Promotion of the Testing services and locations (Path West Labs – throughout WA); advice service for those &lt;16 years); choice to attend DOHA funded Sexual Health service or a medical practitioner for treatment</p>
Novak and Karlsson (2005) Sweden <sup>47</sup>	<p>1. Target behaviour (s): Log on to website; order home urine test; Test; Use test; return test; log on to check results; visit physician if possible; participate in counselling if offered (social work); consent to partner tracing</p> <p>2. Customer Orientation: N/A</p>

Table 3. Continued

Study	Coding against benchmark criteria
<p>Oh <i>et al.</i> (2002) US<sup>46</sup></p>	<ol style="list-style-type: none"> <li>3. Theory: N/A</li> <li>4. Insight: Home sampling is easy – but many kits are never used (even when provided and posted free). Need to include men and women in promotion to effective reduce screening rates</li> <li>5. Exchange: Secure website; free kits; easy access to results; only need to present to physician if positive result; print out of referral to take to physician; oered counselling and partner tracing if positive by a trained social worker (support)</li> <li>6. Competition: N/A</li> <li>7. Segmentation: N/A</li> <li>8. Methods Mix: Provision of home testing kit (Mail out); Related Chlamydia Website (secure online reporting; interpretation of results; print out of physical referral if test was positive; printed referral from website for positive results; provision of counselling (social work) intervention on basis of physician letter to indicate treatment had been sought; reminder emails and phone calls if no letter feedback from physician to indicate treatment had been access within 4 weeks (if results +ve) message only if test was negative Marketing strategy (press conference; posters at youth centres and schools; banner ad on popular ‘chat’ website; video commercial at local sporting arena</li> </ol>
<p>Sacks-Davis <i>et al.</i> (2010) Australia<sup>44</sup></p>	<ol style="list-style-type: none"> <li>1. Target behaviour: Call CT hotline or Options Phone Line; home urine test</li> <li>2. Customer Orientation: Pre – formative campaign and focus groups to develop intervention. Pilot tested materials prior to intervention. During – quantitative data;</li> <li>3. Theory: Theory of Reasoned Action &amp; Media Practice Model</li> <li>4. Insight: Identify and address barriers – e.g. correct misinformation about CT, privacy issues, access. Motivators (use of TV as source of information for adolescents) sense of self and lived experience</li> <li>5. Exchange: Hard talk about STIs so get the facts from the phone line/brochure; serious consequences if not treated (and asymptomatic); important to call; oer of 5 testing sites in local area</li> <li>6. Competition: N/A</li> <li>7. Segmentation: N/A</li> <li>8. Methods Mix: Mail out (brochure); TV and radio campaign; Pre-recorded Check-it-Out Chlamydia Hotline; A staed Chlamydia Options information line; a free Chlamydia test (LCR) (clinic-based);</li> </ol>
<p>Scholes <i>et al.</i> (2007) US<sup>45</sup></p>	<ol style="list-style-type: none"> <li>1. Target behaviour: Home urine test</li> <li>2. Customer Orientation: N/A</li> <li>3. Theory: N/A</li> </ol>

**Table 3.** Continued

Study	Coding against benchmark criteria
van Bergen <i>et al.</i> (2004) Netherlands <sup>34</sup>	<ol style="list-style-type: none"> <li>4. Insight: Young men don't often attend health care settings and need for interventions to target male to lower infection (not customer need though)</li> <li>5. Exchange: Offering benefit (finding out if positive) and reducing costs to testing; address barriers via mail out strategy – time, logistics, discomfort</li> <li>6. Competition: N/A</li> <li>7. Segmentation: N/A</li> <li>8. Methods Mix: Letter + test request form; Letter + mail back kit)</li> </ol>
Vaughan <i>et al.</i> (2010) Ireland <sup>30</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Clinic urine test</li> <li>2. Customer Orientation: Literature review to identify issues and barriers to screening. Process evaluation (seven [six female, one male] participant interviews conducted post intervention).</li> <li>3. Theory: N/A</li> <li>4. Insight: Identified that young people desired a hassle free, non-clinical setting screening process.</li> <li>5. Exchange: Provided participants with a free, anonymous, easy to access, and private screening process. Volunteers offered €25 vouchers as incentives. Offered participants a sense of relief and peace of mind by taking a test.</li> <li>6. Competition: Addressed barrier of screening in clinical settings by offering an alternative non clinical setting. Increased self-efficacy for testing by reducing embarrassment for taking a test by creating a normalized – everyone is doing it, atmosphere.</li> <li>7. Segmentation: Specifically targeted students aged 18–29 who are most at risk of CT.</li> <li>8. Methods Mix: Programme was part of an overall Sexual Health &amp; Awareness &amp; Guidance (SHAG) Week. Posters and leaflets distributed around campus. Media releases, radio broadcasts, email alerts and newspaper articles publicises the intervention. Intervention steering group (student health units and student unions). Use of peer volunteers. Testing packs distributed around campus, especially in male and female toilets.</li> </ol>
van Bergen <i>et al.</i> (2010) <sup>30</sup> van den Broek <i>et al.</i> (2010) Netherlands <sup>31</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Home urine test (males), home vaginal swab (females)</li> <li>2. Customer Orientation: formative research and pilot data Insight: identified and addressed barriers</li> <li>3. Theory: N/A</li> <li>4. Insight: N/A</li> <li>5. Exchange: used home based test to reduce barriers</li> <li>6. Competition: N/A</li> <li>7. Segmentation: N/A</li> <li>8. Methods Mix: Invitation letter (population register – invited to participate if are or have been sexually active) promoting the website and a personal code; Secure Website (information; 'risk assessment score'; place to request home sampling kit; facility to notify partners anonymously; Home Chlamydia test (urine or vaginal swab); Testing in three regional accredited laboratories; Advice and referral letter for treatment (self and current partner); Positive test recipient receive a test package 6 months</li> </ol>

Table 3. Continued

Study	Coding against benchmark criteria
	after first test Repeated invitation letter (1 year) – no results available yet on value of repeat invitations
Wilkins and Mak (2007) Australia <sup>27</sup>	<ol style="list-style-type: none"> <li>1. Target behaviour: Clinic urine test (males), clinic vaginal swab (females)</li> <li>2. Customer Orientation: N/A</li> <li>3. Theory: N/A</li> <li>4. Insight: Focus groups – not described</li> <li>5. Exchange: use of reminders to overcome barriers</li> <li>6. Competition: N/A</li> <li>7. Segmentation: GPs and community</li> <li>8. Methods Mix: Mass and narrow case media (TV, radio, posters (pubs/clubs hotels/uni/tafe/ magazines and print ads)– directing people to Interactive website (Q&amp;A); SMS (to people registered to receive smoking SMS/for this project); GPs – Chlamydia Information Kits; Posters for waiting rooms</li> </ol>

All except one<sup>32</sup> addressed the monetary cost involved in screening by providing free tests/kits. Mitigating other costs (e.g. time, effort) was addressed more comprehensively in some interventions than others. For example, to promote the uptake of home CT screening behaviours, some interventions distributed kits directly by mail to participants,<sup>41,45</sup> while others necessitated time and effort to request a kit via a mailed form<sup>45</sup> or online requests<sup>28–30,40,46,47</sup> or provided tests in more accessible locations.<sup>32</sup>

Interventions also addressed barriers to specimen delivery to a laboratory by mail<sup>32–34</sup> or by onsite processing.<sup>37</sup> Access barriers to receiving results were addressed by sending results via use of phone, SMS, email or post and access to treatment also by post<sup>44</sup>. Other barriers of access addressed included transport, health insurance and confidentiality.<sup>40</sup> It is also likely that many of these home-based interventions also overcame some of the embarrassment or stigma associated with asking for and receiving a CT test – although this was not reported against in any of the studies.

In terms of offering incentives or benefits, most interventions highlight the benefits of screening and treatment, for example a sense of relief and peace of mind by taking a test.<sup>39</sup> Others interventions offered, prizes (from \$10–\$80) issued randomly and treatment services

offered at times and locations convenient to students,<sup>37</sup> cold drinks, lollipops, a prize draw for MP3 player, CD vouchers,<sup>44</sup> access to free, anonymous, easy to access and private screening process,<sup>39</sup> soft drink, water and class leave passes<sup>36</sup> and volunteers offered monetary vouchers as incentives.<sup>36,39</sup>

#### Competition

All of the interventions sought to enhance the exchange for the target audience by addressing the barriers of access to screening in the primary care setting by utilizing non-clinical settings (e.g. music festivals or pharmacies), or via establishing a presence in an online environment. For example, use of home-based kits addressed both internal barriers (e.g. fear of pelvic examination, embarrassment) and external barriers (time to visit clinic, costs, parental involvement).<sup>28,29</sup> Alicea-Alvarez *et al.*<sup>36</sup> directly addressed the competing behaviour of ‘attending class’ by offering ‘passes’ to attend the school clinic. Wilkins and Mak<sup>27</sup> also used reminders in recognition that participants’ may be distracted or forget about screening.

#### Segmentation

With the exception of four interventions, two of which were set in pharmacies,<sup>27,32,33,43,47</sup> all

interventions defined specific target audiences for their programme. Eight were defined on the basis of age,<sup>26,27,30,37,41,44,46</sup> one on gender,<sup>45</sup> four on age and gender<sup>29,34–36,40</sup> and one targeting attendees at a University.<sup>38</sup> Geographic segments were also targeted including schools within disadvantaged or rural communities in two interventions,<sup>36,37,39</sup> at a regional level<sup>41</sup> and another at a state level.<sup>26</sup> Finally, one intervention targeted attendees at a music festival.<sup>44</sup> Whilst tailoring of the programmes to meet the specific needs of these segments may have occurred in the design of the programmes. Unfortunately, if or how this was done was not made explicit within the reporting of most of the articles. Three exceptions included Alicea-Alvarez *et al.*<sup>36</sup> who discussed the development of gender-specific messages and materials for adolescent girls in a rural setting, and two other interventions, which reported tailoring resources for GPs and community.<sup>26,27</sup>

#### Methods mix

Social marketing interventions do not rely solely on education, but utilize the breadth of the marketing mix: product, price, place and promotion.

#### Product

‘Product’ refers to the desired behaviour (actual product) and the set of benefits associated with the desired behaviour (core product).<sup>18</sup> In this study, the use of a CT screening test is the desired behaviour (actual product), whilst the benefits that people accrue from screening use such as confidential free treatment, avoiding infertility caused by Chlamydia, or not infecting future partners are core products. The mostly commonly promoted actual product was home-based urine test kit,<sup>32,35,40,43,44,47</sup> and urine tests which could be taken in ‘alternative’ settings.<sup>36,37,39,42</sup> Vaginal swabs were less frequently promoted both for home use<sup>28,29,41–43</sup> and in one alternative on-campus setting.<sup>38</sup> Only one intervention provided users a choice or

vaginal or urine testing.<sup>30,31</sup> Two interventions also promoted screening at community health clinics and/or with a GP, but did not specify the type of test.<sup>26,27</sup>

Augmented products are the features that encourage uptake of an actual product or service. In this case, augmented products are those that support people in their use of the promoted CT screening test. In the interventions products used to support the use CT testing included interactive websites, phone information lines, information resources (on screen and printable), referral support (print outs or phone support) and partner notification services (online).

Supportive online features included facilities to assist participants to calculate risk scores, ‘Question and Answer’ educational information, results notification services<sup>45,47</sup> and an email facility for anonymous partner notification.<sup>30,31</sup> Phone services offered with some interventions included a recorded information line, staff supported information lines,<sup>32</sup> counselling services and results notification services.<sup>32,33,39,40,44</sup> These services offered information (and/or support) at various points including prior to screening, to communicate results and to support access to treatment or discuss results. Interventions in alternative non-medical clinics within educational settings may have also provided trained personnel as an augmented service to support the uptake of screening in the target audiences,<sup>36–39</sup> although this was not clearly described.

#### Price

Price was addressed within the interventions in the following ways: the provision of a free test kit, or free treatment (addressing monetary costs), and providing testing in a non-clinical home or educational setting; the use of direct mail for distribution of tests kits, online, phone or post results notification, phone information, support and advice lines; post-treatment support including partner notification services (all addressing psychological and time costs).

## Place

In regards to the 'where' of CT service use, the 'actual product' section of this paper has detailed how the 'where' component of screening (home based vs. clinic based screening) can influence uptake of screening behaviours.

### *Communication channels*

The interventions used a variety of strategies including brochures, leaflets, posters and cards in 14 interventions.<sup>26–35,37,40,41,45,46</sup> Four of these distributed promotions via direct mail,<sup>30,31,41,45,46</sup> seven via mass or narrow cast media (e.g. radio, TV, email alerts and video ads at sporting grounds).<sup>26–29,39,40,46,47</sup> In-class presentations were also utilized in high-school settings<sup>36,37</sup> and at youth groups and public health clinics.<sup>42</sup> Websites were utilized in eight interventions,<sup>27–31,40,42,43,47</sup> interpersonal channels in pharmacy settings<sup>32,33</sup> and at the music festival.<sup>44</sup>

## Promotion

Not all the interventions specified promotional messages that were utilized as part of their programme. Of those with associated websites mentioned in publications describing included interventions, the following messages were identified. Firstly, "I want the kit"<sup>40</sup> focusing on how participants could obtain free Chlamydia testing. Another, "Most people don't have a clue" focused on lack of knowledge about Chlamydia.<sup>27</sup> This intervention also used rotating comic book style images with slogans including "Could my partner have it?", "Could I be infertile?", "My package looks good but could I have it?" and "Could I have it again?" to engage people at risk but potentially unaware. This intervention also used radio buttons highlighting where to get Chlamydia information and especially 'Free testing'.

The 'Get the Facts' Website<sup>43</sup> focused on information including signs and symptoms, risk factors and the need to get tested and treated. Vaughan *et al.*,<sup>39</sup> also promoted Chlamydia screening during the Annual Sexual Health and Awareness and Guidance (SHAG) Week.

However, no specific Chlamydia campaign materials could be identified via the website.

## Discussion

To our knowledge, this is the first systematic review of community-based Chlamydia screening interventions in a range of non-clinical settings, and the first to utilize the social marketing benchmark criteria as a framework to evaluate the nature, strategies and outcomes of interventions against behavioural goals. This systematic review identified 20 articles examining the effectiveness of interventions to engage young adults in community-based (non-medical) settings to participate in CT screening. Whilst the overall quality of evidence available was low (including variations in study design, numbers of participants and a variation in the methods utilized to collect evaluation data), a descriptive systematic review of current approaches to promoting screening behaviours in community settings remains useful, generating lessons to be drawn to inform future research and intervention designs.

Overall, the results in regard to the potential effectiveness of community-based interventions to promote CT screening in young people are promising. Across all of the interventions, 15 reported achieving high proportional screening rates<sup>26,27,29,30,32,34,41,42,44</sup> when compared to rates within primary care settings in countries such as Australia. This suggests that screening promoted in community-based settings may overcome some of the barriers to screening performed in health and medical clinics. All interventions that offered an alternative 'clinic' in educational settings resulted in higher rates of screening than is typical in the primary care setting, whilst those promoting home-based tests produced mixed results with some higher and some lower rates than primary care. This suggests there may still be value to the target audience in face-to-face, supported screening and that overcoming some of the time, access and psychological barriers of traditional medical clinics may be effective in increasing participation in screening.

Four interventions also achieved a higher positivity rate than is currently observed in sexual health clinics.<sup>48</sup> Three of these four interventions included a formal risk assessment for participants as part of the strategy to promote testing in higher risk groups,<sup>27,40,43</sup> suggesting that the incorporation of such a programme feature may be important to reach higher risk segments of the population.

In relation to promoting screening that leads to treatment of Chlamydia, only four included interventions reported the proportion of those who accessed treatment following a positive test result (ranging between 47.1 and 91%).<sup>32,35,39,43</sup> Therefore, the effectiveness of community-based screening as a pathway to treatment is less certain. This is important because an analysis of the intervention strategies shows a tendency of community interventions to only address the 'cost' of screening by focusing on improving access to 'a kit' and also to results. However, the barriers (time and psychological) that exist for young people to presenting to a medical clinic for treatment remain and were addressed in only one of the interventions, which also provided treatment by post.

Overall, the systematic review suggests that those programmes in a community setting that incorporated a greater range of strategies consistent with social marketing principles were likely to achieve more positive results (even if they were not planned with, or self-identified as using the social marketing framework). This demonstrates the utility and potential of social marketing in the development of community-based CT interventions. Furthermore, the social marketing benchmark criteria present a useful evaluation tool.

The systematic review also identified that interventions did not comprehensively utilize social marketing as a strategic framework. This is not surprising given that most included interventions were not self-identified as social marketing. Given its effectiveness as a behaviour change approach, the analysis presented here generates useful insight that can inform the development and implementation of future CT screening interventions. A key finding was that

included interventions often failed to use or failed to report use of formative research. Therefore, CT screening interventions should place a greater emphasis on formative research to understand the attitudinal and behavioural segments within the target audience. This should improve insight and opportunities for segmenting and tailoring interventions. Segmentation of the target audiences in the majority of the interventions was defined on the basis of age (range 14–29) and geographic region; only five specified a gender target group. Whilst tailoring of the programmes to meet the specific needs of these segmentation may have occurred in the design of the programmes – unfortunately, how this was done was not made explicit within the reporting of included studies. There was also no evidence of targeting of interventions to minority ethnic groups or other more vulnerable populations other than on the basis of geographic region.<sup>36,37</sup> Given the known differences in attitudes, stigma and health behaviours between genders and cultures, this is surprising, highlighting the need for consideration of programmes targeted and towards these market segments. Interestingly, two interventions also targeted on the basis of other behaviours (e.g. attendance at a University health clinic and purchase of oral contraceptives). Results from these two studies were both mixed, suggesting the need for further research to explore the value of 'coupling' CT screening with other behaviours.

Few existing CT screening interventions currently reported using behavioural theory in their design and implementation. Given the efficacy of use of theory to inform behaviour change programmes in other domains, future CT screening interventions should be theoretically framed. Post-intervention process analysis of 'why' people did or did not participate would also offer insight.

Further research on young people from culturally and linguistically diverse also appears warranted. Finally, few current interventions adequately address the competition to the desired behaviour. Research to identify why a particular target segments do not present for

screening and helping to identify competitive behaviours and influences should be a component of future CT screening programmes.

## Conclusion

Whilst the quality of evidence remains low for current approaches, a systematic review of community-based interventions to promote CT screening in young people <30 years suggests the potential utility of strategic community-based social marketing interventions across a range of settings to promote screening at higher rates than currently exist in primary care for this target group. The use of clinics in educational settings (which overcome the barriers of time and cost of visiting a medical clinic) suggests the value of face-to-face support and interaction for some young people. The use of risk assessment tools also shows promise in community settings to increase positivity rates. Evaluation of programme strategies according to social marketing benchmark criteria highlighted that whilst few comprehensively incorporated all social marketing principles those that did incorporate, a greater range of strategies were likely to be effective. Given its effectiveness as a strategic approach to promote health behaviour change, the use of social marketing to develop future CT screening interventions holds potential to improve outcomes. Formative research to increase insight, facilitate engagement and enable segmentation and tailoring of screening interventions may also improve outcomes. Finally, robust evaluation is required to provide evidence of the efficacy of CT social marketing interventions and generate further insight on effective strategies for engaging young people.

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## Conflict of interest

None.

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