Review

Evidence for behavioural interventions addressing condom use fit and feel issues to improve condom use: a systematic review

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Abstract. Continuing high rates of sexually transmissible infections (STIs) in many countries highlight the need to identify effective behavioural interventions. Consistent and correct use of male condoms is a key strategy for the prevention of STIs. However, some men report problems with condom fit (e.g. the size and shape of the condom) and feel (e.g. tightness, irritation, sensitivity), which inhibits their use. We conducted a systematic review to identify existing interventions addressing condom use fit and feel problems. We searched electronic databases for peer-reviewed articles and searched reference lists of retrieved studies. Five studies met the inclusion criteria. These were generally small-scale pilot studies evaluating behavioural interventions to promote safer sex with men aged under 30 years, addressing, among other things, barriers to condom use relating to fit and feel. There were significant increases in the reported use of condoms, including condom use with no errors and problems. Improvements in some condom use mediators were reported, such as condom use self-efficacy, knowledge, intentions and condom use experience. There were mixed findings in terms of the ability of interventions to reduce STI acquisition. Behavioural interventions addressing condom fit and feel are promising in terms of effectiveness but require further evaluation.

Additional keywords: behaviour change techniques, sexual health.

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Introduction

The global prevalence and incidence of sexually transmissible infections (STIs) in adult men and women aged 15–49 years remain high, with close to one million new infections acquired each day.[1] Several international agencies promote consistent and correct use of condoms as a key strategy to reduce the risk of infection and unintended pregnancy.[2–4] Although male condoms can be highly protective against the transmission of HIV and most STIs,[5,6] inconsistent or incorrect use compromises their effectiveness. A systematic literature review of studies reporting the frequency of condom use errors and problems[7] identified the most frequent errors as not using condoms throughout the sexual episode, inadequate application (e.g. not squeezing air from the tip of the condom) and the use of inappropriate lubricants, and the most frequently reported problems as condom slippage, leakage and condom-associated erection problems. These problems may be related to

fit and feel issues. 'Fit' refers to physical aspects of matching the condom to the size and shape of the wearer; 'feel' refers to awareness of any physical sensations as a result of the type of condom used, such as tightness, irritation, comfort and sensitivity.[7] Problems encountered with the fit and feel of condoms may lessen the likelihood of them being used, and are therefore an important consideration for condom promotion interventions.

Sanders *et al.*[7] developed the condom use experience (CUE) model as a framework for understanding the role of errors and problems in inadequate condom protection (Fig. 1). In the model, contextual factors (e.g. information, self-efficacy, product availability (condoms and lubricants)) along with condom use experience during sexual events affect future condom use (probability and consistency of use). CUE during sexual events may involve application errors (e.g. incorrect behaviours when using condoms, such as late
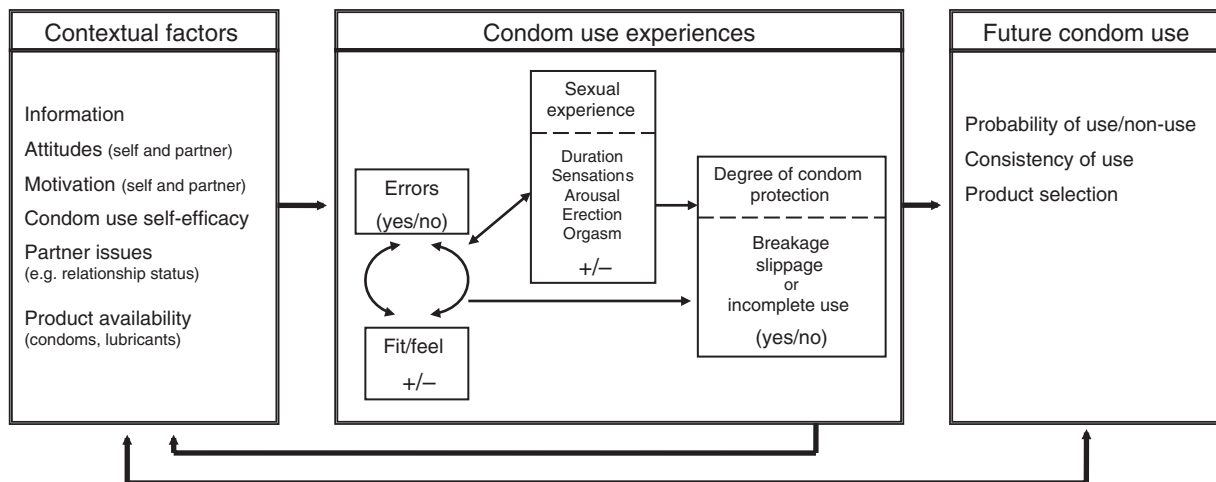
Fig. 1. The condom use experiences model represents our conceptualisation of the relationships among experiential aspects of condom use (including the presence or absence of condom use errors, how the condom fits and feels, the quality and feature of the sexual experience for both partners) and the degree of condom protection. The condom use experience interacts with contextual factors in influencing future condom use. (Modified with permission from Sanders *et al.*[7])

application) and fit and feel issues, both of which can lead to problems such as breakage, slippage and erection difficulties. For example, a condom that is not rolled down fully (condom error) could lead to slippage, and a condom that is too tight (fit and feel issue) could lead to breakage. These, in turn, can lead to incomplete use, thus affecting the degree of condom protection. The CUE model also proposes that condom use errors interact with issues of the fit and feel of condoms. For example, a condom that is too tight (fit and feel) will be more difficult to apply, which may lead to an application error, whereas a condom that is not rolled down correctly (error) is likely to be experienced as uncomfortable (fit and feel). Problems are seen as determining the degree of condom protection during a sexual event, either directly or as mediated through other aspects of the sexual experience, such as sensations, discomfort and duration or intensity of intercourse. Future condom use is affected by the quality of the CUE, which cyclically affects condom-related contextual factors during subsequent sexual encounters. For example, experiencing a loss of erection during application is likely to affect an individual's future self-efficacy to apply condoms, which, in turn, will affect the likelihood of future use. Therefore, the model can be considered dynamic, with CUE (past and present) affecting contextual factors that, in turn, affect condom use experience.

Several reviews have synthesised evidence on the effectiveness of behavioural and other interventions to promote the use of condoms, but these have been limited in the conclusions that can be drawn.[8–11] In particular, it has been difficult to ascertain what the effective components of the interventions are. A systematic overview of systematic reviews of behavioural interventions to increase condom use included 13 reviews covering a total of 248 individual primary studies in a variety of populations (e.g. young people, injecting drug users, women with HIV).[11] All the included reviews covered HIV/AIDS education, safer sex information and skills training (i.e. condom application, negotiation). The authors

of that review reported that 'behavioural interventions were effective in promoting condom use and other safer sexual practices and reduced STIs'.[11] Skills training, such as correct condom application, was a characteristic of successful behavioural interventions.

The evidence from these reviews suggests that behavioural interventions to promote the use of condoms can be effective, but no previous reviews have focused on studies specifically evaluating interventions that address fit and feel as a barrier or enabler to condom use. Up-to-date, review-level evidence about the efficacy of this approach would enable conclusions to be drawn about whether future sexual health interventions should include content addressing fit and feel.

The primary aim of the present review was to systematically identify, review and critique available interventions targeting condom fit and feel issues to promote condom use. The findings of this review were used to adapt an existing condom intervention, the Kinsey Institute Homework Intervention Strategy (KIHIS), for use in a feasibility study of the intervention for young men aged 16–25 years living in the UK (Homework Intervention Strategy-UK (HIS-UK)).[12]

Methods

Search strategy

We initially referred to the CUE model, described above, as a framework to guide the development of specific search terms. A draft literature search strategy was devised and piloted before use. Following necessary revisions, the finalised search was run in August 2015 using the following Medline (and equivalent) subject heading terms: condoms/or condom; early intervention (education)/or intervention studies/or intervention; health promotion; health behaviour; behaviour therapy. The search was limited to studies published in the English language within the date range January 2006–August 2015. Grey literature was not included. The date range selected reflected our aim to identify recent evidence to inform a rapid, purposeful

systematic review of the literature to guide the development of the HIS-UK intervention to promote condom use targeting fit and feel issues.[12] We also chose the 2006 start date because a comprehensive review of randomised controlled trials promoting effective condom use was published by Free *et al.*,[9] and the end date for their search was 2006.

We searched the following databases: PsycINFO (through EBSCO); Medline and Medline in Process (through Ovid); EMBASE (through Ovid); Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with Full Text (through EBSCO); Cochrane Central Register of Controlled Trials; Database of Abstracts of Review Effects (DARE); and PROSPERO (International Prospective Register of Systematic Reviews). We also examined the reference lists of systematic reviews found in our searches to identify any additional relevant references.

Inclusion criteria and data extraction

The following inclusion criteria were used: (1) the study population included men ($\geq$15 years old) of any sexual orientation and resident in a high-income country, as classified in terms of Gross National Income per capita by the World Bank (https://data.worldbank.org/indicator/NY.GNP.PCAP.Cd, accessed 20 September 2019) (evidence from high-income countries was selected for greater relevance to the UK, where the intervention was to be adapted and piloted); (2) the study evaluated a behavioural intervention to promote the use of condoms through content that addressed condom use fit and feel (as defined above); (3) condom use during sex (e.g. the proportion of sexual acts in which a condom was used) and measures relating to condom fit and feel (e.g. experience of using adequate sized condoms; a measure of fit, experience of irritation, a measure of feel) were included; (4) the study was either a randomised or non-randomised control trial, a case-control study, a prospective single cohort (pre-post) study, a systematic review or meta-analysis; (5) the comparison groups were, where appropriate, current best practice or no intervention; and (6) publication in English, in a peer-reviewed journal.

Studies were excluded if: (1) there was no assessment of actual reported condom use behaviour (e.g. only intentions to use condoms were assessed); (2) they were qualitative studies or case studies; and (3) they reported interventions that recruited highly specific clinic populations (e.g. participants who had mental health conditions).

Two review authors (SA and CAG) independently assessed references for inclusion and compared judgements before agreeing a final decision. Discrepant decisions regarding whether a study should be included or not were discussed until consensus was reached. Data were extracted using a standardised form, followed by team resolution of queries and quality assurance to assess consistency of labelling.

Quality assessment

Studies meeting the above criteria underwent critical appraisal using a standard quality assessment tool for quantitative evaluation studies of health interventions suitable for a range of study designs.[13] The components of quality assessed were

sample selection, study design, identification and treatment of confounders, blinding of outcome assessors and participants, reliability and validity of data collection methods and withdrawals and dropouts. The components were rated strong, moderate or weak according to a standardised guide. Each study was appraised by one reviewer (SA) and the results checked by a second reviewer (CAG), with any disagreements resolved through discussion with a third reviewer (JS). The studies were synthesised narratively. Quantitative meta-analysis was not considered appropriate due to heterogeneity between studies in terms of design and intervention characteristics.

Where appropriate, data are presented as the mean $\pm$ s.d.

Results

The literature searches identified 1044 potentially relevant references (see Fig. 2). An initial screen to remove duplicates ($n = 110$) and those not meeting the inclusion criteria based on titles and abstracts ($n = 764$) left 170 articles. Hand searches of the systematic reviews identified by searches yielded a further six potentially relevant studies for inclusion ($n = 176$). Full-text articles of the 176 references were obtained and screened for inclusion (Stage 1); 53 were subsequently excluded because they did not meet one or more of the inclusion criteria based on outcome measures ($n = 24$), study type ($n = 12$), interventions ($n = 4$), inappropriate control ($n = 1$), geographical area ($n = 1$), language ($n = 1$), target population ($n = 8$) or because they were duplicates ($n = 2$). This resulted in 123 references that investigated the effectiveness of behavioural interventions on aspects of condom use among young men in high income countries (Fig. 2, Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart;[14] for a list of all 123 references, see File S1, available as Supplementary Material to this paper). Following completion of screening (Stage 2), five studies met all the inclusion criteria: studies that tested and reported outcome measures representing aspects of condom use fit and feel.[15–19]

Characteristics of included studies

The characteristics of the five studies are presented in Table 1 and Table 2. Four were undertaken in the US and one was conducted in Canada;[19] all recruited relatively young populations (target age ranged from 15 to 29 years). All but one of the studies included male populations who predominantly identified as heterosexual; the other study[18] included men who have sex with men (MSM). All studies included populations who were described as at higher risk for STIs (e.g. men were recruited from STI clinics[16,17]).

Regarding outcomes, all included studies measured self-reported condom use during sex (by default as a condition of our inclusion criteria). In three studies, aspects of CUE were measured as follows: the frequency with which men experienced condom errors (incorrect application) and problems (e.g. condom slippage) while using a condom during sex[15,19] and correct and consistent condom use (with no errors).[17] Other measures of condom use, not specifically related to CUE, were the proportion of unprotected vaginal sex
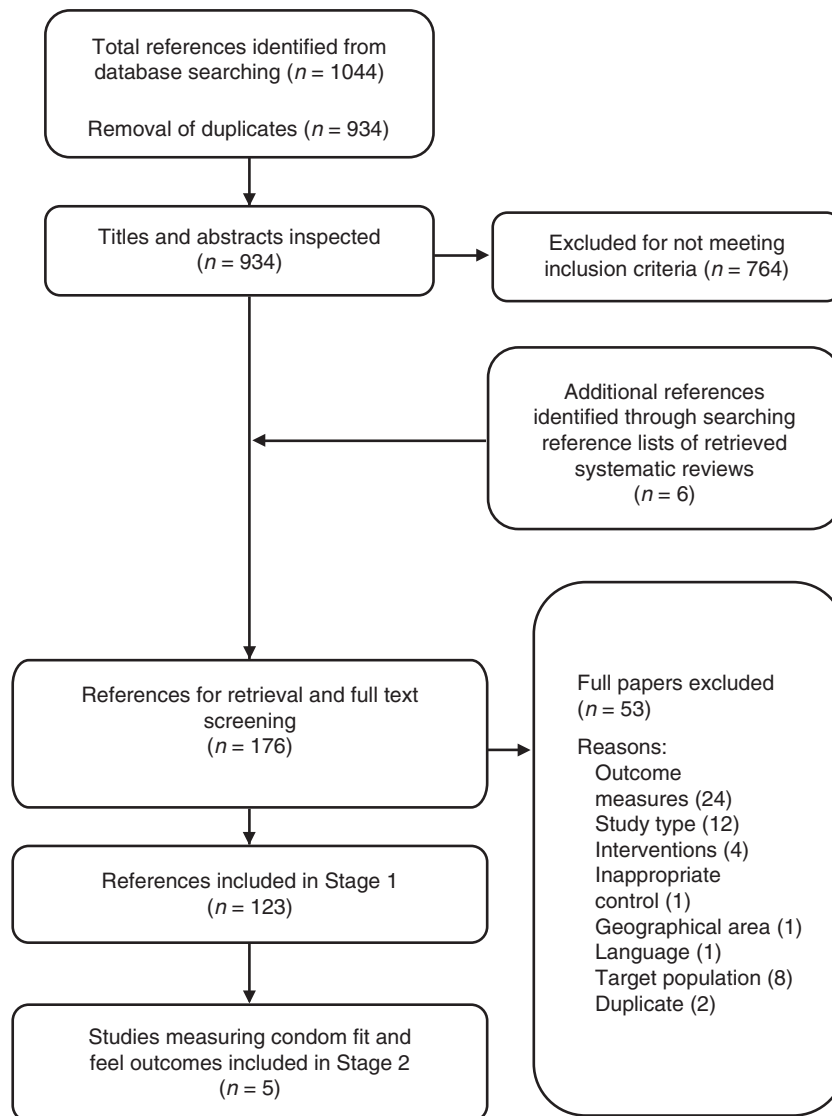
Fig. 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyse (PRISMA) flowchart.

episodes,[15,16] the proportion of unprotected episodes of any sex,[15] the frequency of unprotected anal intercourse,[18] consistent use of condoms,[18] condom use during the last act of penetrative (penile–vaginal or penile–anal) sexual intercourse with a female partner[16] and type of pregnancy protection at last vaginal intercourse, including use of barrier (condom) protection.[15]

The studies also measured mediators of condom use, some of which related to fit and feel. In two studies,[18,19] men were asked to rate their agreement with statements about aspects of fit and feel (e.g. 'condoms don't fit right', 'condoms feel unnatural'). Condom use ability, in which men were asked to rate their agreement with statements about their ability to use condoms effectively (e.g. applying a condom without spoiling the sexual mood), was also measured in one study.[19] Condom use self-efficacy was measured in three studies,[15,18,19] covering issues

such as ability to find condoms that fit properly and confidence to discuss condom use with partners.

Other mediating outcomes with relevance to fit and feel were motivation to use condoms correctly,[18] attitudes towards condoms (e.g. pleasure and comfort)[15,18] and knowledge of correct condom application and communication about safer sex with partners.[15] Two studies reported the incidence of STIs following the intervention.[16,17]

In terms of evaluation design, two studies were randomised control trials[16,17] and the other three were single cohort pre–post intervention designs.[15,18,19] Sample sizes varied, from 30 participants in one study[18] to 702 in another.[17] None of the studies reported a statistical power calculation to determine the necessary sample size. Follow-up outcome assessment was relatively short, with the longest postintervention follow-up 6 months.[17]

Table 1. Characteristics of the five included studies

CUE, condom use experience; KIHIS, Kinsey Institute Homework Intervention Strategy; MSM, men who have sex with men; RCT, randomised control trial; STI, sexually transmissible infection

Study	Design	Location	Target age group (years)	Target group	Intervention	Outcome measures	Findings
Aronson et al.[15]	Cohort (treatment group only)	US: North Carolina	18–24	Higher-risk, heterosexually active, African American or Black male college students (n = 54)	Multicomponent and multisession health education intervention delivered to groups over a weekend and 3 months later key messages delivered again Covered, among other things, correct condom use, how to reduce condom problems (e.g. slippage) and ways of achieving sexual satisfaction while being safe	Protected sex, condom errors, knowledge, attitudes, intentions, self-efficacy; no specific measure of fit and feel	Significant changes in reductions in unprotected sex, increases in protection during last intercourse and fewer condom use errors
Crosby et al.[16]	RCT	US: Kentucky	18–29	Heterosexual African American men newly diagnosed with an STI (n = 266)	Focus on the Future, a clinic-based safer sex program (personalised, single session; up to 50 min) administered by a lay health adviser Covered motivation to use condoms, sexual pleasure compatible with condom use, and information about sizes and shapes of condoms	Correct and consistent condom use, subsequent STIs; no specific measure of fit and feel	Significantly less likely to acquire subsequent STIs, more likely to report using condoms during last sexual intercourse Also, fewer sexual partners, and higher proficiency scores for condom application skills
Crosby et al.[17]	RCT	US: Louisiana and North Carolina	15–23	Male, self-identifying as Black, not knowingly being HIV positive (n = 702)	Adaptation of Focus on the Future, delivered face to face in an STI clinic lasting 1 h Addressed barriers to correct and consistent condom use (e.g. fit and feel, perceived reduction in pleasure)	Subsequent STIs, no. partners, frequency and proficiency of condom use; no specific measure of fit and feel	Efficacy for condom use variables, but no significant change for STIs
Emetu et al.[18]	Repeated-measures pilot and evaluation	US: Indiana	18–29	MSM (n = 30)	KIHIS, a brief researcher-led intervention to teach condom application skills, provision of a condom and lubricant kit and instruction to practice condom application at home	Correct and consistent condom use, attitude, motivation, self-efficacy and experience; CUE subscale of Condom Barriers Scale[A]	Improvements in consistency of condom use, motivation to use correctly, self-efficacy and attitudes
Milhausen, et al.[19]	Repeated-measures pilot and evaluation	Canada: Ontario	16–21	Heterosexual men (n = 28)	KIHIS (as above)	Correct and consistent condom use, skills, enjoyment and self-efficacy; CUE subscale of Condom Barriers Scale[A]	Significant changes for condom experiences, confidence, self-efficacy, condom comfort, and reduction in breakage and erection problems

[A]Specific measure of condom use fit and feel.

Table 2.   Outcome measures used in the included studies
X, study measured this outcome; STI, sexually transmissible infection

	Aronson *et al.*[15]	Crosby *et al.*[16]	Crosby *et al.*[17]	Emetu *et al.*[18]	Milhausen *et al.*[19]
Sexual behavioural outcome measures					
Consistent condom use				X	
Correct and consistent condom use with no errors			X		
Frequency of condom-protected or unprotected sex	X	X		X	X
Condom use at last intercourse	X	X			
Frequency of condom use errors and problems	X				X
No. female partners		X			
Mediators of sexual behaviour					
Condom use self-efficacy and condom use ability	X			X	X
Condom use motivation				X	
Condom use attitudes	X			X	
Condom use experience				X	X
Condom use knowledge	X				
Condom use communication	X				
Proficiency in using condom (penile model)		X			
Biological outcomes					
Subsequent STI diagnosis		X	X		

Following our methodological critical appraisal, according to our criteria, two of the studies were judged as moderate quality,[15,17] and the remaining three were judged as weak quality.[16,18,19]

Results of the included studies

Two randomised control trials[16,17] examined the use of the same brief face-to-face intervention (Focus on the Future) that targeted condom fit and feel, motivation and correct and consistent use in samples of young African American men. The single session (45–50 min), delivered by a trained lay (or peer) health adviser, was based on the Information–Motivation–Behavioural Skills (IMB) model.[20] Information directly relevant to the quality of condom use was provided. Men were taught that condoms are available in a variety of sizes and shapes, about the value of periodically adding water-based lubricants to condoms during sexual intercourse and, by demonstration from the health adviser, that oil-based lubricants can quickly erode latex condoms. Men were also encouraged to use condoms they felt fit them comfortably. Enhancing men's motivation to use condoms was an integral component of the session. Throughout the session, the advisor encouraged men to feel good about using condoms, to experience condoms as being compatible with sexual pleasure and to actively protect themselves from future STI acquisition.

In a 2009 study by Crosby *et al.*,[16] men receiving this intervention were significantly less likely to have acquired STIs at the 6-month follow-up (the primary outcome measure) than men in the control condition (standard STI clinic care; 50.4% vs 31.9% respectively; adjusted odds ratio (aOR) 0.32; 95% confidence interval (CI) 0.12–0.86; $P = 0.02$), were more likely to report using condoms during their last sexual intercourse (72.4% vs 53.9%; aOR 2.06; 95% CI 1.07–3.96; $P = 0.03$) and reported fewer acts of unprotected sex (12.3 ± 25.8 vs 29.4 ± 79.3; adjusted mean difference

–11.9; 95% CI –31.3, 7.5; $P = 0.21$). Men in the intervention group also had higher proficiency in using condoms on a condom demonstrator (5.35 ± 1.21 vs 2.18 ± 1.30 on a nine-point rating scale; aOR 3.19; 95% CI 2.81–3.56; $P < 0.001$).

A later study by Crosby *et al.*[17] used an adapted version of the Focus on the Future intervention that specifically focused on overcoming barriers to correct and consistent condom use, such as problems with fit and feel and perceived reduction in sexual pleasure. Results were mixed. At the 6-month follow-up, 51.5% and 46.9% of the intervention and control participants, respectively, reported correct and consistent condom use with no errors (the primary outcome; $P = 0.29$). Adjustment for age and baseline non-equivalence of the outcome variable (the control group were 10% more likely to use condoms consistently and correctly at baseline) yielded an estimated odds ratio (eOR) of 1.63 (95% CI 1.07–2.49; $P = 0.02$), indicating a significant intervention effect. Regarding STIs, at 6 months the incidence of both chlamydia and gonorrhoea was 9.4%; there was no difference between the intervention and control groups. After adjustment for age, self-reported history of chlamydia or gonorrhoea and the baseline value of the primary dependent behavioural variable (correct and consistent use), the eOR was 1.04 (95% CI 0.49–2.23; $P = 0.91$), indicating no significant intervention effect for reducing STIs.

Two studies tested the KIHIS brief intervention,[18,19] based on the Permission, Limited Information, Specific Suggestions, and Intensive Therapy (PLISSIT) model, which requires clients to participate in behavioural assignments, in this context practising using condoms alone as 'homework'.[21] A key component of the KIHIS intervention is that men are encouraged to experiment with a range of condoms and lubricants to help them find the optimal condom 'fit and feel' and to focus on the physical sensations experienced while using condoms.[19] In one study,[19] the intervention was delivered by a study researcher in either a clinic or university setting; this involved a description of the study activities

required and a demonstration of condom application on a penile model that the participant was asked to repeat until perfected. Participants were then given a condom 'kit' containing a variety of condoms and lubricants to take away for home practice. There were significant improvements ($P < 0.05$) between baseline and the 3-month follow-up for the study outcomes of condom use fit and feel experiences (score increase of 0.27 ± 0.52), confidence in the ability to use condoms (score increase of 0.29 ± 0.67) and self-efficacy to apply condoms correctly (score increase of 0.31 ± 0.68). Significant improvements in experiences with the fit and feel of condoms during the last three times condoms were used, the use of water-based lubricants with condoms and a reduction in erection problems while using condoms were reported.[19]

Emetu *et al.*[18] tested the same KIHIS intervention in a population of 29 MSM. At the 6-week follow-up, 45% of men ($n = 13/29$) reported a reduced frequency of unprotected insertive penile–anal intercourse in the previous 30 days compared with baseline, whereas the frequency stayed the same for 45% of men (13/29) and increased for 10% of men (3/29; $P = 0.01$). The percentage of events for which a condom was used for insertive anal intercourse increased between baseline and the 6-week follow-up from a mean of $59.6 \pm 33.4\%$ to $73.4 \pm 37.3\%$ ($P = 0.01$). There were also significant improvements in condom use self-efficacy, attitudes towards condom use and motivation to use condoms.

The fifth study, by Aronson *et al.*,[15] used a community-based participatory research partnership to develop and pilot the Brothers Leading Healthy Lives intervention. The intervention was informed by the IMB model[20] and Whitehead's Big Man Little Man Complex (BM/LMC) model.[22] Key messages were to discover ways of achieving sexual satisfaction while being safe, safer sex can be pleasurable and enjoyable, how to reduce condom problems during sex and a variety of ways to get sexual pleasure that are not risky for HIV. A treatment group-only design was used to pilot test the newly developed intervention. There was a decrease in the mean proportion of vaginal sex encounters that were unprotected, from 0.56 ± 0.37 at baseline to 0.29 ± 0.34 at the 3-month follow-up ($P < 0.001$), and a decrease in the mean proportion of any sex that was unprotected from 0.70 ± 0.23 to 0.56 ± 0.30 ($P < 0.05$). The proportion of men who reported using pregnancy protection at last vaginal intercourse increased from 0.72 ± 0.45 to 0.85 ± 0.36 ($P < 0.05$), and the proportion who reported using at least one barrier method (e.g. condom, intrauterine device) at last vaginal intercourse increased from 0.51 ± 0.50 to 0.74 ± 0.44 ($P < 0.01$). The total mean number of condom errors (e.g. incorrect application of a condom) decreased from 3.35 ± 1.41 to 1.96 ± 1.51 at the 3-month follow-up ($P < 0.001$). Scores for three of the four condom use self-efficacy subscales improved from baseline to the 3-month follow-up. There were also significant improvements in knowledge about HIV and correct condom application ($P < 0.001$), attitudes towards condoms ($P < 0.05$) and intentions to use condoms ($P < 0.001$).[15]

In addition to measuring outcomes, two studies evaluated the acceptability of the intervention.[18,19] In the study of Milhausen *et al.*,[19] men were asked open-ended questions at follow-up about what they liked about the study, what they would change about the intervention and how it helped improve their condom skills. The responses indicated that men liked the program and felt their knowledge and confidence in using condoms had increased. Emetu *et al.*[18] reported that over 80% of their participants found the intervention to be an enjoyable and useful experience.

Summary of results

The results of this review show some encouraging findings, albeit with methodological caveats. Following receipt of the behavioural interventions, there were significant increases in the use of condoms for vaginal or anal intercourse,[15,16,18,19] correct and consistent condom use with no errors[17] and condom use at last sexual intercourse,[15,16] and a reduction in the frequency of condom use errors.[15] It is particularly noteworthy that condom use without errors was increased because errors are a key barrier to effective condom use that these interventions were designed to address.

The studies also demonstrated improvements in some of the mediators of condom use, including condom use self-efficacy and condom use ability,[15,18,19] condom use knowledge and intentions to use condoms,[15] CUE (specifically measuring aspects of condom fit and feel)[18,19] and attitudes towards using condoms.[15,18]

There were mixed findings regarding the ability of interventions to reduce STI acquisition (chlamydia and gonorrhoea) in the two studies that measured this, with one study noting a decrease in the intervention compared with the control group[16] and the other finding no difference.[17] A sample size calculation for measuring reductions in STIs was not reported in these studies; thus, there may not have been enough participants and sufficient occurrence of infections to demonstrate a statistically significant difference between the groups.

Discussion

None of the interventions included in this review was based on the CUE model.[7] However, the results of the studies, as a collective body of evidence, can be interpreted in relation to this model. There were some improvements in the mediators of condom use (e.g. knowledge and self-efficacy, akin to 'contextual factors' in the model) and in correct condom use. To fully support the ability of the model to predict correct and consistent condom use, studies should demonstrate improvements across the three main components of the model: contextual factors, CUE and future condom use. Only one study[15] provided evidence of consistency of effects across these three components, with improvements in condom use mediators as well as reported condom use with no errors. Future behavioural interventions addressing condom fit and feel should be designed and evaluated based on the CUE model to deepen our understanding of the mechanisms influencing effectiveness.

The findings of this review need to be interpreted with caution due to the methodological limitations of the studies included. Only two studies used an experimental design; the other three used single cohort pre–post intervention designs without any comparison or control group. It is important to recognise that the relationship between issues related to fit

and feel and condom errors or problems may be reciprocal (i.e. fit and feel issues may lead to breakage or slippage, but these problems may also reduce sensation). Although all five studies evaluated interventions that targeted fit and feel issues, only two studies[18,19] included a measure of fit and feel. None of the studies reported a sample size calculation, and it is therefore unclear whether they were adequately powered to detect statistically significant effects. Other limitations include the relatively short length of study follow-up, high rates of participant drop-out and potential social desirability bias associated with self-reported outcomes. Three of the studies described themselves as 'pilots',[15,18,19] with the authors themselves recommending further intervention evaluation using larger samples and controlled experimental designs to strengthen the quality of evidence. Pilot studies may also be more prone to publication bias towards positive findings.

The limitations of this review also need to be acknowledged. Standard systematic review processes[23] were followed, including a search of several key literature databases, independent article eligibility screening, data extraction and critical appraisal. However, due to the need for a rapid review[24] to inform the development of an intervention,[12] our search dates were limited to commence from 2006 onwards. Thus, any earlier relevant studies would not have been identified. Further, we are aware of at least one relevant study published since our literature search was completed, a pilot randomised control trial of an intervention addressing men's barriers to condom use.[25] In that study, men ($n = 176$) attending STI clinics in the UK participated in an online intervention website that addressed aspects such as discomfort, lack of pleasure and education about different sizes and types of condom. Measures of condomless sex with female and male partners were not significantly different between the intervention and control groups at the 3-month follow-up.[25]

Notwithstanding the above limitations of the current evidence, this review contributes useful information about the overall effectiveness and acceptability of condom use behavioural interventions to guide future design and evaluation of behavioural interventions to address condom fit and feel issues.

Conflicts of interest

The authors have no conflict of interests to declare.

Acknowledgements

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