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Interventions Supporting Engagement with Sexual Healthcare among People of Black Ethnicity: A Systematic Review of Behaviour Change Techniques

Abstract

Background: Black ethnic groups are disproportionately affected by sexually transmitted infections (STIs). This review aimed to identify the effectiveness of interventions designed to increase engagement with sexual health care among people of Black ethnicity as determined by rates of STI testing, adherence to sexual health treatment, and attendance at sexual healthcare consultations. The behavioural theory and behaviour change techniques (BCTs) used within identified interventions were evaluated.

Method: Four electronic databases (Web of science; ProQuest; Scopus; PubMed) were systematically searched to identify eligible articles published between 2000-2022. Studies were critically appraised using the Mixed Methods Appraisal Tool. Findings were narratively synthesised.

Results: Twenty-one studies across two countries were included. Studies included randomised controlled trials and non-randomised designs. Behavioural interventions had the potential to increase STI/HIV testing, sexual healthcare consultation attendance and adherence to sexual health treatment. Behavioural theory underpinned 16 interventions which addressed barriers to engaging with sexual healthcare. Twenty-six BCTs were identified across the included interventions but similar BCTs occurred in both effective and ineffective interventions. Twelve varying intervention formats were used. Intervention facilitators' demographics and lived experience were frequently matched to those of recipients.

Discussion: Our findings highlight the importance of considering sociocultural, structural and socioeconomic barriers to increasing engagement with sexual healthcare and support the use of intervention facilitators that represent intervention recipients to increase engagement and trust. Further examination of different BCT combinations would benefit future sexual health interventions in Black ethnic groups.

Keywords: Sexual Health, Black Minority Ethnic Groups, Intervention, Systematic Review

Introduction

People from Black ethnic backgrounds are disproportionately affected by sexually transmitted infections (STIs). While there is variation across Black ethnic groups, individuals of Black ethnicity in the UK had the highest STI diagnosis rates in 2022, with those from Black Caribbean backgrounds having the highest diagnosis rates of chlamydia, gonorrhoea, infectious syphilis, trichomoniasis and genital herpes compared to White British individuals [1]. Similarly, Black and African Americans in the United States report higher rates of chlamydia, gonorrhoea and infectious syphilis than White individuals [2]. Thus, reducing sexual health disparities in high-risk populations has been identified as a priority [3].

Literature suggests that no unique clinical, attitudinal or behavioural factors can explain the higher rates of STI diagnosis in Black ethnic groups [4]. Therefore, the sexual health disparity between individuals of Black ethnicity and other groups, may be driven by differences in sociocultural, structural and socioeconomic factors. For example, sexual networks and increased concurrent sexual partners can influence the speed in which STIs can spread within a population [5]. Research indicates the complexity of, and reasons for, concurrent sexual relationships include notions of masculinity, peer pressure and the influence of social media [5]. Moreover, individuals of Black ethnicity report experiences of negative racialised stereotypes, not feeling listened to and feeling less comfortable discussing sexual and reproductive health with healthcare professionals [6,7]. Such experiences can create mistrust in sexual health services leading to reduced clinic attendance [8]. Furthermore, associations are reported between differences in residential areas and job opportunities, deprivation and poorer sexual health outcomes [9; 10]. Barriers to accessing sexual healthcare, such as the out-of-pocket costs, are likely to perpetuate disparities in sexual health prevention, diagnosis and treatment [9; 10].

While existing systematic reviews have examined approaches to reducing sexual health risk behaviours in individuals of Black ethnicity [11], there is a gap in our understanding of how best to support engagement with sexual healthcare among individuals of Black ethnicity who have identified a need to access services or treatment. The aim of this review was twofold; first, to collate and assess interventions designed to increase STI testing, STI diagnosis, or STI treatment among individuals of Black ethnicity. Second, to identify theoretical constructs and behaviour change techniques used within these interventions and their association with effectiveness.

Methods

This review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [12]. The review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) (#CRD42021290594).

Eligibility Criteria

Studies were eligible for inclusion if they:

1. Reported an evaluation, and outcome measure for an intervention designed to increase engagement with sexual healthcare, defined by increased rates of STI testing (including home testing kits), diagnosis or treatment, increased attendance at sexual health consultations or clinic visits.
2. Used a sample of participants aged ≥13 years of age and of any Black ethnic group.
3. Used any study design (including randomised controlled trials (RCTs), non-randomised controlled groups, single-arm designs, retrospective or prospective cohort studies).

Studies were excluded if they were published before 2000, not fully available in English or did not report outcomes of participants of Black ethnicity separately to those of other ethnicities. Studies conducted in non-WEIRD (western, educated, industrialised, rich, democratic) countries were also excluded. This was because heterogeneity in access to healthcare and populations was considered to reduce meaningful interpretation of the data.

Information Sources and Search Strategy

Four databases (Web of Science; ProQuest; PubMed, and Scopus) were systematically searched from 1st January 2000 to 10th February 2022. Reference chaining and citation checking via Google Scholar were used to identify additional studies. The search strategy was developed in line with the Population Intervention Comparator Outcome Study (PICOS) design framework [13]. Boolean operators were used to adapt the search for each database (Supplementary File 1).

Study Selection and Data Extraction

One reviewer (RC) screened titles and abstracts. Three researchers (RC, GH and CF) independently screened the full text of relevant articles against the eligibility criteria. Data were extracted from included articles on key study characteristics e.g., country, study design and setting, recruitment information, sample and intervention content, including use of theory, mode of delivery and BCTs. The use of theory, mode of delivery and BCTs were independently coded by three researchers (RC, GH and CF) and differences were resolved through discussion. Only outcome data relating to this review's objectives were extracted (i.e., measures for preventative behaviours, such as condom use, were not extracted).

Use of Theory

The Theory Coding Scheme [14] was used to assess the extent to which theory had been applied within interventions. The Theory Coding Scheme consists of a 19-item checklist that is coded "yes", "no" or "don't know" based on explicit description of theory within the article. Items 1-11 were used to assess whether theory had been mentioned in the study, whether theory had been used to select participants or tailor intervention techniques, and whether theoretical constructs/predictors were linked to intervention techniques.

Behaviour Change Techniques

Intervention content was coded using the Behaviour Change Technique Taxonomy (v1) [15]. This taxonomy contains 93 behaviour change techniques (BCTs), clustered into 16 groups: Goals and Planning, Feedback and Monitoring, Social Support, Shaping Knowledge, Natural Consequences, Comparison of Behaviour, Associations, Repetition and Substitution, Comparison of Outcomes, Reward and Threat, Regulation, Antecedents, Identify, Scheduled Consequences, Self-Belief, and Covert Learning.

Mode of Delivery

Intervention mode of delivery was subdivided and assessed by an approach outlined by Webb and Sheeran [16]: (i) intervention format (e.g., group sessions, text message), and (ii) intervention facilitator (e.g., healthcare professional, digital).

Critical Appraisal

Three researchers (RC, GH, CF) independently appraised the methodological quality of included studies using the Mixed Methods Appraisal Tool [17]. An overall quality score was calculated after responding “yes”, “no” and “can’t tell” to five questions relevant to the study design. Discrepancies were resolved through discussion.

Data Analysis

Due to heterogeneity of the included interventions, a narrative approach was used to synthesise intervention characteristics and outcomes, theoretical application, mode of delivery and BCTs. Interventions were considered effective if the relevant outcome measure was reported to have significantly increased ($p<0.05$) in the intervention group and, where available, was significantly greater than in the control group. To ensure that the reported effectiveness of intervention components only reflected active elements in the intervention group, components present in both the intervention group and control groups were not included in analysis whereby control groups were insignificant. Increase in STI/HIV testing and access to treatment were reported separately to adherence to HIV treatment and appointment attendance.

Results

A total of 2793 articles were retrieved. Twenty-one articles met the inclusion criteria (see Figure 1). Of the 21 included articles, 13 reported RCTs and eight used non-randomised study designs. Twenty studies were conducted in America and one in the United Kingdom. Studies reported a variety of outcome measures, including HIV testing (n=11), STI testing (n=5), treatment for STIs (n=2), HIV treatment adherence (n=5) and appointment attendance (n=2). The follow-up period for measuring outcomes ranged from two weeks to 12 months. Further details on the intervention characteristics are reported in Supplementary Files 2 and 3.

126

127 ***Quality Assessment***

128

129 Methodological quality ranged from low to high, with nine studies rated as low, 10 rated as
130 moderate and two as high (Tables 1 and 2). Intervention fidelity was often unclear [18, 19, 20, 21,
131 22, 23, 24, 25]. In some cases, studies reported that participants did not receive all intervention
132 content [26, 27, 28, 29, 30, 31, 32] or that the delivery protocol was not adhered to [33]. Sufficient
133 data were not always provided to compare participant demographics between an intervention and
134 control group [19, 34] and it was unclear whether participants were representative of the target
135 population [30].

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137 ***Intervention Effectiveness***

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139 *Interventions Aiming to Increase STI/ HIV Testing and Access to STI Treatment*

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141 Five interventions aimed to increase STI testing [22, 24, 25, 35, 36]. Harawa [22] used personalised
142 wellness plans, peer mentors, and group educational and social sessions. There was a significant
143 increase in STI screening in the intervention group (pre: 32%, post: 88%) and the control group (pre:
144 23%, post: 70%). However, no significant between-group changes occurred. Sánchez [36] found no
145 differences in ethnic groups syphilis testing rates at a health event promoting syphilis testing in
146 minorities (Black participants: 33.5%; Hispanic participants: 42.6%; Other participants: 48.3%,
147 p=0.055). Dolcini [35] reported a psycho-educational friendship group-based intervention did not
148 significantly increase STI testing compared to a control (37% vs 42.4%). Similarly, Wilton [24] also
149 found no significant increase in STI testing between a psycho-educational group-based intervention
150 and a wait-list control group at 3-month follow-up (42.5 vs 35.5%, OR=1.47; 95% CI=0.86-2.51) and
151 6-month follow-up (33.9% vs 32.3%, OR=1.17; 95% CI=0.69-1.98).

Two studies aimed to increase engagement with STI treatment [23, 25]. Jones [23] reported findings from a contact tracing intervention for chlamydia that was adapted to address barriers to engagement, such as staff availability, method of contact and chlamydia education. After the adaption, participants were significantly more likely to make a treatment plan (RR, 1.14; 95% [CI], 1.01-1.27; p=0.03) and complete treatment compared with the original intervention (RR, 1.45; 95% [CI], 1.20-1.75; p=0.0001). Partners of participants were also significantly more likely to complete treatment than those in the original intervention (RR, 3.02; 95% [CI], 1.81-5.05; p=0.0001) [22]. Wingood [25] reported participants in a psycho-educational intervention for women were more likely to communicate STI results to concurrent male sexual partners (OR=1.52; 95% CI=1.11-2.06), and their partners were more likely to complete treatment for STIs (OR=1.41; 95% CI=1.05-1.90) than those in the control group.

Eleven further studies aimed to increase testing for HIV [18, 19-22, 24, 32-35, 37]. Two of these studies delivered HIV information and content related to HIV-related behaviours/attitudes through video interventions. Washington [32] found participants who received the video intervention via social media were seven times more likely to have tested for HIV at 6-week follow-up than those in a control group (OR=7.00, 95% CI [1.72, 28.33], p=.006). However, Chittamuru [19] reported that a 13-episode drama video did not significantly increase HIV testing compared with the control group at the 3-month follow-up.

Four studies used group-based interventions to increase HIV testing. Diallo [37] reported a single-session HIV prevention workshop significantly increased HIV testing and receipt of test results compared with the control group at 6-months (AOR=2.30; 95% CI=1.10, 4.81). Dolcini [35] found 14–15-year-olds in a friendship group-based intervention for young people were more likely to have tested for HIV than those in a control group (OR=7.43, p=0.05, 95% CI=0.95–58.33). Dolcini [35]

suggested different ages may respond differently to intervention content and future interventions should be refined specifically for developmental groups. Frye [20] reported no significant increase in HIV testing at 3-months following a psycho-educational group session (baseline: 62.9%, 3-months: 71.4%; p=0.63). Similarly, Wilton [24] found no significant group differences in self-reported HIV testing at 3-months for a group-based weekend retreat intervention. However, intervention participants had 81% greater odds of HIV testing at 6-months than comparison participants (OR=1.81, 95% CI=1.08-3.01, p=0.023).

Three studies used community-engagement approaches. Berkley-Patton [18] delivered intervention content through multi-level church outlets, finding that HIV testing increased significantly in both the intervention (23% to 47%, p=0.01) and comparison group (19% to 28%, p=0.012) at 6-months. However, the intervention group who received culturally tailored content were 2.2 times more likely to have tested for HIV (OR 2.2, 95% CI [0.97–5.10], p=0.06). Kenya [34] found testing with a community health worker significantly increased home-based rapid HIV testing compared with control participants testing alone ($p \leq 0.05$) and significantly increased access to HIV care if positive (100% vs. 83%, $\chi 2$ [1, N=60] = 5.46, $p \leq 0.02$). Seguin [33] reported the HIV self-sampling return rate was 55.5% (66/119, 95% CI 46.1%-64.6%) when practice nurses and community workers opportunistically distributed testing kits using a HIV rationale script.

Two studies used peer-mentoring interventions. Hawara [22] found no significant increase in HIV testing in participants assigned trained peer mentors. However, Frye [21] found that friendship pairs who did HIV self-testing together had twice the odds of reporting HIV testing in the past three months (OR=2.29; 95% CI 1.15, 4.58) and almost twice the odds at 6-month follow-up (OR=1.94; 95% CI 1.00, 3.75). Self-testing was significant at 3-month follow-up ($p < 0.02$) and marginally significant at 6-months ($p \leq 0.05$).

Interventions Aiming to Increase HIV Treatment Adherence and Appointment Attendance

Eight interventions aimed to increase adherence to antiretroviral treatment (ART) [22, 26-31, 38]. Bouris [27] used an intervention group to enhance social support. Intervention participants were 2.91 times more likely to have ≥90% medication adherence (95% CI: 1.10-7.71; p=0.031) than control participants. Ma [30] reported that while at baseline, no participants met the 80% ART adherence criterion, after using an outreach worker to observe participants' ART intake, 75% met the 80% adherence criterion at 3-months, and 67% met the 80% adherence criterion at 6-months. Pagan-Ortiz [38] found SMS adherence reminders with HIV information increased adherence after eight weeks (baseline: 38%, 8-weeks: 86%). Guy [28] found no significant increase in ART adherence in a group-based intervention.

Three studies reported the use of counselling-based interventions to increase ART adherence. Bogart [26] found client-centred counselling increased ART adherence compared with the control group (OR=1.30 per month, 95% CI=1.12-1.51, $p < 0.001$), representing a large cumulative effect after 6 months (OR=4.76, Cohen's *d*=0.86). Jones [29] reported ART adherence increased with individual counselling, group sessions and supportive phone calls (baseline: 76%, 1-month: 100%, 3-months: 99.17%). However, the increase was not significant. Magidson [31] reported an increase in ART use in the intervention group (baseline: 46.9%, 12-month follow-up: 85.7%) and time-matched control group (baseline: 65.5%, 12-month follow-up: 86.7%). Across both groups, there was a significant increase in the likelihood of being on ART over time (logs odds=0.71, p=0.001).

Two interventions aimed to increase sexual health appointment attendance [27, 28]. Bouris [27] found the intervention group 3.01 times more likely to have had ≥3 HIV primary care visits in the past 12 months (95% CI: 1.05-8.69, p=0.04) than the control group. However, Guy [28] reported medical appointment attendance to decrease from pre- to post-intervention by 12.5% (p=0.39).

Use of Theory

Interventions Aiming to Increase STI/ HIV Testing and Access to STI Treatment

A theoretical basis was reported for 10 interventions that aimed to increase STI/HIV testing and access to STI treatment. Six interventions which used theory were found to be effective [18, 22, 24, 25, 32, 37]. Berkley-Patton [18] reported applying the Theory of Planned Behaviour [39] to increase behavioural beliefs about the importance of HIV testing, change normative beliefs, reduce stigma, and enhance perceived behavioural control. The intervention's mode of delivery was guided by Social-Ecological Theory [40]. Diallo [37] reported that their intervention was guided by the Health Belief Model [41], Transtheoretical Model [42] and Social Cognitive Theory [43]. However, how the theories were applied was not specified. Hawara [22] described group intervention activities as being based on Social Cognitive Theory [44], and the intervention's peer mentors stemming from Social Impact Theory [45] and Social Comparison Theory [46]. Washington [32] reported their intervention to be informed by the Integrative Model of Behaviour Change [47, 48], targeting HIV knowledge, behavioural beliefs, self-regulation skills and ability, social support, and engagement in self-management behaviour. A combination of Social Cognitive Theory [44], Behavioural Skills Acquisition Model [49], Transtheoretical Model of Behaviour Change [42] and the Decisional Balance Model [50] guided the development of Wilton's [22] intervention. However, how the theories were implemented was not specified. Similarly, Social Cognitive Theory [44] was reported to inform Wingood's [25] intervention content, alongside The Theory of Gender and Power [51]. Theoretically informed content sought to enhance participants' attitudes and skills to avoid untreated STIs and educate on gender power imbalances and gender-related HIV prevention strategies.

Four ineffective interventions which aimed to increase STI/HIV testing and access to STI treatment reported behavioural theory. Chittamuru [19] reported Social Cognitive Theory [44] to inform intervention content. Similarly, Frye [20] used Social Cognitive Theory [44] as a theoretical framework alongside Empowerment Theory [52], Social Identity Theory [53] and Rational Choice Theory [54]. The AIDS Risk Reduction Model [55] was reported to guide Dolcini's [35] interventions development. Seguin [33] reported that the Capability, Opportunity, Motivation, Behaviour Model [56] was applied to identify barriers and facilitators to behaviour change.

Interventions Aiming to Increase HIV Treatment Adherence and Appointment Attendance

Five studies reported a theoretical basis to interventions aiming to increase HIV treatment adherence and appointment attendance. Bogart [26] reported application of Social-Ecological Theory [57] to address disparities at multiple levels, and Information-Motivational-Behavioural skills model [58] to build treatment knowledge and adherence skills, self-efficacy, and motivation. Theories addressing multiple levels were also used by Guy [28] who applied Intersectionality, Social-Ecological Model [59] and Social Cognitive Theory [44] to target individual, interpersonal, community and structural factors to health disparities. Bouris [27] reported that their intervention was grounded in the Information-Motivation-Behavioral Skills model [58, 60] and an adapted Transtheoretical Model [42] to target motivation and social factors by addressing attitudes and beliefs about stigma and HIV-specific support. The PEN-3 model (Persons, Extended family, and Neighbours; Perceptions, Enablers and Nurturers; and Positive, Existential, and Negative behaviours) [61] was used by Jones [29] to place culture at the centre of intervention development. Pagan-Ortiz [38] reported the Health Belief Model [62] and Social Cognitive Theory [44] as a theoretical basis to address participants' perceived susceptibility to illness, positive beliefs and adherence, and self-efficacy.

Behaviour Change Techniques

Interventions Aiming to Increase STI/ HIV Testing and Access to STI Treatment

A total of 26 BCTs were identified (Table 5). The number of BCTs within each intervention ranged from two to 13 (mean: 6.9). The most commonly observed BCTs across all interventions aiming to increase STI/HIV testing and access to STI treatment were *information about health consequences* (n=13), *instruction on how to perform behaviour* (n=9), *restructuring the physical environment* (n=9), *framing/reframing* (n=7) and *demonstration of the behaviour* (n=7). The BCTs from significant comparison groups have been included in the narrative below and Table 5 to help interpret BCT combinations that may be effective in supporting engagement with healthcare.

Within the nine interventions found to significantly increase STI/HIV testing and access to STI treatment within the intervention group, observed BCTs ranged from two to 13 (mean: 7.9). Commonly observed BCTs included *information about health consequences* (n=8), *instruction on how to perform behaviour* (n=6), *information about social and environmental consequences* (n=4), *restructuring the physical environment* (n=4) and *framing/reframing* (n=4). Two significant comparison arms also included *restructuring the physical environment* (n=2). The following BCTs were solely used in effective interventions: *goal setting (behaviour), review behaviour goal(s), information about social and environmental consequences, social comparison, reduce negative emotions* and *restructuring the social environment*.

Five interventions did not report a significant increase in their intervention group. The BCTs reported within these interventions ranged from five to 10 (mean: 7.8). The most commonly observed BCTs were *information about health consequences* (n=5) and *demonstration of the behaviour* (n=4).

Asking individuals to *commit* to behaviour change was the only BCT used solely in an intervention that did not report a significant increase in their intervention group.

Interventions Aiming to Increase HIV Treatment Adherence and Appointment Attendance

A total of 31 BCTs were observed (Table 6). The number of BCTs reported ranged from four to 14 (mean: 9.75). The most commonly reported BCTs across all interventions aiming to increase HIV treatment adherence and appointment attendance were *problem solving* (n=8), *information about health consequences* (n=6) and *goal setting (behaviour*) (n=5).

Within three intervention groups found to significantly increase adherence to HIV treatment and appointment attendance, observed BCTs ranged from eight to 14 (mean: 11.6). The most frequently used BCTs in the effective intervention groups were *information about health consequences* (n=3) and *problem solving* (n=3). The following BCTs were only used once and within effective interventions: *discrepancy between current behaviour and goal, review outcome goal(s), behavioural contract, self-monitoring of the behaviour, feedback on outcome(s) of behaviour, habit formation, pros and cons* and *non-specific reward.*

Four interventions were reported not to be effective, in which the BCTs identified ranged from four to 14 (mean: 9.25). The most commonly identified BCTs within these interventions were *problem solving* (n=4), *information about health consequences* (n=3), *goal setting (behaviour)* (n=3) and *restructuring the social environment* (n=3). The following BCTs were only used once and within interventions not found to be effective: *monitoring of behaviour by others without feedback, monitoring of outcome(s) of behaviour without behaviour, social support (unspecified), social support (practical), demonstration of behaviour, social comparison, pharmacological support* and *focus on past success.*

Mode of Delivery

Interventions Aiming to Increase STI/ HIV Testing and Access to STI Treatment

Ten intervention formats and 10 facilitators were identified in interventions aiming to increase STI/HIV testing and access to STI treatment (Table 3). The most commonly used intervention formats in effective interventions were face-to-face group sessions (n=5) and individual face-to-face sessions (n=4). Other effective interventions utilised telephone (n=3), videos (n=2), SMS messages (n=1), resource material (n=1), posters (n=1), church bulletins (n=1), and letters (n=1).

The most frequently used intervention facilitators in effective interventions were digital (n=4), peers (n=3) and printed material (n=2), The following facilitators were used once: trained facilitators, health educators, church pastors, church health liaisons, screening and treatment program staff, community health worker, community workers and actors.

Interventions Aiming to Increase HIV Treatment Adherence and Appointment Attendance

Six intervention formats and eight facilitators were identified for interventions aiming to increase HIV treatment adherence and appointment attendance (Table 4). The most commonly reported intervention formats in effective interventions were individual face-to-face sessions (n=3), group face-to-face sessions (n=2) and booklets (n=1).

Intervention facilitators used in effective interventions included counsellors (n=1), social worker interventionist (n=1) and trained therapist (n=1) and printed material (n=1).

Discussion

This review identified 21 interventions designed to increase engagement with sexual healthcare in Black ethnic groups. Some behavioural interventions were found to increase STI/HIV testing, access to STI treatment, ART adherence and attendance at sexual healthcare appointments. Fifteen interventions were underpinned by behavioural theory, with 26 BCTs identified across the included interventions. Social Cognitive Theory [44] and the Transtheoretical Model of Behaviour Change [42] were the most frequently used behavioural theories. The most frequently utilised BCTs were *information about health consequences*, *instruction on how to perform the behaviour*, *restructuring the physical environment*, *framing/reframing,* and *demonstration of the behaviour*. Interventions were delivered in 12 different intervention formats. Intervention facilitators were frequently reported to be being of Black ethnicity or to have similar life experiences as intervention recipients. A summary of components identified in effective interventions and where uncertainty remains has been included in Figure 2.

Fifteen of the included interventions reported behavioural theory. This finding contrasts with previous suggestions that there is limited theoretical underpinning for sexual health clinic attendance interventions [63]. However, studies in the present review were often unclear on how theory had informed intervention design, content or delivery. Thus, identifying patterns in how theory may influence intervention outcomes remains challenging. Nevertheless, the use of theory supports suggestions that sexual health disparities for Black individuals are driven by differences in sociocultural, structural and socioeconomic factors [5, 6, 9]. For example, restructuring environments to include pastors' modelling HIV testing [18], client-centred counselling to address medical mistrust [26], and education on partner selection and the economic impact of pregnancy [25]. This approach follows Medical Research Council guidance [64] to consider how theory interacts with contextual factors within intervention development. More detailed reporting of intervention

384 design, implementation and theory evaluation in future interventions will help to develop
385 understanding of how theory can guide behaviour change in the context of sexual health.
386
387 While the present review demonstrates that a variety of intervention delivery modes can be used,
388 interventions frequently matched the demographics and lived experience of the intervention
389 facilitator with that of the intervention recipients. Matching the ethnicity or gender of intervention
390 facilitators has previously increased effectiveness and improved patient experience within
391 healthcare services [65, 66]. Moreover, existing literature indicates that interventions with
392 facilitators who are representative of the recipients have good acceptability and fidelity [67]. Peer
393 delivery of sexual health interventions have previously been more effective than expert delivery
394 [65]. In addition, an African American sample have reported shared life experiences and sufficient
395 trust can make discussing sexual health easier [59]. Thus, future intervention facilitators must
396 represent intervention recipients and deliver trustworthy messages [68]. When identifying, engaging
397 and collaborating with such stakeholders, it is essential to acknowledge stakeholders' expertise,
398 clarify roles and responsibilities, ensure visible representation among the team, and to establish
399 trust [4]. Creating partnerships with local organisations, demonstrating a commitment to benefit
400 local communities, and involving local community members in designing and delivering sexual health
401 promotion and interventions are encouraged [67, 68; 4]. Collaborative intervention design may
402 improve future intervention fidelity, reduce prejudices and bias, and ensure that interventions are
403 delivered using culturally-appropriate venues and modes [10]. In line with the findings of this
404 research, digital modes of intervention delivery and social media have previously been
405 recommended due to their influence [10].
406
407 The most commonly reported BCTs in interventions aiming to increase STI/HIV testing and access to
408 STI treatment were *information about health consequences*, *instruction on how to perform the*
409 *behaviour*, *restructuring the physical environment*, *framing/reframing* and *demonstration of the*

410 *behaviour*. Providing information about health consequences is frequently used in sexual health
411 interventions [63] but we found that its use was not strongly associated with effectiveness. There
412 was also little difference in the mean number of BCTs identified in effective and ineffective
413 interventions (7.9 vs 7.8), suggesting that different BCT combinations may have mediated outcomes.
414 In particular, the seven BCTs solely used in effective interventions may have influenced outcomes.
415 Addressing the social environment, setting and reviewing goals, rewarding achievements and
416 managing negative emotions may have helped enable personalised support for individual participant
417 barriers [21, 22] and challenged community narratives about sexual health and relationship
418 dynamics [20, 28, 22, 18, 33]. Consequently, this may have enabled person- and community-centred
419 support for sexual healthcare barriers [11]. Nevertheless, ongoing engagement with Black
420 communities is of utmost importance to ensure tailored sexual health interventions are culturally
421 relevant, acceptable and engaging [68, 10].
422
423 Frequently identified BCTs in interventions designed to increase HIV treatment adherence and
424 appointment attendance were *problem solving*, *information about health consequences* and *goal*
425 *setting (behaviour*). These BCTs reflect theories indicating a need to address both practical
426 (e.g., *problem solving*) and perceptual barriers (e.g., *information about health consequences*) to
427 treatment and appointment attendance [70]. Nevertheless, as *problem solving*, *information about*
428 *health consequences* and *goal setting (behaviour*) were identified in both effective and ineffective
429 interventions further consideration must be given to the other BCTs used alongside them. Eight
430 further BCTs solely used in effective interventions targeted individuals' motivation for behaviour
431 change [56] with behavioural contracts, pros and cons lists, prompts to support habit formation,
432 self-monitoring, reviews and feedback on behaviour, and rewards. Thus, interventions to increase
433 ART adherence and HIV appointment attendance in those with Black ethnicity, may benefit from
434 frameworks that address an individual's capability (e.g., *information about health consequences*),
435 opportunity (e.g., *problem solving*) and motivation (e.g., rewards, feedback, prompts supporting

habit formation) [56]. Moreover, it has been recommended that sexual health promotion for individuals from a Black ethnic background needs to be informative (capability), address sexual health myths (opportunity) and use incentives (motivation) [68, 10]. Nevertheless, testing the effectiveness of specific frameworks and BCT combinations should be a priority for future research.

Strengths and limitations

This is the first systematic review of interventions which aim to support engagement with sexual health services and treatment in Black ethnic groups. The review thus provides valuable insight into how future interventions can be optimised to improve sexual health outcomes in individuals of Black ethnicity and reduce health inequalities. Nevertheless, this review was limited by heterogeneity in the identified intervention aims, outcome measures, inclusion criteria, sample sizes and follow-up durations. Such variation renders it impossible to conduct more complex analyses and creates challenges in comparing studies. Secondly, not all studies included a comparison group or pre-test data and, in some cases, BCTs were also identified in comparison groups [23, 34]. Reporting of BCTs was included in significant comparison groups to help support interpretation of which intervention components may support engagement with healthcare. However, caution is required when interpreting the effectiveness of some interventions and BCTs. Thirdly, additional intervention studies that aimed to increase engagement with sexual healthcare in Black participants were excluded because data were not reported separately for individual ethnic groups or because of uncertainty about included participant ethnicities (e.g., “Other” ethnicities). Finally, identifying and understanding the application of behavioural theory and BCTs was challenged by sub-optimal reporting of intervention characteristics. Theory and BCTs were only coded when they could be explicitly identified. Although available intervention protocols were reviewed, it is possible that additional intervention characteristics may not have been reported. The use of reporting guidelines, such as the CONSORT [71] and TiDieR [72], or the availability of more open-access intervention

protocols, will help aid the future assessment of intervention components and their effectiveness. Reporting interventions using standardised terminology will support identification of intervention components and facilitate comparison across interventions. The release of the Behaviour Change Technique Taxonomy 2 with additional techniques and further distinction between techniques may help identification and comparison of intervention components [73].

Conclusion

This review provides ~~new~~ additional insight into how behavioural interventions can increase engagement with sexual healthcare among individuals of Black ethnicity. Findings highlight the importance of considering sociocultural, structural and socioeconomic barriers to engaging with sexual healthcare when providing content to modify health-seeking behaviours. Educational interventions can be optimised by including components to strengthen individuals' opportunities and motivation to engage in behaviour change. Intervention facilitators should represent the target community, and steps should be taken to enhance recipients' trust in intervention providers. Future sexual health intervention research in this area would benefit from examining the effectiveness of various BCT combinations.

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Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of the systematic search and selection of articles.

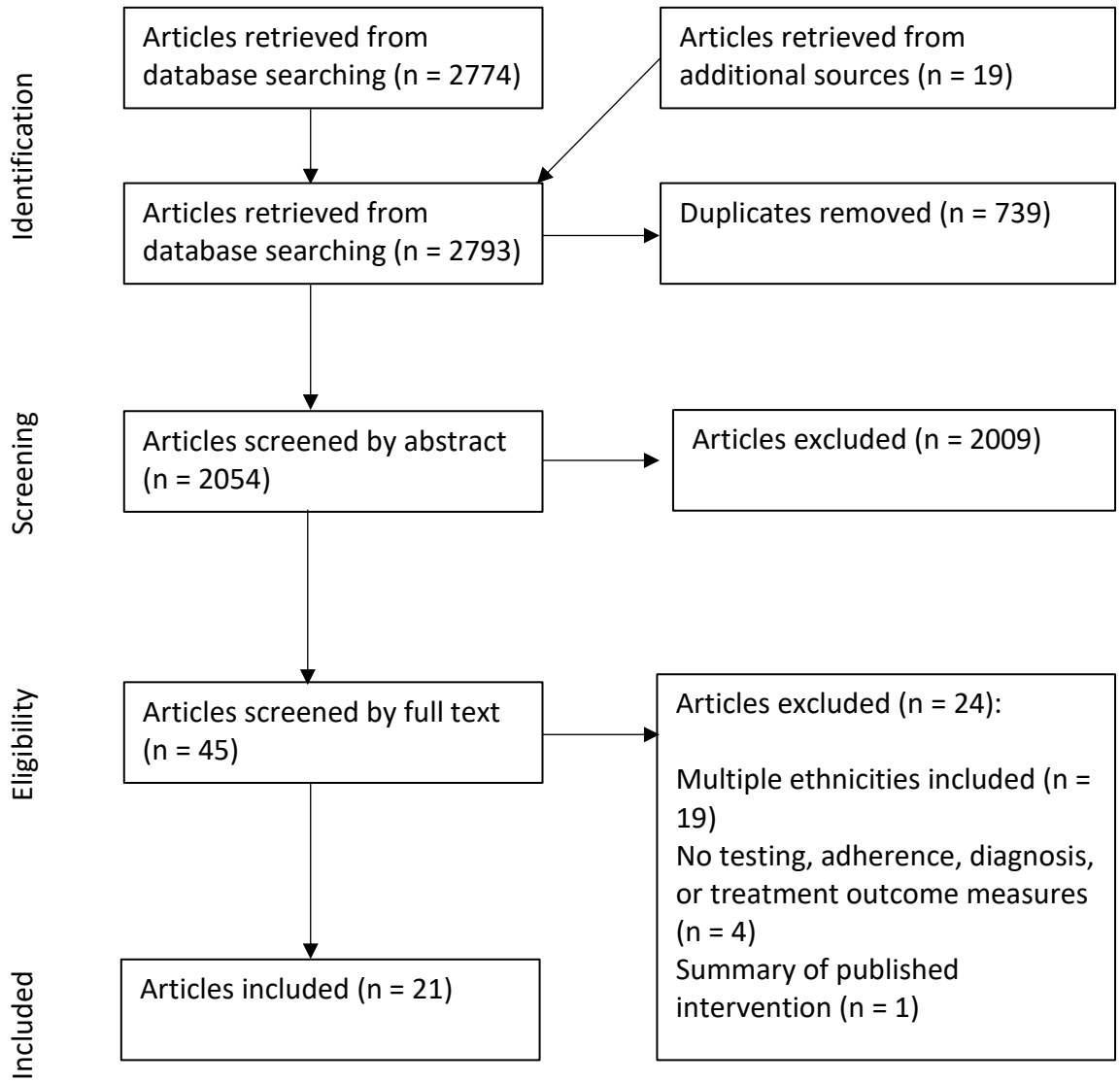

Figure 2: Summary of components identified in effective interventions

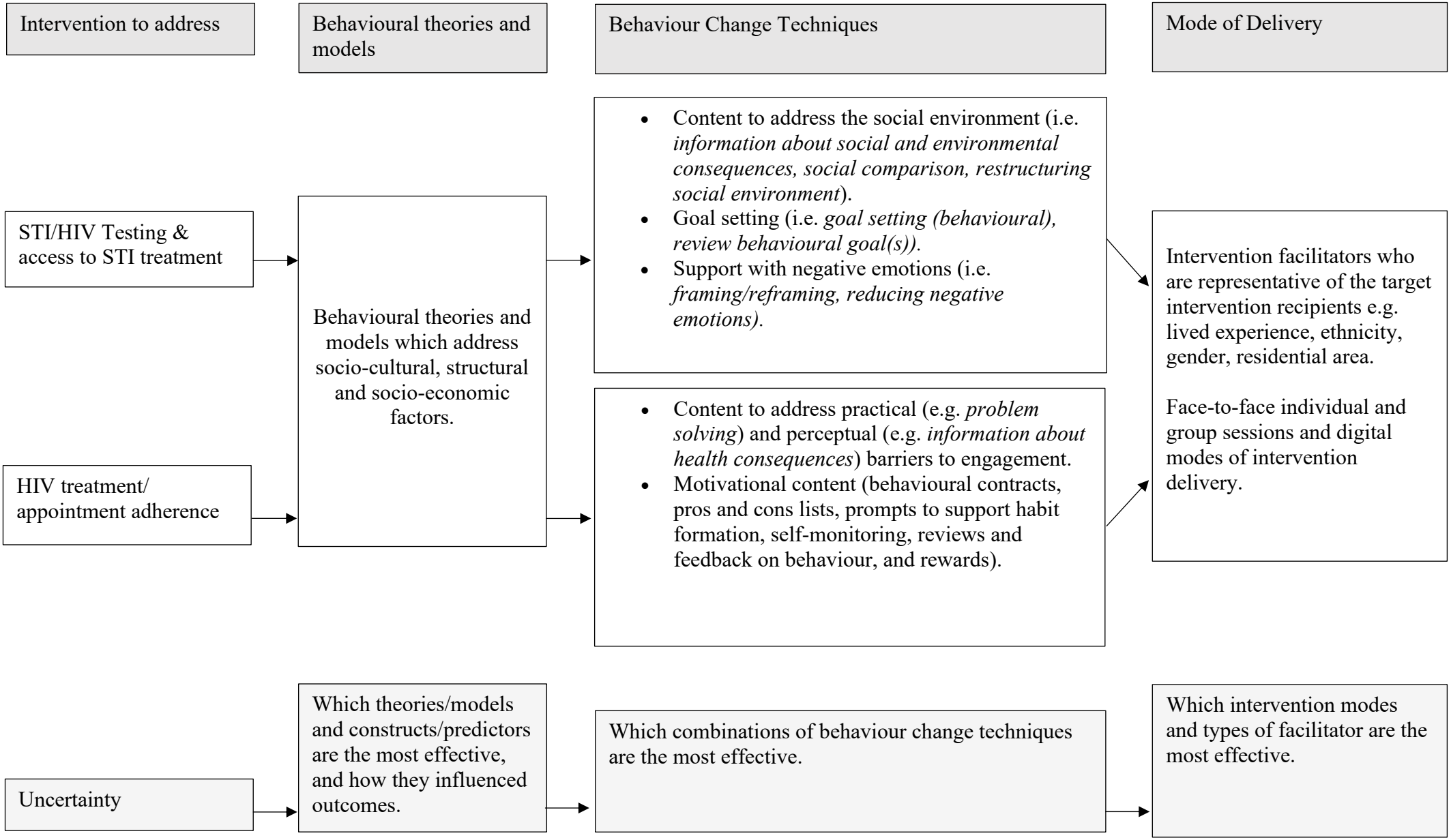

Table 1: Quality assessment of interventions aiming to increase STI/HIV testing and STI treatment

Category of design	Methodological quality criteria	Berkley-Patton (2016)	Chittamuru (2017)	Diallo (2010)	Dolcini (2010)	Frye (2013)	Frye (2020)	Harawa (2020)	Jones (2021)	Kenya (2016)	Sánchez (2009)	Seguin (2018)	Washington (2017)	Wilton (2009)	Wingood (2013)
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?		✓			✓	✓	✓	✓					✓	✓
	2.2. Are the groups comparable at baseline?			✓	✗	✓	✓	✓	✓				✓	✓	✓
	2.3. Are there complete outcome data?		✓	✓	✓	✓	✓	✓	✓	✓			✓		✓
	2.4. Are outcome assessors blinded to the intervention provided?						✗		✗						
	2.5 Did the participants adhere to the assigned intervention?			✓	✗					✓			✗		
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?	✗									✓	✓			
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	✓									✓	✓			
	3.3. Are there complete outcome data?	✓									✓	✓			
	3.4. Are the confounders accounted for in the design and analysis?	✓									✓	✓			
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?										✓	✗			
	MMAT score	3	2	3	1	3	3	3	3	2	5	4	2	2	3

Green ticked boxes: Yes. Orange blank boxes: Can't tell. Red cross: No.
0-2, low. 3-4, moderate. 5 high.

Table 2: Quality assessment of interventions aiming to increase HIV treatment adherence and appointment attendance

Category of design	**Methodological quality criteria**	**Bogart (2017)**	**Bouris (2017)**	**Guy (2020)**	**Jones (2018)**	**Ma (2008)**	**Magidson (2022)**	**Pagan-Ortiz (2019)**
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?	☐	☐				☑	
	2.2. Are the groups comparable at baseline?	☑	☒				☒	
	2.3. Are there complete outcome data?	☑	☒				☑	
	2.4. Are outcome assessors blinded to the intervention provided?	☑	☐				☑	
	2.5 Did the participants adhere to the assigned intervention?	☒	☒				☒	
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?			☐	☒	☐		
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?			☑	☑	☑		
	3.3. Are there complete outcome data?			☑	☑	☑		
	3.4. Are the confounders accounted for in the design and analysis?			☐	☐	☐		
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?			☒	☒	☒		
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?							☑

	5.2. Are the different components of the study effectively integrated to answer the research question?							☑
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?							☑
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?							☑
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?							☑
	MMAT score	3	0	2	2	2	3	5

Green ticked boxes: Yes. Orange blank boxes: Can't tell. Red cross: No.
0-2, low. 3-4, moderate. 5 high.

Table 3: Summary of intervention modes of delivery for interventions aiming to Increase STI/ HIV testing and access to STI treatment

	Intervention format	**Intervention facilitator**
Berkley-Patton et al (2016)**	Face-to-face sessions (individual and group), resource material, posters, church bulletins, telephone, SMS messages, videos	Church pastor, church health liaisons, printed materials, digital
Chittamuru et al (2017)	Video	Digital
Diallo et al (2010)*	Face-to-face sessions (group)	Trained facilitator (Black ethnicity, female)
Dolcini et al (2010)	Face-to-face sessions (group)	Health educator (African American, female)
Frye et al (2013)	Face-to-face sessions (group)	Trained facilitators (African American, male)
Frye et al (2020)*	Face-to-face sessions (individual)	Peer educators
Hawara et al (2020)**	Face-to-face sessions (individual and group)	Peer mentors (Black, MSM)
Jones et al (2021)*	Telephone, letters	Screening and treatment program staff, digital, printed material
Kenya et al (2016)*	Face-to-face sessions (individual), telephone	Community health worker, digital
Sánchez et al (2009)	Resource material, emails, face-to-face sessions (group and individual)	Venue staff, venue promoters, outreach staff, printed material, digital
Seguin et al (2018)	Face-to-face sessions (individual), SMS message	Practice nurses, community workers, digital
Washington et al (2017)*	Videos	Digital, actors (Black, MSM)
Wilton et al (2009)*	Face-to-face sessions (group)	Trained peers (Black, MSM)
Wingood et al (2013)*	Face-to-face sessions (group)	Health educators (African American, female)

*significant increase in intervention group

**significant increase in both intervention and control group

Table 4: Summary of intervention modes of delivery for interventions aiming to increase HIV treatment adherence and appointment attendance

	Intervention format	**Intervention facilitator**
Bogart et al (2017)*	Face-to-face sessions (individual and group)	Counsellors (Black ethnicity)
Bouris et al (2017)*	Face-to-face sessions (individual and group)	Social worker interventionist
Guy et al (2020)	Face-to-face sessions (group)	Intervention facilitators (African American, living with HIV and serious mental illness)
Jones et al (2018)	Face-to-face sessions (individual and group), telephone, treatment manuals	Clinician facilitators (trained to M.A. level), digital, printed material
Ma et al (2008)	Face-to-face sessions (individual), telephone	Outreach worker (African American, female, from local community), digital
Magidson et al (2022)**	Face-to-face sessions (individual), booklets	Trained therapists, printed material
Pagan-Ortiz et al (2019)	SMS messages	Digital

*significant increase in intervention group

**significant increase in both intervention and control group

Table 5: The Behaviour Change Techniques (Michie et al., 2013) used in interventions aiming to Increase STI/ HIV testing and access to STI treatment

Group	BCT identified	Berkley-Patton: Intervention arm (2016)**	Berkley-Patton: Comparison arm (2016)**	Chittamuru (2017)	Diallo (2010)*	Dolcini (2010)	Frye (2013)	Frye (2020)*	Harawa: Peer mentor arm (2020)**	Harawa: Non-peer mentor arm (2020)**	Jones (2021)*	Kenya (2016)*	Sánchez (2009)	Seguin (2018)	Washington (2017)*	Wilton (2009)*	Wingood (2013)*
Group 1: Goals and planning	1.1 Goal setting (behaviour)							■	■	■						■	
	1.2 Problem solving					■	■							■		■	■
	1.4 Action planning					■		■	■	■				■		■	
	1.5 Review behaviour goal(s)											■					
	1.9 Commitment					■											
Group 2: Feedback and monitoring	2.2 Feedback on behaviour				■	■	■									■	
Group 3: Social Support	3.1 Social support (unspecified)					■		■	■							■	
Group 4: Shaping Knowledge	4.1 Instruction on how to perform behaviour	■			■	■	■	■						■	■	■	■
	4.2 Information about antecedents				■		■								■	■	
Group 5: Natural Consequences	5.1 Information about health consequences	■		■	■	■	■		■		■	■	■	■	■	■	■
	5.3 Information about social and environmental consequences				■				■						■	■	

Group 6: Comparison of behaviour	6.1 Demonstration of the behaviour	■		■	■	■	■	■						■			
	6.2 Social Comparison	■							■								
	6.3 Information about others' approval	■		■													
Group 7: Associations	7.1 Prompts/ cues	■	■										■				
Group 8: Repetition and substitution	8.1 Behavioural practice/rehearsal				■	■	■	■						■		■	
Group 9: Comparison of outcomes	9.1 Credible source	■	■	■					■					■			
	9.2 Pros and cons						■								■		
Group 10: Reward and threat	10.1 Material incentive (behaviour)								■	■			■				
	10.1 Material reward (behaviour)								■	■			■				
	10.6 Non-specific incentive															■	
Group 11: Regulation	11.2 Reduce negative emotions														■		
Group 12: Antecedents	12.1 Restructuring the physical environment	■	■				■		■	■	■		■	■		■	
	12.2 Restructuring the social environment							■	■	■							
Group 13: Identity	13.2 Framing/reframing	■		■	■	■	■									■	■
Group 15: Self-belief	15.1 Verbal persuasion about capability													■			■
	Total BCTs used	9	3	5	8	10	10	7	11	6	2	2	5	9	6	13	5

*significant increase in intervention group
**significant increase in both intervention and control group

Table 6: The Behaviour Change Techniques (Michie et al., 2013) used in interventions aiming to increase HIV treatment adherence and appointment attendance

Group	BCT identified	Bogart (2017)*	Bouris (2017)*	Guy (2020)	Jones (2018)	Ma (2008)	Magidson: Act Healthy (2022)**	Magidson: Supportive Counselling & LifesSteps (2022)**	Pagan-Ortiz (2019)
Group 1: Goals and planning	1.1 Goal setting (behaviour)	■		■	■		■	■	
	1.2 Problem solving	■	■	■	■	■	■	■	■
	1.4 Action planning	■		■			■	■	
	1.5 Review behaviour goal(s)		■	■	■		■		
	1.6 Discrepancy between current behaviour and goal	■							
	1.7 Review outcome goal(s)	■							
	1.8 Behavioural contract						■		
Group 2: Feedback and Monitoring	2.1 Monitoring of behaviour by others without feedback					■			
	2.3 Self-monitoring of the behaviour						■		
	2.5 Monitoring of outcome(s) of behaviour without behaviour					■			
	2.7 Feedback on outcome(s) of behaviour	■							
Group 3: Social Support	3.1 Social support (unspecified)	■	■	■				■	
	3.2 Social support (practical)					■			

Group 4: Shaping Knowledge	4.2 Information about antecedents								
Group 5: Natural Consequences	5.1 Information about health consequences								
	5.3 Information about social and environmental consequences								
Group 6: Comparison of behaviour	6.1 Demonstration of behaviour								
	6.2 Social comparison								
Group 7: Associations	7.1 Prompts/ cues								
Group 8: Repetition and substitution	8.1 Behavioural practice/rehearsal								
	8.3 Habit formation								
Group 9: Comparison of outcomes	9.2 Pros and cons								
Group 10: Reward and threat	10.3 Non-specific reward								
Group 11: Regulation	11.1 Pharmacological support								
	11.2 Reduce negative emotions								
Group 12: Antecedents	12.1 Restructuring the physical environment								
	12.2 Restructuring the social environment								
Group 13: Identity	13.2 Framing/reframing								
	13.4 Valued self-identity								
Group 15: Self-belief	15.1 Verbal persuasion about capability								
	15.3 Focus on past success								
	Total BCTs used	14	8	14	13	6	13	6	4

*significant increase in intervention group

**significant increase in both intervention and control group

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Competing interests Jonathan Ross reports personal fees from GSK Pharma and Bayer Consumer Care; ownership of shares in GSK Pharma and AstraZeneca Pharma; lead author of the UK and European Guidelines on Pelvic Inflammatory Disease; Member of the European Sexually Transmitted Infections Guidelines Editorial Board. He is an NIHR Journals Editor and associate editor of Sexually Transmitted Infections journal. He is treasurer for the International Union against Sexually Transmitted Infections and chair of charity trustees for the Sexually Transmitted Infections Research Foundation. The other authors report no conflicts of interest.

Data sharing statement The data that support the findings of this study are available on request from the corresponding author.