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**EDITORIAL**

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# The rapidly changing paradigm of HIV prevention: time to strengthen social and behavioural approaches

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**Abstract**

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A decade after the world's leaders committed to fight the global HIV epidemic, UNAIDS notes progress in halting the spread of the virus. Access to treatment has in particular increased, with noticeable beneficial effects on HIV-related mortality. Further scaling-up treatment requires substantial human and financial resources and the continued investments that are required may further erode the limited resources for HIV prevention. Treatment can play a role in reducing the transmission of HIV, but treatment alone is not enough and cost-effective behavioural prevention approaches are available that in recent years have received less priority. HIV prevention may in the future benefit from novel biomedical approaches that are in development, including those that capitalize on the use of treatment. To date, evidence of effectiveness of biomedical prevention in real-life conditions is limited and, while they can increase prevention options, many biomedical prevention approaches will continue to rely on the behaviours of individuals and communities. These behaviors are shaped and constrained by the social, cultural, political and economic contexts that affect the vulnerability of individuals and

communities. At the start of the 4<sup>th</sup> decade of the epidemic, it is timely to re-focus on strengthening the theory and practice of behavioural prevention of HIV.

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**Introduction**

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After almost three decades of a growing HIV pandemic, successes in the global fight against HIV are finally becoming evident. In its 2010 Report on the Global AIDS Epidemic, the Joint United Nations Program on HIV/AIDS (UNAIDS) boldly notes that 'the world has turned the corner—it has halted and begun to reverse the spread of HIV' [1]. While these words have been strongly criticized as reckless and premature [2], there are grounds for some optimism that concerted, programmatic efforts to promote universal access to prevention, treatment, care and support are having noticeable effects. Compared with 1997, when the HIV epidemic is thought to have peaked, globally, 21% fewer adults and children are estimated to have become infected with HIV in 2009 [1]. Also, in 2009 alone, 1.2 million more people in low- and middle-income countries newly received effective antiretroviral treatment (ART), bringing the total number of people receiving such treatment to 5.2 million, a 13-fold increase in only 5 years since 2004. As access to treatment has increased, the estimated number of AIDS-related

deaths has declined by 19%, from a peak of 2.1 million in 2004 to 1.8 million in 2009 [1].

These are truly remarkable achievements that have only occurred in the decade since the member states of the United Nations (UN), in 2001, convened for the UN General Assembly Special Session on HIV/AIDS and signed the Declaration of Commitment on HIV/AIDS [3]. Global resolve to fight HIV/AIDS has in particular been enabled by substantially increased financial investments and innovative public-private funding mechanisms [4], supported by resource-rich countries and philanthropists, including through the Global Fund to Fight HIV, Tuberculosis and Malaria, the US President's Emergency Plan for AIDS Relief, the World Bank and the Bill and Melinda Gates Foundation. This global political and financial support is vital for the HIV response in many countries as are the wider innovations in global health governance incited by the HIV response [5]. Achievements to date illustrate that investments in sound and acceptable programmes can alter the course of the HIV pandemic in many low- and middle-income countries, as previously have evidence-based responses in developed countries [6].

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### **Building on achievements**

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There are many compelling reasons for continued vigilance and caution in celebrating achievements in the global fight against HIV. Complacency is dangerous [2] and, as noted more than a decade and a half ago regarding the HIV epidemic among gay and other men who have sex with men (MSM) in resource-rich countries, the best way to loose the fight against HIV is to declare victory and leave the field [7]. In times of global financial constraints, funding for the global fight against HIV continues to fall well short of what is needed [2], while large increases in spending for prevention and treatment of HIV will be needed to control the epidemic in the future [8].

Understandably, many low- and middle-income countries express concerns around the sustainability of financial support to maintain and build on successes that have been achieved [9]. Furthermore, in many countries and regions, proven and well-

targeted responses need to be strengthened and their coverage increased, rather than merely maintained, highlighting that, to effectively curb the HIV pandemic, much more funding and human resources are needed to successfully scale-up programmes [10]. While fewer people may become infected annually, the estimated number of people newly infected in 2009 was a staggering 2.6 million [1]. Also, at the same time that countries with the largest epidemics in sub-Saharan Africa have seen HIV incidence fall, incidence has increased in countries in Eastern Europe and Central Asia [1]. Resource-rich countries, including those that had successfully contained the HIV epidemic early on, are now experiencing a resurgence of HIV infections in MSM, who continue to account for most infections in these countries [11]. At the same time, new and newly identified epidemics of HIV among MSM are reported in Asia and Africa [12]. Globally, the HIV prevention needs of MSM and other socially marginalized communities, such as injection drug users, remain particularly underserved [13,14].

As the worlds' leaders committed themselves, starting a decade ago, to ensuring universal access to prevention, treatment, care and support [15], a major focus has been on increasing the numbers of people who receive ART [16]. Now that many people living with HIV in resource-rich countries can lead relatively normal lives and their life expectancy has substantially increased [17], it is essential also to ensure sustained access to treatment for people who live in resource-poor countries, with resulting benefits for individuals, families, communities, societies and the world at-large. However, 15 years after effective ART was first introduced, still only one-third of the 15 million people living with HIV estimated to need treatment actually receive it [1,16]. Furthermore, as AIDS-related deaths decline and more than 7000 people become infected every day, the number of people living with HIV continues to grow rapidly and was estimated at 33.3 million in 2009 [1]. This growing population of people living with HIV, combined with international expert recommendations and guidelines supporting earlier initiation of treatment [18,19], will only further increase demand for treatment, including in sub-

Saharan Africa, the world's region most affected by HIV [16,19]. Of particular concern is that treatment programmes already take up the largest share of the budget for the HIV response that is available to many low-and middle-income countries [9]. Moreover, treatment programmes in poorer countries typically are at least in part internationally funded, usually for a limited period of time, increasing concerns regarding their future sustainability [9].

Even at the recent, accelerated, pace of scaling up access to treatment, it will take years to achieve universal access for all in need, a target that was originally, and aspirationally, set for 2010 [1,14,15]. At the same time, millions of people will become newly infected with HIV. Despite major achievements in providing access to treatment in recent years, the number of people newly infected with HIV continues to outpace the number of people newly initiating treatment [20], with UNAIDS data showing that for every person initiating ART in 2009 two people became newly infected [1]. A committee of experts tasked by the US Institute of Medicine recently came to the conclusion that, in Africa, the burden of HIV-related morbidity and mortality cannot be alleviated through treatment alone as ART can reach only a fraction of those who need it and costs are unsustainable [20].

The increasing acknowledgement of the (practical) limitations of ART in curbing the HIV epidemic anywhere soon has contributed to a recognition of the continued importance of HIV prevention [21,22], and underlies the UNAIDS calls to action for HIV prevention [23], and for a prevention revolution [24]. Moreover, as HIV infection, at least in theory, is easily preventable, it is also a public health and human rights imperative to focus on stemming the HIV epidemic upstream. Unfortunately, HIV prevention has received much less priority, funding and demand and access to treatment has not been matched by access to prevention [21,22].

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### **Increased options and combination HIV prevention**

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From the early years of the pandemic, many HIV prevention programmes have been community

based and informed by a public health approach [3], aiming to educate people about HIV, facilitate access to services and encourage preventive behaviours [25]. Behavioural prevention programs that make use of a range of theory-based approaches, such as persuasive communication, social marketing, peer education, diffusion of innovation and cognitive-behavioural techniques [25], have become particularly important in promoting change in individuals, couples, families, small groups, networks, institutions and entire communities, including through HIV and sexuality education for young people in and out of school [25,26]. However, thus far none of the only nine identified, randomized controlled trials (RCTs) of behavioural interventions that included HIV infection as an outcome have found effects on HIV [27].

Sustained changes in behaviour that are large enough to affect the course of the HIV epidemic are difficult to achieve [25]. In part, this is because social, economic, political and environmental factors affect HIV risk and vulnerability [28], including poverty, gender inequality and social exclusion. The importance of such structural factors in the dynamics of the global HIV pandemic is increasingly recognized and favours longer-term development approaches to HIV prevention [3], which address the social processes that shape and constrain individuals' behaviours and their possibilities to protect themselves [28]. For instance, stigma and discrimination of people living with HIV, sex workers, injection drug users, MSM and transgender persons limits access their access to prevention and other services and women and girls cannot always insist that their male partners use a condom. A structural approach to HIV prevention highlights the need for more prevention options, in particular those that can be controlled by women [29], as well as underscores the importance of comprehensive HIV prevention to deal with complexity [23], of which the promotion and protection of human rights is a core part [24].

As Coates *et al.* [25] note, HIV prevention is neither simple nor simplistic but requires a combination of behavioural, structural and biomedical approaches [3,22,23,25,28,30–32], integrated with treatment of

HIV and other sexually transmissible infections [25], and brought together in a sophisticated programmatic mix that is appropriate in specific local epidemiological contexts [31,33]. Recently, progress has in particular been made with respect to biomedical interventions, other than the male and female condom, to reduce the likelihood of HIV transmission [31], with the potential to substantially extend the array of HIV prevention options in the future. Notably, evidence is now available from three RCTs in high prevalence countries in Sub-Saharan Africa, which show that surgically safe circumcision in adult men reduces the likelihood of these men becoming infected with HIV through heterosexual intercourse after wound healing by up to 60% [34]. However, the direct benefits for female partners of circumcised men are unclear [34] as is acceptability of (adult) male circumcision as programmes are being rolled out [31]. Progress is also being made in developing a preventive vaccine against HIV infection [35]. A first successful RCT now shows a 30% protective efficacy of a prime-boost combination of two vaccine candidates in a general population sample of men and women mostly at heterosexual risk [36].

A biomedical HIV prevention approach that is currently seen as particularly promising is the use of ART for the prevention of HIV infection and transmission [37]. Antiretroviral drugs are already routinely used to prevent transmission from HIV-infected mothers to their child and for occupational post-exposure prophylaxis (PEP) in health care workers; PEP is recommended to prevent HIV infection after likely sexual exposure to HIV infection, also known as non-occupational PEP or N-PEP [37]. A novel use of ART for prevention that is being investigated for efficacy is as pre-exposure prophylaxis (PrEP), which involves the use of antiretroviral drugs by people who are not infected with HIV before possible exposure to the virus to reduce the likelihood that they become infected. There is now initial evidence that the use of antiretroviral drugs for PrEP can offer some protection against HIV infection. A RCT among women in South Africa showed that coitus-related use of a vaginal gel containing antiretroviral drugs reduced HIV infections in women by 39% [38]. A RCT of a daily

oral regimen of antiretroviral drugs in MSM in six countries in the Americas, Asia and Africa, found a 44% reduction in HIV infections among men and transgender women who had sex with men [39].

While PEP and PrEP aim to protect uninfected individuals, ART can also be used strategically to reduce the infectiousness of HIV-infected individuals and limiting the likelihood of onward transmission [37]. At least in theory, a strategy of universal testing for HIV and immediate initiation of treatment upon HIV diagnosis (i.e. universal test and treat) may contribute significantly to the reduction and elimination of the HIV epidemic [40]. Support for the universal test and treat approach comes from ecological studies in MSM in San Francisco and injection drug users in British Columbia, showing population-level associations between increased HIV testing, wider ART coverage, decreased viral load and decreased annual numbers of new HIV diagnoses [41,42].

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### Reality constraints of new prevention technologies

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The diverse current and future uses of ART for prevention have the potential to affect the course of the HIV epidemic at the population level, and strengthen and perhaps even radically change HIV prevention. In view of the recent evidence, it is not surprising that enthusiasm for the range of treatment-based HIV prevention strategies is growing [43], with some commentators noting that prevention as a strategy to defeat HIV finally came of age [44]. However, despite the potential future benefits of treatment-as-prevention, there are still major caveats that need to be addressed before PrEP and universal test and treat programmes can be confidently implemented as population interventions. These include the need for more and robust evidence to support the efficacy and effectiveness of treatment-as-prevention approaches in a wider range of communities and settings [37,45,46]. Observations from Australia caution that high uptake of testing and ART among MSM does not necessarily result in fewer HIV infections [45]. Also in other countries where MSM have good access to HIV testing and antiviral treatment,

the HIV epidemic in this community is resurging [11]. This may be because for universal test and treat to be effective in reducing HIV incidence, very high levels of coverage in a population are required [47], above what is already being achieved in resource-rich countries today [48]. There is also evidence to show that, despite the fact that a high proportion of HIV-infected MSM in Australia are on ART and have undetectable viral load, the per-contact probability of HIV transmission due to unprotected anal intercourse is similar to estimates reported from developed country settings before ART became widely available. [49]. Furthermore, mathematical modelling shows that, even when treatment of HIV-positive partners in serodiscordant couples is optimal, there is the potential for substantial increases in HIV incidence when condom use declines [50]. The risk that more reliance on treatment-based prevention options increases risk taking that could offset any prevention benefits is not yet well understood [37].

Treatment-based prevention requires the provision of and access to sophisticated health services, which not only increases medicalization of healthy individuals using PrEP [37] but also requires human and financial resources that, realistically, may be difficult if not impossible to be made available and sustained [9,37]. Moreover, a stronger reliance on treatment for HIV prevention may compound problems with access to ART for those in need [37] and may come at the expense of other prevention approaches that are already compromised by the emphasis on treatment [48]. As investments in other forms of (behavioural) prevention decrease, there is even a potential that overall coverage and intensity of HIV prevention decreases, at least in the short term, and new HIV infections may increase as a result. Experience with providing ART to those in need has shown that rolling out treatment programmes takes money and time and is also restricted by the availability of sufficient services and qualified health care staff [1,9,16]; there is no reason to expect that this will be any different when rolling out treatment for prevention. In fact, the challenges in bringing treatment-for-prevention programmes to scale are powerfully illustrated by disconcerting experiences with the provision of ART

for the prevention of mother-to-child transmission of HIV. While substantial progress is being made [1,16], there is a long way to go in achieving the elimination of mother-to-child transmission, a goal that is generally considered feasible [1]. Notably, in 2009, only an estimated 53% of pregnant women in low- and middle-income countries, who presumably were known to be HIV positive, received antiretroviral medication to prevent mother-to-child transmission. Importantly, merely 26% of pregnant women were tested for HIV [1], suggesting substantial unmet need regarding HIV diagnosis that will also affect other forms of treatment for prevention.

In the current climate, there is, nevertheless, considerable momentum to further develop, test and bring to scale proven and potential biomedical options for HIV prevention and these new prevention technologies, in particular the universal test and treat approach, are heralded as a ‘paradigm shift’ and ‘game changers’ [48]. This has the paradoxical effect of strengthening the dominance of treatment over prevention, which has also been strongly criticized by leading medical experts [22], and more generally perpetuates the dominance of medical over behavioural and social approaches, and signals a disquieting re-medicalization of the response to HIV [48]. Nguyen *et al.* [48] discursively note a ‘medical triumphalism’ that touts new prevention technologies as potentially more effective than old prevention technologies of condoms use, based on what they consider inappropriate comparisons. It is true that, as some biomedical prevention scientists note, evidence from RCTs that show an impact on HIV infection is only available for treatment-as-prevention approaches [37]. It is equally true, however, that social and behavioural approaches to prevention remain particularly underfunded [3] and that in the past decades only nine RCTs of behavioural prevention have been reported that looked at HIV incidence as an outcome, none of which showed a significant effect [27]. At least 31 trials have been conducted of biomedical prevention that, overwhelmingly (25 of 31; 80%), also failed to find an effect [51]. Only one trial has looked at the effects of structural interventions on HIV incidence and found no effect [52]. It is also true that not all RCTs were adequately designed to assess

effects on HIV incidence [27,51], which at least in part reflects difficulties in securing funding for the required large scale studies, and that RCTs, in particular those using HIV incidence as an outcome, can pose serious challenges, especially for the evaluation of interventions requiring large scale implementation and/or targeting more distal determinants [53] and should not be the only evidence that is relied on [51]. Many (complex) behavioural interventions have been tested in RCTs that showed substantial effects on behaviour [54] but these findings are often dismissed because they rely on potentially biased self-reports that do not provide adequate surrogate indicators of HIV infection [27,53], without a much needed in-depth consideration of complex design, measurement and conceptual issues that inform the evidence for HIV prevention interventions [32,51].

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### **Continued importance of social and behavioural prevention**

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Despite statements to the contrary by some [51,55], partly effective biomedical prevention options are yet again (perceived to be) presented as a magic bullet by others, a promise they are unlikely to live up to, but that nevertheless distracts from investment in other approaches [48]. However, it is absolutely clear that new prevention technologies, including male circumcision and the use of treatment for prevention, are not and cannot be replacements for social and behavioural prevention, even when proven effective and when they can realistically be brought to scale. The extent and importance of the social and behavioural implications of new prevention technologies are not adequately considered in current debates and may be substantially underestimated. The same is true for the ethical implications of the use of treatment for prevention when access to these same drugs to mitigate morbidity and mortality is still limited, as well as the implications of providing toxic drugs that can cause viral resistance to healthy people who may be less likely to optimally adhere to treatment regimens [37]. At

the very minimum, the implementation of new prevention technologies will also require social and behavioural approaches to promote uptake and support adherence [25,27], including understanding and addressing the individual, social, economic and political factors that affect acceptability and accessibility. Furthermore, health education and behaviour change programmes remain needed to counter any unintended increases in risk behaviour, which have already been linked to the availability of ART, at least in MSM [56].

There is a more important role to play for social and behavioural prevention than merely as complements to biomedical prevention strategies, as some surmise [57]. Importantly, while treatment-as-prevention and other new prevention technologies may possibly attenuate the impact of social, economic and political inequalities that shape differences in HIV risk and vulnerability, they do not change or remove these inequalities and vulnerabilities and cannot replace structural approaches to HIV prevention. Social and behavioural approaches also remain much needed to address the prevailing stigma in families, communities and health care settings [25], which profoundly affects and restricts access to prevention, treatment, care and support services for people living with HIV and minority communities most affected by HIV that are also critical for successful implementation of new prevention technologies [9]. Hayes *et al.* [53] propose a practical conceptual framework of the determinants of sexual HIV transmission that operate on at least three reciprocally interacting levels, ranging from the microbiological and cellular levels through the individual and local community levels, to the population and global levels. Each of the multiple determinants in the causal chain provides a potential target for prevention and the framework in particular highlights the potential value of combination prevention.

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### **Strengthening behavioural prevention in social contexts**

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The history of the multidisciplinary fields of health education and health promotion convincingly documents that social and behavioural approaches

to promote public health have long come of age [58]. Building on the wide diversity of conceptual and condition-specific traditions in health education [59] and health promotion [60], a wide range of approaches to HIV prevention have been developed and continue to be refined [61], which, in a diversity of populations, have been shown to effectively reduce behaviours that put individuals at-risk for HIV infection [25] and create supportive social environments that attenuate vulnerability [28].

There is now a large body of evidence that has been synthesized in numerous reviews and meta-analyses of original studies and summarized in a meta-analysis of 18 meta-analyses [54]. This body of research convincingly shows that significant effects of behavioural prevention on sexual risk of HIV infection can be found in a range of population groups, including adolescents, heterosexual adults, gay and other MSM, (injection) drug users, people living with HIV, ethnic minority groups, STI clinic patients and people with mental illness [54]. Significant effects have been obtained using a range of behavioural outcome measures, in particular increased condom use, reduced unprotected sex and reduced numbers of partners; there is some evidence suggesting that behavioural prevention can also reduce rates of sexually transmissible infections [54]. Evidence is also accumulating, including from low- and middle-income countries [62], that a range of behavioural prevention methods can be effective in promoting sexual risk reduction [63]. This includes proven approaches, such as individual counselling, group programs, peer education and community social influence and empowerment [64], as well as couples counselling [65], computer-based interventions delivered online and offline [66] and mass media campaigns [67]. Curriculum-based sex and HIV education in schools also improves preventive sexual behaviours [68]. Importantly, while it is sometimes thought that frank, comprehensive sex education may hasten sexual initiation or increase sexual behaviour in young people, there is strong evidence that it may in fact delay sexual initiation and reduce sexual behaviour [69].

Major achievements are being made in social and behavioural HIV prevention [3,25], but there is much room for improving knowledge of HIV, providing access to basic HIV prevention services, including voluntary counselling and testing and addressing the large unmet need for condoms [1,9,32]. Most-at-risk populations, marginalized in many societies, remain particularly underserved [1,13,14]. It is now time to re-balance approaches to HIV prevention and strengthen the reach and coverage of proven behavioural prevention programs. As Coates *et al.* [25] have argued, behavioural prevention science can also do better, which includes better establishing the effectiveness and longer-term effects of proven interventions [54]. It is also critical to strengthening the translation of effective program into practice [25,32,54,70] and address barriers to implementation related to the evaluation of the nature of the evidence for different prevention approaches, the availability of financial and human resources, as well as social factors that affect the implementation of evidence-based policies and programs, such as cultural values, religious beliefs and regulatory systems regarding lifestyle, sexual diversity and drug use. What is also most needed is an expansion of the theories that guide behavioural prevention, away from the current dominance of mostly individual-level theories of motivation and skills [25,70], and towards theories that account for multiple levels of influence on behaviour, including from structural factors [25,70,71].

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### Overview of contributions

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At the start of the fourth decade of the HIV epidemic, this special issue of *Health Education Research* aims to contribute to the much needed strengthening and dissemination of the theory and practice of behavioural approaches to HIV prevention. This timely special issue brings together 15 papers that address current issues in HIV prevention in a range of developed and developing country settings. The reported studies broadly reflect three different conceptual and practical perspectives that

constitute important pillars of HIV prevention: health psychology, health communication and the pedagogy of HIV education.

Noar *et al.* [72] address the need for new prevention options for African Americans in the USA, who are disproportionately affected by HIV. In view of the evidence supporting computer technology-based interventions, they developed a computer-delivered individually tailored intervention for heterosexually active African Americans. The many advantages of computer-based interventions, in particular their potential to combine large reach with relatively low cost, offer much promise for the future of HIV behavioural prevention.

Latino gay men also face multiple barriers to HIV prevention and there is in particular a lack of programmes that integrate prevention messages with cultural norms and address issues of social marginalization from gay as well as Latino communities. Vega *et al.* [73] report on a culturally responsive multi-layered HIV prevention intervention, originating in the community, to promote effective community leadership, provide HIV education and address internalized homophobia. The initial positive effects of the program merit further investigation.

The study by Li *et al.* [74] contributes to building the evidence base for HIV behavioural prevention outside of the United States. Rather than presenting a new intervention, these authors address the potential of a culturally adapted intervention for young people. Cultural adaptation not only makes good use of existing resources, the positive findings from this quasi-experimental evaluation also provide much needed evidence regarding the usefulness of prevention programmes, and perhaps also their underlying theory, in other cultural contexts.

The following two papers illuminate factors that affect the effects of proven and novel behavioural interventions. Schmiede *et al.* [75] previously demonstrated the efficacy of a theory-based HIV-prevention intervention for justice-involved adolescents, who engage in high levels of risky sexual behaviour. They now show that adolescents' level of positive outlook significantly moderated program effects on outcomes and theoretical media-

tors, with strongest effects for those scoring relatively lower on positive outlook. De Vet *et al.* [76] note that forming implementation intentions, that is action plans that specify when, where and how a person will act, is a promising method to promote condom use. Their study, however, suggests that it is hard for young women to form high quality plans for condom use. Implementation intentions for preparatory behaviours, that is buying, carrying and discussing condoms, were of better quality, implying that it is important to ask individuals to form implementation intentions for preparatory behaviours rather than for the target behaviour alone.

With a focus on one component of a broader HIV prevention communication campaign in Malawi, Creel *et al.* [77] provide an evaluation of a mass media radio programme to reduce HIV-related stigma. Stigma is thought to hinder HIV prevention in a number of ways. The study demonstrates the utility of radio diary programmes, featuring men and women living with HIV, in reducing HIV-related stigma in the larger community. An enhancement to the intervention involving listener group discussions may not add further benefit but in fact, may lead to polarization, which further demonstrates the complexity in understanding stigma and the complexity of addressing it in HIV prevention.

Ditmore and Allman [78], in an international study conducted across multiple continents, uniquely examine communication within research processes for biomedical HIV prevention trials among sex workers. Their paper, which focuses on issues of consultation, translation, research literacy, respect and participant feedback, focuses on the complexity of communication and factors that affect it. In doing so, the authors dispel a dominant myth that sex workers may be against research, and shed light on how ethical practices and structural changes will enhance participation and the quality of research.

Cain *et al.* [79], in an ethnographic study among Xhosa-speaking people in South Africa, provide understanding of sexual communication within both private and public contexts. The authors present a useful framework for understanding both literal



and emotional aspects of communication, between educators and community and between sexual partners. The paper suggests as sexual communication is influenced both by gender roles and power differentials, HIV prevention education that incorporates universal terminology may facilitate greater acceptance free of emotive cultural connotations.

Mutchler *et al.* [80] acknowledge that most research on sexual communication has focused on the interpersonal with fewer studies on cultural and social expectations of that communication. Their analysis of HIV risk in dyadic interviews between young gay men and other young men and between young gay men and heterosexual female friends, conducted in the USA, examines how sexual scripts differ within these different conversational contexts. The authors conclude that assumptions about group-level communication patterns merit revisiting in HIV prevention initiatives.

In a study of gay and bisexual men in France, Adam *et al.* [81] explore the association between online erotic chatting and sexual risk taking. Unexpectedly, they observed that Internet conversations, which include fantasizing about unprotected anal intercourse, may lead to greater actual sexual risk taking. This is an interesting twist on a common belief that communicating fantasies about unsafe behaviour does not manifest itself physically in forms of risk behaviour.

Turning to questions of education, the importance of locating HIV pedagogy within a strong theoretical base is discussed in the paper by Miedema *et al.* [82], which argues for a more detailed exploration of the theoretical assumptions underpinning different forms of HIV-related education. Differentiating between approaches that are 'scientifically' informed, those that draw upon notions of 'rights' and those which are overtly 'moralistic' in the sense that they promote conservative moral positions concerning sexual practices, this paper discusses the strengths and limitations of different types of HIV-related education. It argues for a more rigorous conceptual grounding of different forms of pedagogic practice in pursuit of HIV prevention and for a better understanding of how teachers may be supported in their HIV work.

Goldman *et al.* [83], drawing on research in Australia, make a strong argument for engaging with sexuality education using concepts such as Anderson and Krathwohl's taxonomy of the cognitive domain and Gardner's work on Interpersonal Intelligence. Such a combination, it is argued, will provide teachers with a more theoretically informed basis from which to develop the curriculum, enabling a more rewarding interaction with students. By locating age and gender appropriate educational interventions within a more structured and theoretical approach, it should prove possible to progressively enhance the quality of sexuality education.

The paper by Hatcher *et al.* [84] addresses the ways in which, through the promotion of critical consciousness, the daily reality of women's lives serve as the basis for expanded discussion about the deeply rooted health issues of sexuality, HIV/AIDS and domestic violence. The curriculum, which was based on the work of Paulo Freire, encouraged women participants in Limpopo, South Africa to examine 'normal' cultural practices in a new light through critical reflection. Through this process and the development of a critical consciousness, they were able to see and understand that they shared common problems and were able to find shared solutions to these problems. Both individual and collective solutions and actions to problems were developed and, importantly, individual people felt able to take action and make decisions when they were supported by the collective understanding of the issues, in ways that had not been possible when they believed they were alone in confronting issues of health or sexuality, HIV and AIDS or violence.

Taking up the challenge to HIV pedagogy from the perspective of biomedical interventions, Davis [85] argues that it is the very nature of such interventions that allows for a greater critical, social theoretical input into HIV education. This view is supported in the paper by Hatcher *et al.* [84] who argue for a reinterpretation and application of the work of Paulo Freire and the development of a critical consciousness in HIV pedagogy. Such a critical consciousness they argue would allow for analysis,

mobilization and a constructive understanding of HIV and the social environments in which it is being addressed.

Finally, the work of Mason Jones *et al.* [86] looks at the effectiveness of HIV pedagogy in process through an evaluation of peer education. In this paper, peer educators chosen by staff or those who had volunteered were contrasted with those who had been chosen by the pupils. Despite some small variations, no significant differences were found between the two groups—the paper suggesting far more research is needed into peer educator characteristics and their recruitment to ensure more effective HIV pedagogy of this kind.

What all these papers show is that the debates about effective HIV pedagogy are shifting towards more critical, theoretical positions and a questioning of the assumption that there is a simple body of knowledge that can be unproblematically imparted to a range of people. For effective HIV pedagogy, we need rigour and critique together with an appropriately sophisticated understanding of theory and practice. But if this is true in the field of education, it is also true across all the fields of HIV prevention that have been discussed. We hope this special issue of *Health Education Research* serves both as a reminder of what has been achieved, as well as the challenges that remain as we work critically to re-socialize the international response to HIV and AIDS.

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### Conflict of interest statement

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None declared.

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