

## 161. Science Theatre: A Novel Tool for HIV Interventions in South Africa

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**Abstract.** Science communicators are playing an increasingly active role addressing societal problems where science and human behaviour play roles. HIV AIDS is amongst these problems, and is particularly acute in South Africa. This paper investigates whether an HIV science theatre show influenced HIV associated intentions and behaviour of South African youth (n=697). The theatre piece significantly changed intentions, while gender, age, rural/urban background and audience response all influenced change. Provisional evidence of behaviour change was found 2-4 weeks later. These results have implications for science theatre as a behavioural change agent and science communicators' roles in addressing society's big problems.

**Keywords:** HIV/AIDS, Science theatre, Science centre, Youth, Intention, Behaviour change

### Science Theatre as a Change Agent

The interface of science and society is where much of science communication activity is focused. Increasingly, that focus is being called upon to raise awareness of societal issues where people's behaviour has a large bearing on a problem – climate change and HIV/AIDS being prominent examples. The aim of such efforts is to give people greater awareness of the science and provide information in engaging ways so they can make informed decisions. Where the scientific consensus is largely polarised and suggests action, such as with human contributions to climate change, science communicators sometimes aim to foster behavioural change.

Science theatre is an underutilised format in behaviour change communication. Science theatre can be broadly divided into two types: stage plays, often with a historical basis, such as Michael Frayn's *Copenhagen*; and demonstration-based science 'shows' which are commonly performed in science centres. In this paper, science theatre is used in the latter context. Science theatre has huge potential as a change agent as it has been shown to facilitate learning and positively influence attitudes [1,2], be amongst the most memorable parts of science centre and museum visits [3], and foster emotional engagement [4]. Moreover, it is widely practiced, adaptable to most topics and able to incorporate aspects of behaviour change theory such as modeling desirable attitudes and behaviours. Despite its apparent power, however, science theatre is rarely used to directly influence specific behaviours. Research in this area could not be found in the literature. In contrast, traditional theatre approaches have been shown to be effective in promoting behavioral change, including behaviours associated with HIV [5,6]. This begs the question: can science theatre be a tool for HIV behaviour change? This is the central concern of this paper.

This paper investigates a novel HIV AIDS intervention targeting high school students visiting a science centre in South Africa's KwaZulu-Natal (KZN) province. The research focused on attitude and intention changes from an HIV AIDS science theatre show, which formed the intervention's major component. It also gathered provisional evidence of actual behavior change 2-4 weeks later.

### HIV/AIDS in South Africa

South Africa has the largest HIV epidemic globally, with an estimated 5.7 million people HIV positive and 18.1% average prevalence as of 2007 [7]. The human toll of the epidemic is profound: in 2007 approximately 950 people died each day; 1.4 million children under 17 were AIDS-orphans having lost one or both parents; and 460 000 people were receiving HIV drug treatment, although 1.7 million needed it. After a history of government mismanagement of the problem [8], recent developments have been more positive with a national prevention and treatment campaign launched during 2010 and promising behaviour changes, especially amongst youth [9].

South Africa's KZN province, where the current research was conducted, has been hit hard by the epidemic. Of the nine provinces, KZN has the second highest number of new infections with 134 000 annually [10]. Prevalence in rural areas very close to the science centre studied in this paper show "some of the highest population-based infection

rates yet documented worldwide”, with 27% of females and 13.5% of males HIV-positive [11].

Within the South African epidemic, youth are disproportionately affected, yet offer some of the most promising opportunities for behavioural interventions. As most HIV infections occur in adolescents and young adults [7], reaching them before and during this stage is critical. A national study found 34% of new HIV infections occur within the 15-24 year age bracket, with females accounting for 90% of those infections [10]. In rural KZN close to the science centre, comparing those aged 15-19 and 20-29 is startling, prevalence rising from 11.2% to 40.5% for females and 2.4% to 29.8% for males [11]. The same study reported that 13 times the number of females compared to males were infected among 15-19 year olds. Clearly, effective interventions targeting high school age students could have a huge impact, both in keeping youth HIV-negative and developing knowledge and behaviours to keep them so in the longer term.

Given South African science centres’ clientele are typically school groups, they provide a novel way to deliver science-based HIV AIDS interventions. These interventions can communicate information around HIV risk behaviours, while also exploring the science behind HIV, the immune system, and so on. The intervention studied here addressed all these aspects, while the research focused on behavioural intentions and outcomes.

### **Behaviours associated with HIV in South African youth**

HIV behaviours can be broken into those that prevent/risk HIV transmission (HIV risk behaviours, such as condom use) and those related to HIV (HIV related behaviours, such as discussing HIV). Both were investigated in this study.

Unsafe sexual behaviour groups together a number of HIV risk behaviours and is by far the main vector for HIV transmission in South African youth [12,13]. Approaches to address this in adolescents usually promote abstinence and encourage youth that are sexually active to use condoms and not have multiple concurrent partners – a well known example in South Africa is the ‘ABC’ campaign which used the mantra ‘Abstain, Be faithful, Condomise’. The intervention under study used a similar approach, primarily promoting abstinence, with using condoms and not having multiple partners as secondary messages. The balance of these three messages was tweaked accordingly depending on age groups. The logic was that a clear primary message of abstinence could have the greatest effects, however messages on multiple partnering and condoms were needed for those who would not abstain. Another concern was that focusing on condom use primarily could send a message that to protect oneself from HIV one need not abstain so long as condoms are used. This is true in theory, but evidence suggests it does not work in practice. The gap between awareness and behaviour is large—one study of KZN Grade 11 students found 85% of students agreed that it was important to use condoms every time and 86.4% said it protected them from sexually transmitted infections, yet only 46.2% reported actually using them every time [14].

HIV-related behaviours are also important in addressing HIV AIDS and are mainly related to discussion and openness of the issue. They include reducing HIV’s stigma, talking about HIV, increasing awareness of treatment, encouraging testing, and knowing one’s HIV-status. These aspects were also dealt with in the theatre show and research.

### **Method**

A science theatre show *The Alarming AIDS Adventure* was presented to secondary school groups visiting the University of Zululand Science Centre. The show was the main intervention component, however also included were an HIV game, career advice, and a regular science centre visit. Other elements are in development.

The theatre show follows two characters – a curious student and knowledgeable scientist – as they learn about HIV through multimedia, models, and demonstrations. It was presented in both English and isiZulu language depending on audiences. Content covered HIV behaviors, the immune system, viruses, HIV biology/genetics, and the related aspects previously outlined. The plot climaxes as the audience are shrunk and taken into the body of a person engaging in risky behaviours to track down HIV. The show concludes with a 20-volunteer demonstration highlighting the behaviours that spread HIV.

Students completed pre- and post-show surveys mainly containing 5-point likert-items on intentions; the post survey also assessed audience ratings of the show (i.e. interest, understanding) and some open-ended questions on behavioural intention. Integrated models of health/HIV behaviour place intention as the end point for other influencing factors and as the key predictor of behaviour [15,16]. Hence intention was the primary research focus, however, other factors that lead to forming intentions were also considered including attitudes, self-efficacy, self-reported knowledge, and normative pressures – all henceforth referred to as intention. Demographic information including age, gender and geographic background (rural or urban/township) was also recorded. Follow-up research investigating actual behaviour and impacts comprised an additional survey and focus groups. To promote open discussion these were run

separately for male and female students by a local facilitator of the same gender.

The Australian National University Human Research Ethics Committee approved the research. Consent was gained from teachers and students.

**Results**

*Sample*

As many as 697 students completed the final survey, following piloting and survey refinement. The sample included approximately equivalent numbers of males (n=337) and females (n=351), and twice as many urban (n=456) compared to rural students (n=241), as shown in Table 1.

**Table 1. Sample demographics**

	unknown		female
male	total	rural	1
113	127	241	urban
8			238
210	456	total	9
351	337	697	

Follow-up research involved 19 students from two schools, one rural (seven females; two males) and one urban (five females; five males).

*Changes in intention*

Statistical tests of pre and post survey scores were used to determine significant changes in intention toward HIV risk and HIV related behaviours. Most intentions showed highly significant changes, including resisting peer pressure, wanting to learn more, knowledge of transmission methods, talking to family, and two measures each of abstinence and self-efficacy. Condom use and having an HIV test were of borderline significance, while being worried about catching HIV, talking to friends about HIV, thinking unprotected sex was OK, and trying to get more information on HIV were non-significant. While scores for non-significant items indicated safe or desirable intentions, they point to areas where the show could be refined.

Factors influencing intention change

Modelling was used to determine which factors contributed to post-intention, and hence intention change. Post-intention was largely determined by pre-intention, that is, student’s initial baselines were the greatest factor for their final intentions. Importantly, however, four of the student’s ratings of the show also significantly predicted the post-intention scores – more positive ratings of the show led to greater changes in intention. The contribution of show ratings to post-intention was, however, more modest when compared to pre-intention. Significant rating items were student’s interest, enjoyment, self-reported learning, and understanding. In summary, this suggests that although prior intention is the greatest contributor to final intention, nevertheless interest, enjoyment, and self-reported learning/ understanding are all also associated with intention change. It is important to note that demographic variables had indirect effects on intention change via all the factors mentioned above, as is explained below.

*Demographic effects*

A number of statistical techniques were used to assess demographic differences and how these differences influenced intention change. Demographic differences were evident in both initial intentions and ratings of the show, and hence played a major role in intention change.

Looking generally at intentions, females had more positive intentions than males, and gender differences were large in urban students and almost absent in rural students. Urban students had more positive intentions than rural students, and these differences were greater in females compared to males.

Turning to show ratings, a similar pattern emerged. Rural students gave significantly less positive show ratings than urban across all four rating measures significant for change, while males showed significantly less positive scores on two of the four measures.

Age also showed significant differences across almost all intentions and significant ratings. In general, younger students had more positive results and this declined with age, trending to more negative results for about 15 years and

above.

Taken together, demographic variables were critical in understanding how intention changed as they affected both initial intentions and show ratings. Females were more positive than males; urban were more positive than rural; and students younger than 15 were more positive than those older. The implications of this point are taken up below.

#### ***Follow-up research***

The focus groups and follow-up surveys provided evidence of HIV risk and HIV related behaviour change two to four weeks after the show. Data was largely qualitative in nature and is illustrated by indicative quotes.

When asked if students had been reminded of the show by life events: “Yes, I was at a party at night and I’ve got a boyfriend, [and] he wanted to have sex with me, then I refused because of getting HIV” (20 year old urban female).

However the show was by no means 100% effective, though still had positive effects: “After the show I was blank in mind one day and I had unprotected sex, after that I was blaming myself remembering how the disease work” (18 year old urban male); “I will touch my boyfriend in other ways now, not like previous” (14 year old rural female).

The interviews also indicated students were seeking further information, discussing HIV with family and friends and choosing single partner relationships. It should be noted the follow-up research was provisional in nature and detailed analysis of focus group transcripts is ongoing.

### **Discussion and Implications**

This study provides evidence on the power of science theatre as an intervention to change behaviour, and the effectiveness of rolling out such interventions through science centres. The research shows that the theatre show was able to influence a range of intentions associated with HIV AIDS across a large sample, and this contributed to behavioural change in the short term. Moreover, it elucidates factors that are important for understanding intentions in this context, namely initial intentions and their underlying facets, elements (ratings) of a show that facilitate change, and the role of demographic variables. These three factors should be considered when designing and developing science theatre based behavioural interventions.

First, having knowledge of the current behaviour and intention of your audience is important for design and delivery of the intervention [17]. This study looked primarily at behavioural intention, however deeper knowledge of the factors that contribute to intention will be helpful for any intervention. These include some of those studied here such as attitudes, normative pressures and self-efficacy, which, amongst others, have been shown to be important to behaviour in a range of contexts including HIV AIDS and those affecting the environment [16,18,19]. A limitation of this study is that factors that facilitate translation of intention into behaviour, including behavioural skills and external barriers/promoters, have not yet been seriously tackled in this intervention and hence were not researched. These remain crucial elements for truly effective behavioural interventions. Understanding all these elements, either through formal formative evaluation or informal methods, will allow science communicators to more effectively change behaviour.

Second, the result that certain features of the theatre show—namely interest, enjoyment, self-reported learning, and understanding—were important to facilitating change is a significant finding. While anecdotally acknowledged as good features for any theatre show, this is the first research to demonstrate that audience interest and enjoyment can contribute to intention change during a science theatre show. Interest and enjoyment are the emotions thought to work together in intrinsic motivation [20], so in one respect this result is not surprising. It does however highlight the need for science theatre presenters to heed the role of emotions, especially that of interest and enjoyment, in not only engaging but also motivating change. The significance of ratings of self-reported learning and understanding in the change model could mean several things: it could be the feeling of understanding and competence, or actual learning, or both, is important for change. This stresses the obvious need for appropriately pitched shows, but links between actual learning and intention change require further research.

Third, results that different demographics have significantly different starting points and responses (ratings) have implications for development of the theatre itself and adjunct components of the overall intervention. In this study, rural, male, and older students had less positive initial intentions and gave less positive ratings of the show, which contributed to less positive final intentions. Careful examination of which intentions (which is beyond this paper’s scope) would allow targeted modifications to the show for different audiences. Another possibility is additional intervention components which target a particular behaviour, for all or just selected demographics as necessary. One example from this research is the behaviour of taking an HIV test, which could be addressed via a workshop or exhibit.

It should be noted, however, that in addressing male-specific problems this is not done at the expense of females, especially given the drastically higher risk of contracting HIV for South African adolescent females.

### **Broader Implications for Behaviour Change Programs—a Call to Action**

This study has implications for the role of science theatre, centres and communicators in addressing societal problems where behaviours are key. HIV AIDS and climate change are but two examples of major problems where awareness of the science involved can be leveraged to promote behaviour change. Too often, science centres and communicators feel their remit is to educate, raise awareness and sometimes engage emotionally around scientific issues. This is not to downplay the importance of these aims, but to emphasise that in some cases there is a moral imperative to do more. Science centres are well placed to address these issues; they have the infrastructure, human resources, audiences and skills to deliver interventions. Of course, changing people's behaviour is not to be approached trivially and there is a fine ethical line between sensible guidance based on science and opinion-driven manipulation. All that said, few would challenge the ethics of leveraging scientific awareness to promote behaviours to keep youth safe from HIV, or allow people to contribute to mitigating climate change through responsible environmental behaviours. These are areas where the science is for the most part polarised, hence one can argue for science communicators to present the facts and the implications they have for people's behaviour, allowing people to make informed decisions. In this way, science communicators can become agents for behavioural change.

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