


# Effects of a multimedia campaign on HIV self-testing and PrEP outcomes among young people in South Africa: a mixed-methods impact evaluation of 'MTV Shuga Down South'

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## ABSTRACT

**Introduction** Innovative HIV technologies can help to reduce HIV incidence, yet uptake of such tools is relatively low among young people. To create awareness and demand among adolescents and young adults, a new campaign of the pan-African MTV Shuga series ('Down South 2'; DS2), featured storylines and messages about HIV self-testing (HIVST) and pre-exposure prophylaxis (PrEP) through television, radio and accompanying multimedia activities in 2019–2020.

**Methods** We conducted a mixed-methods evaluation of the new MTV Shuga series among 15–24 years old in Eastern Cape, South Africa, in 2020. Quantitative and qualitative methods were used to investigate complementary evaluations questions, namely, whether and how the DS2 campaign works. A web-based survey, promoted via social media platforms of schools, universities and communities, assessed exposure to MTV Shuga and knowledge of HIV status; secondary outcomes included awareness and uptake of HIVST and PrEP. We used multivariable logistic regression to estimate associations between exposure to DS2 and each outcome, adjusting for sociodemographic factors, media assets and exposure to other media campaigns. An embedded qualitative evaluation explored mechanisms of DS2's impact through deductive and inductive thematic analysis of in-depth individual and group interviews.

**Results** Among 3431 online survey participants, 43% had engaged with MTV Shuga and 24% with DS2 specifically. Knowledge of HIV status was higher among those exposed to DS2 (71%) vs those who were not (39%; adjusted OR=2.26 (95% CI 1.78 to 2.87)). Exposure was also associated with increased awareness of HIVST (60% vs 28%; aOR=1.99 (1.61 to 2.47)) and use of HIVST (29% vs 10%; aOR=2.49 (1.95 to 3.19)). One-third of respondents were aware of PrEP, with higher proportions among those exposed versus non-exposed to DS2 (52% vs 27%; aOR=1.90 (1.53 to 2.35)). Qualitative insights identified mechanisms by which DS2 increased awareness, confidence and motivation to use HIVST and PrEP, but had less influence on service access.

**Conclusions** We found evidence consistent with a positive causal impact of the MTV Shuga DS2 campaign

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Young people have a high need for HIV prevention yet relatively low uptake of testing and pre-exposure prophylaxis (PrEP).
- ⇒ Identifying ways to expand the reach and engagement of young people in HIV prevention, particularly testing services and PrEP, has become a priority for HIV epidemic control.

## WHAT THIS STUDY ADDS

- ⇒ Exposure to a multi-media edutainment campaign was strongly associated with increased awareness and use of HIV self-testing and knowledge of PrEP, and with young people's knowledge of their HIV status.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE AND/OR POLICY

- ⇒ As HIV testing and PrEP options diversify, and digital connectivity expands globally, there is an important role for immersive multi-media campaigns in helping to accelerate HIV prevention among young people.

on HIV prevention outcomes among young people in a high-prevalence setting. As diverse testing and PrEP technologies become accessible, an immersive edutainment campaign can help to expand HIV prevention choices and close age and gender gaps in HIV testing and prevention goals.

## INTRODUCTION

Biomedical innovations in HIV prevention are expanding the options and tools to avoid HIV acquisition and accelerate declines in HIV incidence. By diversifying HIV testing choices, HIV self-test (HIVST) kits have enabled more people to know their HIV status and access pathways into treatment and prevention.<sup>1</sup>

Confirmation of positive status can link those living with HIV/AIDS to life-saving treatment, viral suppression and improved health, while reducing onward transmission.<sup>2</sup> Knowledge of negative HIV status can link individuals to prevention services, including highly efficacious pre-exposure prophylaxis (PrEP).

New tools like HIVST and PrEP can be particularly valuable for young people aged 15–24 years, an important demographic group for the global goal to end AIDS as a public health threat by 2030, who are less likely than older adults to know their HIV status.<sup>2–4</sup> As yet, no country in sub-Saharan Africa has achieved the first step of the UNAIDS ‘90:90:90’ targets for the HIV treatment cascade (90% knowledge of status) among 15–24 years olds, despite significant gains in diagnostic coverage overall.<sup>5</sup> Regionally, less than half of 15–24 year-olds are aware of their HIV status.<sup>6</sup> This represents a missed opportunity for early diagnosis to avoid illness and transmission, and for more young people to avail themselves of high-impact prevention options like PrEP.<sup>7,8</sup>

When offered HIVST in the context of research studies, young people have welcomed the opportunity to test in private, without the judgement, stigma or discrimination they often face in facility-based services.<sup>9–11</sup> In real-world conditions, relatively few young people are aware of or using HIVST.<sup>12</sup> Similarly, while research has shown PrEP to be an acceptable HIV prevention method for young men and women, awareness and uptake of PrEP via national programmes is lower than expected, and annual growth has slowed over time since 2016.<sup>13–16</sup> Identifying ways to expand the reach and engagement of young people in HIV prevention, particularly testing services and PrEP, has become a priority for HIV epidemic control.<sup>15</sup>

MTV Shuga is a multimedia campaign based around a popular dramatic series that promotes HIV prevention and positive sexual health messaging with entertaining storylines and characters. Since the first series based in Nairobi in 2009, MTV Shuga has been broadcast on 179 terrestrial channels reaching an estimated 719 million households. All episodes are available rights-free on internet platforms and MTV Staying Alive Foundation estimates 42 million people have been reached through social media.<sup>17</sup>

In 2019–2020, a new MTV Shuga series entitled ‘Down South 2’ was produced in South Africa and incorporated storylines designed to increase awareness and demand for HIV testing, including self-testing and PrEP in ways that resonate with young people. As with all previous series, the producers conducted initial formative work to develop and validate storylines and scripts with young people through focus group discussions. The show was complemented by wrap-around, ‘360-media’ activities including a radio series, documentary films and online resources<sup>17</sup> (online supplemental figure 1). In the town of Mthatha in Eastern Cape, South Africa, peer-education and community events and a graphic novel distributed through schools enabled opportunities for offline

engagement among those underserved by television and internet.

To date, the efficacy of MTV Shuga has been demonstrated in a cluster-randomised trial of community viewings in Nigeria, which showed a positive impact on HIV and STI testing.<sup>18</sup> Published evidence of effectiveness in non-trial conditions is limited but recent studies indicate that MTV Shuga influences positive sexual health behaviours among viewers, through observational learning and modelling, consistent with social learning theory.<sup>19,20</sup> We sought to evaluate the impact of MTV Shuga Down South on HIV prevention outcomes, including awareness and uptake of HIVST and PrEP, among young people in South Africa.

## METHODS

A mixed-methods evaluation was conducted in 2020 to determine whether and how MTV Shuga Down South 2 (DS2) impacted HIV prevention outcomes among young people. Using a triangulation design to mix separate but complementary methods, a structured survey was designed to identify an effect of DS2 exposure on key outcomes, while embedded qualitative activities were designed to identify mechanisms of DS2 influence on viewers’ knowledge, motivation and opportunity to adopt the key outcomes.<sup>21</sup> All research activities were conducted remotely to avoid risk of SARS-CoV-2 transmission.

First, an online survey was hosted on a website, free of charge for users through reverse-charging arrangements with the service provider. Those who completed the survey received mobile data credit of SAR50 (approximately US\$5) transferred to a phone number provided for this purpose only. The survey was open to 15–24 year old males and females and promoted through virtual marketing on Facebook, Instagram and social media platforms of schools, universities, community groups and clinics in Mthatha, Eastern Cape. This setting was targeted due to: recent distribution of HIV self-testing kits and availability of oral PrEP (ensuring a supply to meet any demand generated by the DS2 campaign)<sup>22</sup>; availability of the offline components of the DS2 campaign, described above; less HIV prevention research and lower HIV testing levels in Eastern Cape relative to other provinces; and the recommendation of the South African Department of Health. We sought to enrol a minimum sample of 2250 young people (with equal numbers by sex and age-group), in order to identify a minimum 10% difference in the primary outcome between those exposed and not exposed to MTV Shuga DS2. In scenarios assuming between 20% and 50% of the target population are exposed to DS2, estimated study power ranged from 88% to 99%.

The self-administered questionnaire (online supplemental file 1) was anonymised with no name or other personal identifying information requested and questions designed to measure exposure to the MTV Shuga DS2 campaign (primary exposure) and any other MTV

Shuga campaign (secondary exposure). The primary outcome was knowledge of HIV status, that is, the proportion who tested for HIV in the past year and received the result, or ever tested HIV positive.

Secondary outcomes included awareness, willingness to use and uptake of HIVST and PrEP. Awareness and willingness were measured through self-reported responses to single-item questions, asking 'Have you ever heard about (HIV self-screening/PrEP) ...?' (or ever used an HIVST kit); 'Would you be willing to take PrEP every day if it reduces your chances of contracting HIV?'; and participants reporting they would be somewhat or very interested in (screening themselves for HIV) (giving a self-screen kit to a sexual partner) if a free kit was available. Uptake of HIVST was defined as reported use of a self-test kit ever or in the past year (online supplemental file 1). For comparability with other research, these questions were drawn from measures validated and used by the Self-Testing Africa Initiative, where possible.<sup>23</sup>

We constructed a directed acyclic graph (DAG) to represent the hypothesised causal relationship between intervention exposure, the study outcomes and other sociodemographic characteristics<sup>24</sup> (online supplemental figure 2). The DAG was interrogated to identify the minimum set of constructs needed to control for confounding, which included such factors as age, sex, location of residence, home language, schooling and employment status, household and individual media assets, food security, sexual behaviours and exposure to other HIV media campaigns. Residence was measured by province and also urban or rural location. Food security was defined categorically by frequency of going to bed hungry in the past month (often, sometimes, never/rarely). Principal component analysis was used to create media asset indices at the household level (inputting household-level ownership of five assets: radio, television, computer/device, internet, TV subscription) and individual level (with three personally owned assets: radio, smartphone or computer/device). Both indices were split into asset scores representing low, medium, or high.

We calculated the proportion of respondents who knew their HIV status, and each secondary outcome, by exposure to DS2, and estimated associations between the intervention and outcomes using multivariable logistic regression to adjust for confounding variables informed by the DAG. Interaction terms were included where there was evidence of effect modification by age or gender. Each logistic regression model was restricted to individuals with non-missing responses for each outcome of interest.

A sample of participants who reportedly engaged with DS2 (watched or listened to at least one episode on TV, internet or radio) and opted into further research were invited to participate in an embedded qualitative evaluation to explore mechanisms of MTV Shuga's impact. Qualitative research activities included in-depth interviews (18 females, 13 males) and six focus group discussions, held in age- and gender-specific groups of 4–6

participants. Topic guides (online supplemental files 4 and 5) were based on the 'COM-B' behavioural wheel model to explore MTV Shuga DS2's influence on participants' capability, opportunity and motivation to adopt attitudes and behaviours supportive of HIVST and PrEP.<sup>25</sup> Video clips with DS2 scenes about HIVST and PrEP were shown to generate discussion. Trained researchers who were bilingual (in either isiXhosa or Zulu and English), and aged under 30 years, facilitated the individual and group interviews via phone, Zoom or WhatsApp. Participants received data transfers in advance, to facilitate participation, and SAR100 airtime credit on completion. Researchers transcribed all interviews into English and transcripts were analysed (by VB) using a hybrid (deductive and inductive) thematic coding process.<sup>26</sup> Deductive codes were generated around the three conditions of the COM-B behavioural framework. A stage of open coding was conducted to allow other mechanisms of influence to emerge inductively. The analyst discussed findings with the data collectors and transcribers to ensure findings reflected the data collected.

We applied a realist evaluation approach to triangulate findings across methods, to understand both whether and how MTV Shuga DS2 works.<sup>27 28</sup> We explored how contextual factors influence mechanisms of change (identified in the qualitative research) to bring about the resulting outcomes (observed in the quantitative survey).

### Research statement

Ways to promote equity in the research partnership were considered at the proposal and design stage and summarised in a Reflexivity Statement (online supplemental file 4).

### Patient and public involvement

Members of the public are engaged in the dissemination and discussion of results, via social media platforms and a public webinar on MTV Shuga evidence.

## RESULTS

### Online survey

#### Characteristics of the survey sample

The web-based survey was available online from September to December 2020, during which 4145 records were created. After removing records without full consent (n=407) or gender (n=144), and likely duplicates (n=163), 3431 (83%) records were taken forward for analysis (table 1). Of those, respondents were predominantly female (59%), aged 20–24 years (69% vs 31% aged 15–19), and spoke isiXhosa at home (80%). Most respondents (83%) were enrolled in education, including 34% in university, 28% in technical/vocational college and 21% in primary or secondary school, while 3.1% were employed and 10.4% unemployed. The majority resided in urban settings (85%), primarily in Mthatha town (72%) or elsewhere in Eastern Cape province (11%), while 16% lived in other provinces of South Africa (6%, 4% and 3% in Western Cape, Gauteng and

**Table 1** Sociodemographic characteristics of online survey participants, overall and by age group (N=3431)

	Age group					
	15–19 years (N=1079)		20–24 years (N=2352)		Total (N=3431)	
	n	%	N	%	n	%
<i>Socio-demographic characteristics</i>						
Gender						
Male	372	34.5	945	40.2	1317	38.4
Female	656	60.8	1364	58.0	2020	58.9
Other (transgender or prefer not to say)	51	4.7	43	1.8	94	2.7
Current schooling/employment status						
In school (primary/secondary)	597	55.3	129	5.5	726	21.2
TVET	144	13.3	823	35.0	967	28.2
University	228	21.1	936	39.8	1164	33.9
Employed	12	1.1	94	4.0	106	3.1
Unemployed	49	4.5	308	13.1	357	10.4
Unknown	49	4.5	62	2.6	111	3.2
Language spoken at home						
English	99	9.2	160	6.8	259	7.5
IsiXhosa	798	74.0	1947	82.8	2745	80.0
Zulu	100	9.3	124	5.3	224	6.5
Other	72	6.7	119	5.1	191	5.6
Unknown	10	0.9	2	0.1	12	0.3
Province						
Eastern Cape (EC)—Mthatha	716	66.4	1746	74.2	2462	71.8
Eastern Cape—O.R. Tambo	24	2.2	46	2.0	70	2.0
Eastern Cape—other EC	102	9.5	192	8.2	294	8.6
Western Cape	57	5.3	157	6.7	214	6.2
Kwa-Zulu Natal	65	6.0	38	1.6	103	3.0
Gauteng	56	5.2	80	3.4	136	4.0
Other provinces	36	3.3	47	2.0	83	2.4
Unknown	23	2.1	46	2.0	69	2.0
Urban/rural residence*						
Urban setting	891	82.6	2032	86.4	2923	85.2
Rural setting	95	8.8	192	8.2	287	8.4
Unknown	93	8.6	128	5.4	221	6.4
Food insecurity						
Never/rarely	610	56.5	1268	53.9	1878	54.7
Sometimes	319	29.6	820	34.9	1139	33.2
Often/always	72	6.7	146	6.2	218	6.4
Unknown	78	7.2	118	5.0	196	5.7
Called a helpline or searched for information on HIV on the internet†						
No	485	44.9	1182	50.3	1667	48.6
Yes	422	39.1	930	39.5	1352	39.4
Unknown	172	15.9	240	10.2	412	12.0

\*Coding Mthatha to urban setting

†This measure includes the following sites/helplines: Bwise, Loveline, Childline, but excludes MTV Shuga website TVET, Technical Vocational Educational and Training colleges.

KwaZulu-Natal, respectively). About 40% of participants reported experiencing food insecurity (going to bed hungry in the past month) either sometimes, often or always.

Most participants lived in a household with a television (TV; 83%), internet (75%), radio (72%) and a computer or other digital device (57%); household ownership of all these was higher among older (20–24 years old) than younger respondents (15–19 years old) (table 2). Most respondents owned their own smartphone (85% for both age groups), while about half owned their own computer and fewer (35%) owned a radio. Digital media engagement was high with 86% using the internet and social media platforms at least once a week, most commonly Facebook (72%), YouTube (44%) and Instagram (37%). Fewer than 1% reported never using the internet or social media. Most watched TV (74%) and listened to the radio (62%) at least weekly. Use of all media types was higher among older than younger respondents, although data were more often missing among the younger group.

### Reported sexual experience

Similarly, younger respondents were more likely to skip questions about sex and relationships: 31% of younger and 20% of older participants did not answer if they had ever had sex (table 2). Of those who responded, 43% of younger and 53% of older respondents reported ever having had sex, and 38% of younger and 47% of older respondents were currently in a relationship. A small minority (3%) had ever been married or co-habited with a partner. Among those who answered the questions, females were more likely than males to report ever having had sex (54% vs 45%), and being in a relationship (48% vs 41%). However, female respondents were more likely than males to skip questions about sex and relationships: 21% of female participants and 16% of males did not answer both questions.

### Exposure to MTV Shuga Down South 2 and other MTV Shuga campaigns

Almost one-quarter (24%) of all respondents reported engagement with the campaign linked to the most recent MTV Shuga series: 'Down South Season 2' (DS2): 29% of the younger and 22% of older respondents (table 3). Engagement most often involved attending a peer educator-led group discussion about DS2 (15%), followed by watching the affiliated 'In Real Life' documentary (11%), reading the DS2 graphic novel (10%), attending a DS2 community event (9%), and watching DS2 on TV or the internet and identifying it as season 2 (7%). Only a small proportion reported listening to DS2 on the radio (2%).

Overall, 43% (50% of the younger and 40% of the older respondents) had engaged with any MTV Shuga campaign (table 3). This included 30% of all respondents who ever watched 'MTV Shuga Down South' (either season 1 or 2) on TV or internet; 25% who watched the MTV preview show '16 and Pregnant'; 17% who watched MTV public service announcements related to Down

South; as well as those who listened to either season 1 or 2 of Down South on the radio (10%), watched the COVID-19 related 'Alone Together' mini-series (8%), or interacted with the campaign by posting comments about an episode on social media (9%), answering a phone-based polling question (8%) or searching the MTV Shuga website (6%).

Engagement with MTV Shuga was higher among younger respondents (15–19 years old vs 20–24 years old) for the DS2 series specifically and any MTV Shuga campaign more broadly, and for all media formats and engagement activities (table 4, online supplemental table 1). Exposure to MTV Shuga was also higher among females versus males, and to a lesser extent, those in school or university compared with those in technical/vocational colleges or out-of-school; and those who speak English or Zulu at home, compared with isiXhosa. Exposure was much higher among those who had ever been sexually active compared with those who had not, and for those currently in a relationship (for both DS2 and any MTV Shuga campaign).

### HIV outcomes and associations with MTV Shuga exposure

About 47% of respondents said they were aware of their HIV status, either because they had ever tested HIV-positive (~11%; 136 out of 1294 who knew their status) or because they had tested in the past year and received their result (table 5). Knowledge of HIV status was higher among those who were exposed to MTV Shuga DS2 (71%) compared with those who were not (39%) (adjusted OR (aOR)=2.26 (95% CI 1.78 to 2.87)), after controlling for possible confounders, including alternative sources of HIV information (table 5, figure 1A, online supplemental table 2). The association between DS2 exposure and knowledge of HIV status was stronger among older respondents (aOR=3.03) than younger respondents (aOR=1.47;  $p<0.001$  for test of interaction by age group).

The proportion of respondents who had ever heard of HIVST was also higher among those exposed to DS2 versus the non-exposed (60% vs 28%; aOR=1.99 (1.61 to 2.47)), with a stronger effect size among older vs younger respondents ( $p<0.001$ ) (table 5, figure 1A). The proportions who had used an HIV self-test, either ever in their lifetime (29% vs 10%; aOR=2.49 (1.95 to 3.19)) or within the past year (21% vs 7%; aOR=2.61 (1.97 to 3.47)) were higher among those exposed versus non-exposed to DS2, with no evidence of a difference by age group. Among those who had never used an HIV self-test before, interest in using a self-test was high overall (83%), and association with DS2 exposure differed by age group: specifically, exposure to DS2 was associated with more interest in HIVST among younger respondents (aOR=1.66 (1.05 to 2.64)) and with less interest among older respondents (aOR=0.50 (0.34 to 0.72)). Similarly, interest in giving an HIV self-test kit to a partner was high, with DS2 exposure associated with more interest among younger respondents (aOR=1.84 (1.13 to 3.0)) and with less interest

**Table 2** Media ownership and sexual experiences reported by online survey participants, overall and by age group and gender (N=3431)

	15-19 years						20-24 years									
	Male (N=372)		Female (N=656)		Other (N=51)		Total (N=1079)		Male (N=945)		Female (N=1364)		Other (N=43)		Total (N=2352)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<i>Media assets</i>																
<i>Household ownership</i>																
Radio	240	64.5	463	70.6	17	33.3	720	66.7	727	76.9	1002	73.5	15	34.9	1744	74.1
Television (TV)	291	78.2	533	81.3	19	37.3	843	78.1	811	85.8	1160	85	18	41.9	1989	84.6
Computer/device	200	53.8	334	50.9	11	21.6	545	50.5	589	62.3	801	58.7	14	32.6	1404	59.7
Internet	270	72.6	464	70.7	18	35.3	752	69.7	752	79.6	1038	76.1	20	46.5	1810	77.0
TV subscription	184	49.5	352	53.7	10	19.6	546	50.6	428	45.3	657	48.2	9	20.9	1094	46.5
Unknown	33	8.9	51	7.8	1	2.0	85	7.9	47	5.0	84	6.2	2	4.7	133	5.7
<i>Household media assets index</i>																
Low	125	33.6	245	37.3	40	78.4	410	38	294	31.1	453	33.2	26	60.5	773	32.9
Medium	111	29.8	168	25.6	2	3.9	281	26	330	34.9	433	31.7	8	18.6	771	32.8
High	103	27.7	192	29.3	8	15.7	303	28.1	274	29.0	394	28.9	7	16.3	675	28.7
Unknown	33	8.9	51	7.8	1	2.0	85	7.9	47	5.0	84	6.2	2	4.7	133	5.7
<i>Personal ownership</i>																
Radio	133	35.8	215	32.8	3	5.9	351	32.5	373	39.5	455	33.4	10	23.3	838	35.6
Smartphone	322	86.6	573	87.3	18	35.3	913	84.6	813	86.0	1179	86.4	17	39.5	2009	85.4
Computer/device	166	44.6	265	40.4	6	11.8	437	40.5	540	57.1	755	55.4	12	27.9	1307	55.6
Unknown	32	8.6	51	7.8	1	2.0	84	7.8	899	95.1	1279	93.8	41	95.3	2219	94.3
<i>Individual media assets index</i>																
Low	133	35.8	249	38	44	86.3	426	39.5	291	30.8	453	33.2	27	62.8	771	32.8
Medium	125	33.6	246	37.5	5	9.8	376	34.8	342	36.2	500	36.7	6	14	848	36.1
High	82	22	110	16.8	1	2.0	193	17.9	266	28.1	326	23.9	8	18.6	600	25.5
Unknown	32	8.6	51	7.8	1	2.0	84	7.8	46	4.9	85	6.2	2	4.7	133	5.7
<i>How often do you watch TV</i>																
Never	8	2.2	17	2.6	3	5.9	28	2.6	21	2.2	20	1.5	3	7	44	1.9
Less than weekly	46	12.4	105	16	6	11.8	157	14.6	125	13.2	169	12.4	4	9.3	298	12.7
At least once per week	274	73.7	453	69.1	16	31.4	743	68.9	727	76.9	1058	77.6	14	32.6	1799	76.5
Unknown	44	11.8	81	12.3	26	51.0	151	14	72	7.6	117	8.6	22	51.2	211	9
<i>How often do you listen to the radio</i>																
Never	45	12.1	79	12	6	11.8	130	12	55	5.8	113	8.3	6	14	174	7.4
Less than weekly	57	15.3	154	23.5	7	13.7	218	20.2	128	13.5	244	17.9	2	4.7	374	15.9
At least once per week	225	60.5	341	52	13	25.5	579	53.7	682	72.2	865	63.4	15	34.9	1562	66.4
Unknown	45	12.1	82	12.5	25	49.0	152	14.1	80	8.5	142	10.4	20	46.5	242	10.3
<i>How often do you use the internet</i>																

Continued

Table 2 Continued

	15-19 years						20-24 years																				
	Male (N=372)			Female (N=656)			Other (N=51)			Total (N=1079)			Male (N=945)			Female (N=1364)			Other (N=43)			Total (N=2352)					
	n	%		n	%		n	%		n	%		n	%		n	%		n	%		n	%				
Never	3	0.8	2	0.3	2	3.9	7	0.6	2	0.2	5	0.4	1	2.3	8	0.3											
Less than weekly	19	5.1	65	9.9	6	11.8	90	8.3	33	3.5	47	3.4	2	4.7	82	3.5											
At least once per week	314	84.4	527	80.3	19	37.3	860	79.7	851	90.1	1223	89.7	19	44.2	2093	89											
Unknown	36	9.7	62	9.5	24	47.1	122	11.3	59	6.2	89	6.5	21	48.8	169	7.2											
How often do you use social media platforms																											
Never	3	0.8	11	1.7	3	5.9	17	1.6	6	0.6	2	0.1	1	2.3	9	0.4											
Less than weekly	19	5.1	40	6.1	5	9.8	64	5.9	45	4.8	45	3.3	2	4.7	92	3.9											
At least once per week	316	84.9	540	82.3	19	37.3	875	81.1	838	88.7	1231	90.2	19	44.2	2088	88.8											
Unknown	34	9.1	65	9.9	24	47.1	123	11.4	56	5.9	86	6.3	21	48.8	163	6.9											
<i>Sexual experience</i>																											
Relationship status																											
Not in a relationship	176	47.3	288	43.9	30	58.8	494	45.8	446	47.2	493	36.1	20	46.5	959	40.8											
In a relationship	108	29	200	30.5	8	15.7	316	29.3	339	35.9	555	40.7	11	25.6	905	38.5											
Ever married/lived with someone	4	1.1	4	0.6	9	17.6	17	1.6	24	2.5	51	3.7	4	9.3	79	3.4											
Unknown	84	22.6	164	25	4	7.8	252	23.4	136	14.4	265	19.4	8	18.6	409	17.4											
Ever had sex																											
No	157	42.2	258	39.3	12	23.5	427	39.6	422	44.7	440	32.3	2	4.7	864	36.7											
Yes	110	29.6	208	31.7	4	7.8	322	29.8	368	38.9	627	46.0	13	30.2	1008	42.9											
Prefer not to say	22	5.9	27	4.1	33	64.7	82	7.6	26	2.8	41	3.0	23	53.5	90	3.8											
Unknown	83	22.3	163	24.8	2	3.9	248	23.0	129	13.7	256	18.8	5	11.6	390	16.6											

**Table 3** Proportions exposed to MTV Down South 2 and any MTV Shuga campaign, overall and by age group

	Age group					
	15–19 years (N=1079)		20–24 years (N=2352)		Total (N=3431)	
	n	%	n	%	n	%
<i>MTV Shuga Down South 2 (MTV DS2)</i>						
Ever watched MTV DS2 on TV, MTV website or YouTube	100	9.3	138	5.9	238	6.9
Ever listened to MTV DS2 on the radio	29	2.7	42	1.8	71	2.1
Read the MTV Shuga DS2 graphic novel	140	13.0	204	8.7	344	10.0
Watched the documentary called MTV Shuga in real life that was broadcast at the end of DS2	144	13.3	242	10.3	386	11.3
Attended small group discussion facilitated by a peer educator (at a clinic, school, university, TVET or somewhere else) on DS2 anywhere	182	16.9	331	14.1	513	15.0
Attended a community event on DS2 anywhere	107	9.9	185	7.9	292	8.5
<b>Exposure to MTV DS2: said yes to at least one of the above (primary exposure measure)</b>	<b>309</b>	<b>28.6</b>	<b>518</b>	<b>22.0</b>	<b>827</b>	<b>24.1</b>
<i>Any MTV Shuga campaign</i>						
Ever watched MTV Shuga: Down South 1 or 2 on TV, MTV Shuga website or YouTube	368	34.1	666	28.3	1034	30.1
Ever listened to MTV Shuga: Down South on the radio	132	12.2	201	8.5	333	9.7
Read the MTV Shuga DS2 graphic novel	140	13.0	204	8.7	344	10.0
Watched the documentary called MTV Shuga in real life that was broadcast at the end of DS2	144	13.3	242	10.3	386	11.3
Attended small group discussion facilitated by a peer educator (at a clinic, school, university, TVET or somewhere else) on DS2 anywhere	182	16.9	331	14.1	513	15.0
Attended a community event on DS2 anywhere	107	9.9	185	7.9	292	8.5
Watched the MTV preview show called 16 and Pregnant	329	30.5	527	22.4	856	24.9
Watched MTV PSA spots (Public Service Announcements) short MTV videos with health messages	215	19.9	381	16.2	596	17.4
Watched any MTV Shuga Alone Together episodes on YouTube or the MTV Shuga website	79	7.3	201	8.5	280	8.2
Searched for information on HIV on the MTV Shuga website (since this was a multiple choice question, any selection of MTV Shuga website implies exposure)	79	7.3	131	5.6	210	6.1
Answered a polling question about an MTV Shuga: Down South episode	110	10.2	157	6.7	267	7.8
Ever posted any comments about an episode of MTV Shuga: Down South Season 2	119	11.0	175	7.4	294	8.6
<b>Watched/accessed/participated in any MTV Shuga videos/shows/resources (secondary exposure measure)</b>	<b>539</b>	<b>50.0</b>	<b>948</b>	<b>40.3</b>	<b>1487</b>	<b>43.3</b>
TVET, Technical and Vocational Education and Training.						

among the older (aOR=0.52 (0.36 to 0.77)), compared with the non-exposed.

One-third of respondents were aware of PrEP, with higher proportions aware of PrEP among those exposed versus not exposed to DS2 (52% vs 27%; aOR=1.90 (1.53 to 2.35)). Demand for PrEP (ie, willingness to take PrEP every day) was high overall with weak evidence of higher demand among those exposed to DS2 (85% vs 80% among non-exposed; aOR=1.31 (0.97 to 1.76)), and no

differences by age group (table 5, online supplemental table 2).

Respondents who were exposed to DS2 were more likely to have had sex, ever in their lifetime (74% vs 44% of the non-exposed; aOR=2.86 (2.19 to 3.72)) and in the past 12 months (64% vs 37%); aOR=2.13 (1.65 to 2.74)), than non-exposed respondents. This was particularly true for older respondents, with those exposed to DS2 much more likely to have ever had sex than those not exposed



**Table 4** Factors associated with exposure to MTV Down South 2 and any MTV Shuga campaign

	Exposure to Down South 2				Exposure to any MTV Shuga campaign			
	Total	Outcome	Row % outcome	Age-adjusted OR	Total	Outcome	Row % outcome	Age-adjusted OR
	N	n	%	aOR (95% CI)	N	n	%	aOR (95% CI)
Overall	3198	805	25.2		3198	1458	45.6	
Age group								
15–19	988	300	30.4	1	988	527	53.3	1
20–24	2210	505	22.9	0.68	2210	931	42.1	0.64
Gender								
Male	1233	257	20.8	1	1233	455	36.9	1
Female	1874	538	28.7	1.50	1874	984	52.5	1.86
Other	91	10	11.0	0.42	91	19	20.9	0.39
Current schooling/employment status								
In school (primary/secondary)	653	223	34.2	1	653	386	59.1	
TVET	921	120	13.0	0.31	921	196	21.3	0.2
University	1094	369	33.7	1.06	1094	646	59	1.08
Other	428	78	18.2	0.47	428	191	44.6	0.61
Unknown	102	15	14.7	0.35	102	39	38.2	0.45
Language spoken at home								
English	231	74	32.0	1	231	133	57.6	1
isiXhosa	2563	629	24.5	0.71	2563	1129	44.0	0.6
Zulu	216	65	30.1	0.89	216	116	53.7	0.83
Other*	188	37	19.7	0.52	188	80	42.6	0.54
Urban/rural residence								
Urban setting	2741	686	25.0	1	2741	1232	44.9	1
Rural setting	255	81	31.8	1.37	255	152	59.6	1.78
Unknown	202	38	18.8	0.66	202	74	36.6	0.66
Province								
Eastern Cape (EC)—Mthatha	2305	573	24.9	1	2305	969	42.0	1
Eastern Cape—O.R. Tambo or other EC	321	94	29.3	1.22	321	189	58.9	1.93
Other provinces	509	120	23.6	0.89	509	265	52.1	1.43
Unknown	63	18	28.6	1.18	63	35	55.6	1.68
Food insecurity								

Continued

**Table 4** Continued

	Exposure to Down South 2						Exposure to any MTV Shuga campaign									
	Total		Outcome		Row % outcome		Age-adjusted OR		Total		Outcome		Row % outcome		Age-adjusted OR	
	N	n	%	aOR	(95% CI)	N	n	%	aOR	(95% CI)	N	n	%	aOR	(95% CI)	
Never/rarely	1785	371	20.8	1		1785	735	41.2	1		1785	735	41.2	1		
Sometimes	1048	321	30.6	1.71	1.44 to 2.04	1048	550	52.5	1.61	1.38 to 1.88	1048	550	52.5	1.61	1.38 to 1.88	
Often/always	204	77	37.7	2.31	1.70 to 3.14	204	121	59.3	2.09	1.55 to 2.81	204	121	59.3	2.09	1.55 to 2.81	
Unknown	161	36	22.4	1.05	0.71 to 1.56	161	52	32.3	0.65	0.46 to 0.91	161	52	32.3	0.65	0.46 to 0.91	
Household media assets index																
Low	1176	320	27.2	1		1176	570	48.5	1		1176	570	48.5	1		
Medium	1048	217	20.7	0.72	0.59 to 0.88	1048	439	41.9	0.79	0.67 to 0.94	1048	439	41.9	0.79	0.67 to 0.94	
High	974	268	27.5	1.03	0.85 to 1.25	974	449	46.1	0.92	0.78 to 1.09	974	449	46.1	0.92	0.78 to 1.09	
Individual media assets index																
Low	1190	250	21.0	1		1190	503	42.3	1		1190	503	42.3	1		
Medium	1218	341	28.0	1.50	1.24 to 1.81	1218	638	52.4	1.54	1.31 to 1.82	1218	638	52.4	1.54	1.31 to 1.82	
High	790	214	27.1	1.47	1.19 to 1.82	790	317	40.1	0.96	0.80 to 1.16	790	317	40.1	0.96	0.80 to 1.16	
Relationship status																
Not in a relationship	1453	287	19.8	1		1453	528	36.3	1		1453	528	36.3	1		
In a relationship	1221	313	25.6	1.45	1.21 to 1.74	1221	604	49.5	1.80	1.54 to 2.10	1221	604	49.5	1.80	1.54 to 2.10	
Ever married/lived with someone	96	24	25.0	1.45	0.90 to 2.35	96	45	46.9	1.68	1.11 to 2.56	96	45	46.9	1.68	1.11 to 2.56	
Unknown	428	181	42.3	2.96	2.35 to 3.73	428	281	65.7	3.34	2.66 to 4.20	428	281	65.7	3.34	2.66 to 4.20	
Ever had sex																
No	1291	162	12.5	1		1291	286	22.2	1		1291	286	22.2	1		
Yes	1330	453	34.1	3.84	3.13 to 4.70	1330	868	65.3	7.52	6.28 to 9.01	1330	868	65.3	7.52	6.28 to 9.01	
Prefer not to say	172	12	7.0	0.48	0.26 to 0.89	172	27	15.7	0.57	0.37 to 0.89	172	27	15.7	0.57	0.37 to 0.89	
Unknown	405	178	44.0	5.41	4.18 to 7.00	405	277	68.4	7.78	6.05 to 10.01	405	277	68.4	7.78	6.05 to 10.01	
Called a helpline or searched for information on HIV on the internet																
No	1667	296	17.8	1		1667	495	29.7	1		1667	495	29.7	1		
Yes	1352	456	33.7	2.35	1.98 to 2.78	1352	888	65.7	4.57	3.91 to 5.33	1352	888	65.7	4.57	3.91 to 5.33	
Unknown	179	53	29.6	1.84	1.30 to 2.60	179	75	41.9	1.59	1.15 to 2.18	179	75	41.9	1.59	1.15 to 2.18	

\*Includes five respondents whose language was unknown TVET, Technical and Vocational Education and Training.

**Table 5** Associations between exposure to MTV Down South 2 (A) and any MTV Shuga campaign (B) with HIV self-testing and PrEP outcomes

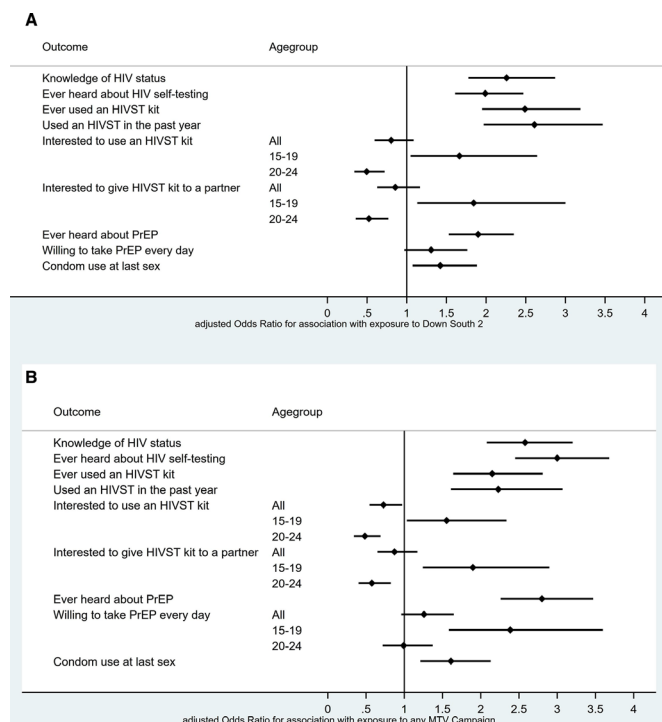
	Exposed		Total		Outcome		Age adjusted OR		Fully adjusted* OR (overall)		
	N	n	N	n	%	aOR	(95% CI)	P value	aOR	(95% CI)	P value
<i>(A) MTV Down South 2</i>											
<b>HIV status</b>											
Knowledge of HIV status (N=2768)	No	2113	828		39.2	1			1		
	Yes	655	466		71.2	4.06	3.34 to 4.92	<0.001	2.26	1.78 to 2.87	<0.001
<b>HIV self-testing/screening outcomes</b>											
Ever heard about HIV self screening kit (N=2727)	No	2077	589		28.4	1			1		
	Yes	650	387		59.5	3.90	3.24 to 4.70	<0.001	1.99	1.61 to 2.47	<0.001
Ever tested for HIV using HIV self screening kit (N=2694)	No	2049	211		10.3	1			1		
	Yes	645	186		28.8	3.65	2.92 to 4.57	<0.001	2.49	1.95 to 3.19	<0.001
Tested for HIV using HIV self screening kit in the last 12 months (N=2689)	No	2044	132		6.5	1			1		
	Yes	645	136		21.1	4.12	3.17 to 5.35	<0.001	2.61	1.97 to 3.47	<0.001
Demand for HIV self screening – to screen oneself (N=2213)†	No	1786	1498		83.9	1			1		
	Yes	427	335		78.5	0.78	0.60 to 1.02	0.069	0.80	0.59 to 1.09	0.156
Demand for HIV self screening – willing to give kit to partner (N=2188)†	No	1774	1502		84.7	1			1		
	Yes	414	330		79.7	0.79	0.60 to 1.04	0.092	0.86	0.63 to 1.17	0.326
<b>PrEP outcomes</b>											
Ever heard about PrEP (N=2649)	No	2023	548		27.1	1			1		
	Yes	626	323		51.6	2.93	2.43 to 3.53	<0.001	1.90	1.53 to 2.35	<0.001
Demand for PrEP – willing to take PrEP everyday (N=2284)	No	1747	1394		79.8	1			1		
	Yes	537	457		85.1	1.54	1.17 to 2.01	0.002	1.31	0.97 to 1.76	0.079
<b>Sexual behaviour outcomes</b>											
Ever had sex (N=2621)	No	2006	877		43.7	1			1		
	Yes	615	453		73.7	3.95	3.22 to 4.85	<0.001	2.86	2.19 to 3.72	<0.001
Had sex in the past 12 months (N=2492)	No	1918	717		37.4	1			1		
	Yes	574	366		63.8	3.25	2.66 to 3.96	<0.001	2.13	1.65 to 2.74	<0.001
Condom use at last sex with current or last partner (in the last 12 months) (N=1056)	No	699	410		58.7	1			1		
	Yes	357	234		65.5	1.35	1.03 to 1.76	0.028	1.42	1.07 to 1.89	0.014
<i>(B) Any MTV Shuga campaign</i>											
<b>HIV status</b>											
Knowledge of HIV status (N=2768)	No	1535	431		28.1	1			1		

Continued

**Table 5** Continued

	Exposed	Total		Outcome		Row % outcome		Age adjusted OR		Fully adjusted* OR (overall)		
		N	n	n	%	aOR	(95% CI)	P value	aOR	(95% CI)	P value	
	Yes	1233	863		70.0	6.62	5.58 to 7.85	<0.001	2.58	2.08 to 3.20	<0.001	
<b>HIV self-testing/screening outcomes</b>												
Ever heard about HIV self screening kit (N=2727)	No	1509	284		18.8	1			1			
	Yes	1218	692		56.8	6.12	5.12 to 7.31	<0.001	3.00	2.45 to 3.68	<0.001	
Ever tested for HIV using HIV self screening Kit (N=2694)	No	1483	115		7.8	1			1			
	Yes	1211	282		23.3	3.75	2.97 to 4.74	<0.001	2.15	1.64 to 2.81	<0.001	
Tested for HIV using HIV self screening kit in the last 12 months (N=2689)	No	1478	70		4.7	1			1			
	Yes	1211	198		16.4	4.19	3.14 to 5.58	<0.001	2.23	1.61 to 3.07	<0.001	
Demand for HIV self screening—to screen oneself (N=2213)†	No	1342	1143		85.2	1			1			
	Yes	871	690		79.2	0.74	0.59 to 0.92	0.008	0.73	0.55 to 0.97	0.031	
Demand for HIV self screening—willing to give kit to partner (N=2188)†	No	1338	1145		85.6	1			1			
	Yes	850	687		80.8	0.78	0.62 to 0.99	0.041	0.87	0.65 to 1.17	0.364	
<b>PrEP outcomes</b>												
Ever heard about PrEP (N=2649)	No	1469	251		17.1	1			1			
	Yes	1180	620		52.5	5.63	4.7 to 6.74	<0.001	2.8	2.26 to 3.47	<0.001	
Demand for PrEP—willing to take PrEP everyday (N=2284)	No	1292	1011		78.3	1			1			
	Yes	992	840		84.7	1.65	1.32 to 2.06	<0.001	1.26	0.96 to 1.65	0.095	
<b>Sexual behaviour outcomes</b>												
Ever had sex (N=2621)	No	1467	462		31.5	1			1			
	Yes	1154	868		75.2	7.85	6.53 to 9.45	<0.001	4.29	3.36 to 5.48	<0.001	
Had sex in the past 12 months (N=2492)	No	1419	377		26.6	1			1			
	Yes	1073	706		65.8	6.21	5.18 to 7.46	<0.001	3.03	2.39 to 3.84	<0.001	
Condom use at last sex with current or last partner (in the last 12 months) (N=1056)	No	365	206		56.4	1			1			
	Yes	691	438		63.4	1.34	1.04 to 1.74	0.025	1.61	1.21 to 2.13	0.001	

\*All models (except models on sexual behaviours) include the following variables: main exposure, age, gender, schooling, home language, rural/urban setting, province, food insecurity, household media index, individual media index, relationship status, ever had sex and exposure to other non-MTV resources; models for sexual behaviours include all the above variables except ever had sex  
 †Among those who had never used an HIV self-test before.  
 PrEP, pre-exposure prophylaxis.



**Figure 1** Associations between key study outcomes and exposure to MTV Shuga Down South 2 (A) and any MTV Shuga campaign (B). HIVST, HIV self-testing; PrEP, pre-exposure prophylaxis.

(aOR=8.05 (5.57 to 11.65)). Among those who reported sex within the past 12 months, DS2 audiences were more likely to report condom use at last sex than those not exposed to DS2 (66% vs 59%; aOR=1.42 (1.07 to 1.89)) (table 5, online supplemental table 2).

In sensitivity analyses in which multiple imputations were conducted for all participants with missing values, results were consistent with the complete case analysis (online supplemental table 4). In analysis of the secondary exposure measure (exposure to any MTV Shuga campaign, including but not limited to DS2), most outcomes were more common among those exposed to any MTV Shuga compared with those with no MTV Shuga exposure of any kind, and associations between exposure and outcomes were similar to those observed with exposure to MTV Shuga DS2 specifically (table 5B, figure 1B).

In more detailed reports of HIV testing experiences, those exposed to DS2 accessed HIV testing services more frequently than those not exposed (ever and within the past year) (online supplemental table 4). This was true of HIVST as well as testing with a community health worker and within ante-natal care services (for females). HIV self-test kits were accessed from a range of outlets, most often government clinics, community health centres, or hospitals, and university/Technical Vocational Educational and Training colleges settings. Pharmacies were also a common source, particularly for younger (15–19 years old) participants, and more so among young DS2 audiences (27%) than those not exposed (17%). DS2 viewers were also more likely to have paid fees for their

last self-test (36% vs 21% of non-exposed), among both age groups. Respondents cited a range of reasons for their last HIV self-test, with the most common motivation being to learn their HIV status (>80% of those who self-tested). Of those exposed to DS2, 32% of the younger respondents and 18% of older respondents cited MTV Shuga as the reason they got their most recent HIV self-test. Following their self-test, DS2 viewers were more likely than non-viewers to seek a laboratory test to confirm the result (66% vs 56% of self-testers).

### Qualitative research

In analysis of qualitative data, themes emerged about the behavioural mechanisms through which MTV Shuga DS2 influenced participants' capability, motivation and opportunity related to HIVST and PrEP outcomes (online supplemental table 5). *Awareness* (an aspect of capability) of HIVST and PrEP was enhanced by watching the show, with some learning about these resources for the first time from DS2:

Honestly speaking, I didn't know about the self-testing until I watched the show now. I now know that you can test yourself. (male, 15–19)

Others gained a greater understanding through the show:

Before seeing the show, PrEP was just something I saw in books. I didn't know that it is actually out there. (female, 20–24)

Participants expressed ways in which this understanding, and storylines (about Bongzi and Arrabella living with HIV), helped to reduce their fear about HIV and knowing their own status:

The show showed me that knowing your status is better than just living with an unknown status ... [it] won't mean the end of the world. (female, 15–19)

Some also gained *confidence* to enquire and learn more, for example, from internet searches and approaching health service staff. Young people described how scenes and storylines from DS2 helped them feel more *prepared* to access HIV services:

I know what I will be experiencing from the whole situation. (male, 20–24)

This included participants who were not yet sexually active and felt better prepared for future relationships:

Now that I have information about PrEP, it will help me when I meet someone. I will know what I need to do and know how PrEP will help me. (male, 20–24)

Scenarios presented through the show also helped young people to *reflect* on their own needs and preferences for HIV prevention options, at different times of their life. After watching the show, some realised they prefer self-testing at home, for the privacy and convenience, while others would be more anxious testing at home and would prefer the support available at a clinic:

For me, this thing of testing at home really scared me ... At home, there will be no one to help you [after getting the results]. (male, 20–24)

Participants were also able to imagine scenarios in which they could use PrEP, for example,

I like the fact that it protects you from getting HIV when your partner has tested positive. (female, 15–29)

However, some preferred to rely on condoms for HIV prevention. While capability and motivation were clearly enhanced for many, the show had less influence on *opportunity to access* services like HIVST and PrEP. While they saw ways in which they could get such resources, from the show, many doubted the availability in their own setting, especially during closures related to COVID-19 lockdowns:

I wouldn't be confident that if I go to the hospital, I'd get them. The hospitals here are not the same as those in Joburg. (female, 15–19)

The qualitative data also illustrated ways in which DS2 had a broader influence, beyond its immediate audience (online supplemental table 6). It helped some viewers initiate conversations and discussion with partners and parents, with whom they said conversations about sex are often avoided or awkward, although some remained hesitant to engage in such discussions. Some young males described ways in which the show changed the tone of conversations with peers, to more substantive discussions about PrEP and contraception. Many felt enlightened by the show and wished more young people would have access to the information about PrEP and HIV self-screening. Some felt that this should be done through more government and health campaigns, and many saw the role they themselves could play as educators and advocates for HIV testing and prevention, in their community and their own family:

People are usually afraid of the pain and pricking when it comes to taking HIV test. So, I'll definitely be an advocate for the self-screening HIV test now because of the show. (male, 20–24)

I can be able to give my little brother advice on when he wants to date ... Now I can explain to him how to be safe when he's having sex, testing, everything. (male, 20–24)

Some participants said they were unaffected by the show and did not learn anything about PrEP and HIVST. These topics featured in four different scenes (8 min of content) in the 10 episodes of the DS2 series, and some viewers missed those scenes, or were distracted at the time. Some were confused by the scenes and did not gain confidence or motivation to use PrEP or self-testing:

Since they say HIV is something that is tested through blood, I kind of don't understand what they are doing there [with HIV self-screening] 'cause there's only saliva inside the mouth. (male, 15–19)

## DISCUSSION

Our findings from a mixed-methods evaluation of MTV Shuga's multimedia edutainment campaign are consistent with a causal impact of the campaign on important HIV prevention outcomes among young people in South Africa. However, other explanations for the observed associations such as unmeasured confounding cannot be ruled out. Among 3431 15–24 years old participants of an online survey, based predominantly in Eastern Cape province, substantial proportions had been exposed to MTV Shuga: one-quarter had engaged with the most recent MTV Shuga series (Down South 2; DS2) and 43% with any component or past series of the MTV Shuga campaign. Exposure to DS2 and the wider MTV Shuga campaign was strongly associated with the primary outcome of the study, knowledge of HIV status, as well as increased awareness and use of HIVST and knowledge of PrEP. Respondents' interest to use HIVST and PrEP was very high overall; it was higher among MTV Shuga audiences for the younger (15–19 years old) but not among older respondents aged 20–24 years.

An embedded qualitative study offered insights into the contexts and mechanisms by which MTV Shuga DS2 may have influenced these outcomes. DS2 enhanced young people's capability and motivation to adopt HIV prevention behaviours, while its influence on opportunity (eg, to access prevention services) was more limited.<sup>25</sup> Some viewers were introduced to HIVST and PrEP for the first time through the show, and greater awareness helped to reduce fear and boost confidence to learn their HIV status and seek further HIV information and services. For others, HIV information that had previously seemed abstract or academic was made real and relevant in DS2 scenarios and storylines, with viewers given an opportunity to observe behaviours that were typically kept private, for example, couples self-testing together at home. This was evidence of observational learning, consistent with social learning theory.<sup>29</sup> While not all felt they currently needed to use resources like HIVST and PrEP, they imagined future circumstances in which they would benefit from them. Some reflected on options presented by DS2 storylines, to think through their personal preferences for HIV prevention, and this may help to explain the differences in demand for HIVST by age group, for example, if older viewers generally value the support available from provider-led testing and younger adolescents prefer the privacy of self-testing at home. For some, the scenes on HIVST and PrEP were too short or unclear to have any influence.

The findings suggest ways in which a popular, immersive multimedia campaign like MTV Shuga can accelerate achievement of HIV prevention goals for young people. MTV Shuga's influence is consistent with a person-centred approach to HIV prevention: through engaging storylines and characters, young people are offered accurate and relevant information on HIV prevention options and enabled to make their own choices (in contrast to assuming that young people are 'passive beneficiaries').<sup>30</sup>

Respecting personal choice and agency in this way can help people to adopt HIV prevention choices at different time points, as their needs and situations change, analogous to offering a 'contraceptive method mix' reflecting users' diverse preferences and circumstances.<sup>31</sup> This can help young people to prepare for changes that may increase their HIV risk, for example, to know prevention options before their first sexual experience. In southern Africa, many young people do not engage with sexual and reproductive health services until they are already sexually active, pregnant or married, at which point many are already at risk for HIV/STI (in settings where HIV incidence escalates from an early age).<sup>32 33</sup> The first sexual experience is often one in which young people are not well prepared, for example, with information, contraception, condoms or HIV/STI testing.<sup>34</sup> While MTV Shuga audiences were more likely to have had sex than those who never engaged with the campaign, viewers who had never had sex felt more aware and prepared for HIV prevention choices once they became sexually active. Acquiring a new sexual partner is another high-risk transition point for young people, for which they can be prepared in advance, and MTV Shuga viewers anticipated prevention choices they could make with new partners, for example, to use PrEP with a partner who is living with HIV.

The benefits of MTV Shuga may be greatest for those who are most connected to digital media for access to the dramatic television series with high production values, and the ability to be immersed in all episodes. However, in the study setting of Mthatha, more respondents reported experiencing 'offline' components of the DS2 campaign than the televised or internet-streamed episodes. Many had engaged with community-based viewing events, peer-led Shuga discussions, and the DS2 graphic novels distributed through schools. Our qualitative research found that Shuga opened up dialogue about sex and HIV with peers, parents and partners, and this ability for Shuga to stimulate real-life discussions can happen across all its formats. Also, some viewers were inspired to become 'advocates' for the new HIV prevention information they learnt via DS2, suggesting that, by reaching the most digitally connected young people, MTV Shuga can inspire early adopters of HIV preventive innovations, who are well placed to diffuse those messages to peers online and in real life.<sup>35</sup>

An important limitation to a multimedia campaign like MTV Shuga is its lack of influence on supply of services, either actual or perceived supply, including the HIV prevention technologies it promoted through DS2. Viewers were typically sceptical about the opportunity to access HIVST and PrEP in their area of Eastern Cape, despite recent investments in HIV self-test and PrEP distribution.<sup>22</sup> The survey showed that DS2 viewers were more likely than non-viewers to have paid a fee for their last HIV self-test kit, suggesting that the ability to pay or access a pharmacy may help to explain the observed differences in use of self-testing, even if MTV Shuga

boosted motivation for HIV testing. To ensure equitable access to prevention tools and services, media campaigns that generate demand should be directly linked to distribution efforts that are available and acceptable to young people.

The findings are consistent with a small but growing number of studies that demonstrate benefits of MTV Shuga. The afore-mentioned trial in Nigeria found increases in HIV and STI testing in communities randomly selected to receive group showings of MTV Shuga episodes.<sup>18</sup> Among a cohort of adolescent girls and young women in rural KwaZulu, exposure to MTV Shuga was relatively low by 2019 (~15% of randomly sampled 15–24 years old females), but associated with a range of sexual and reproductive health benefits (although not with HIV testing, perhaps due to regular HIV surveillance in the study area).<sup>20</sup> In this study, the higher prevalence of exposure to MTV Shuga (>40%) may be due to better media access as well as more concerted efforts to offer MTV Shuga activities offline, through schools and communities in Eastern Cape.

Our study had a number of limitations. It is likely that the sample does not represent the general population of Eastern Cape, but is skewed in favour of those young people who frequently engage with digital media. Compared with a representative sample in urban areas of Eastern Cape in 2016, cell-phone ownership was similar among 20–24 years old, but higher among our younger respondents (15–19 years).<sup>36</sup> This may reflect recent growth in phone ownership among teenagers, throughout South Africa and Mthatha. Only 1% of our study participants reported that they never used the internet. This may reflect the virtual, internet-based study methods we used to comply with COVID-19 restrictions in South Africa and avoid SARS-CoV-2 transmission risk, however, connectedness and social media use is rapidly growing across South Africa. A recent study in Mthatha described young people's social media use as 'pervasive'.<sup>37</sup> We tried to minimise cost barriers to participation, by making the internet survey free to access (through reverse-charging) and providing data credit to all participants, however, participation was most likely easier for those with digital devices, more reliable internet access and greater literacy.

Our design also relied on self-reported measures of MTV Shuga engagement and misclassification may have under-estimated or over-estimated exposure. Many respondents opted not to answer some questions, particularly the questions on sexual experiences, suggesting that online surveys are not ideal for collecting such private information from young people, even if anonymised. However, the study findings were largely unchanged in sensitivity analyses with imputation of missing values. Another limitation is that the increased associations observed may be explained by unknown or unmeasured confounders, especially as the questionnaire length was kept as short as possible for online use. Nevertheless, associations remained strong after accounting for numerous

potential confounders, including other sources of HIV prevention information and campaigns, and were strong and consistent across multiple outcomes.

## CONCLUSIONS

As new HIV testing and PrEP options become available, we sought evidence of a multimedia edutainment campaign's influence on awareness and demand for such tools, among young men and women in a high-prevalence setting of South Africa. Together, findings from a large online survey and embedded qualitative research are consistent with a causal impact of MTV Shuga on young people's awareness and use of HIVST and PrEP, and knowledge of their own HIV status, although we cannot exclude other possible explanations for the observed associations. With online and offline components, the '360-degree' media campaign reached sizeable proportions of young people through TV, internet, schools and community events, especially adolescent girls—a group at particularly high risk of HIV acquisition in high-burden countries. Positive effects were equally strong for females and males, and the diverse characters and storylines enabled MTV Shuga viewers to reflect on their personal needs and HIV prevention choices. With stronger, more direct links to the supply and distribution of prevention tools like self-test kits and PrEP, growing use of digital media among young people, and the potential for early adopters to diffuse innovation, a popular edutainment campaign like MTV Shuga has an important role to play in closing age and gender gaps in HIV testing and prevention goals.

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