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## Impact of you live only once: A resilience-based HIV prevention intervention to reduce risky sexual behaviour among youth in South Africa

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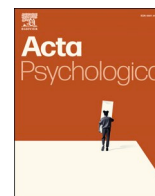
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# Impact of *you only live once*: A resilience-based HIV prevention intervention to reduce risky sexual behaviour among youth in South Africa

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## ABSTRACT

**Purpose:** Interventions focused on promoting resilience or protective factors of youth have been proposed as a strategy for reducing risky behaviours associated with HIV infection among youth; however few studies have explored their effectiveness. This study assessed the impact of a resilience-based HIV prevention intervention (*You Only Live Once*) on risky sexual behaviours, resilience and protective factors of youth.

**Methods:** A one-group pretest-posttest design was used. One hundred and ninety-seven youth aged 15–24 years were conveniently recruited from a non-profit organisation in Maluti-a-Phofung Local Municipality, South Africa and participated in a 12-session, resilience-based HIV intervention delivered over a 1-week period by trained adult facilitators. Outcomes of interest were assessed at baseline and 3-month follow-up using validated risky sexual behaviour measures, and Child and Youth Resilience Measure. Mixed effect logistic and linear regression models were formulated to assess the impact of the intervention on risky sexual behaviours; resilience and protective factors respectively.

**Results:** Compared to baseline, participants at 3-month follow-up were 68 % less likely to have unprotected sex, 22 % less likely to regret their decision to engage in sexual activity and 0.4 % less likely to be pregnant or made someone pregnant. Conversely, participants at the 3-month follow-up had a higher propensity to engage in multiple sexual partnerships, transactional sex and intergenerational sex than baseline. Participants at 3-month follow-up had significant improvements in their scores of resilience, individual capacities and contextual factors that facilitate a sense of belonging ( $p < 0.05$ ).

**Conclusion:** *You Only Live Once* intervention appeared to have mitigated some risky sexual behaviours, and improved resilience and protective factors over a 3-month period. These findings suggest that the intervention has ability to reduce risky sexual behaviours associated with HIV, and improve resilience and protective factors among youth in South Africa. Further evaluation of the intervention with a rigorous study design, larger sample size and longer period for follow-up is warranted.

## 1. Introduction

South Africa has the highest number of people living with Human Immunodeficiency Virus (HIV) in the world, about 7.8 million (Joint United Nations Programme on HIV/AIDS, 2021). Youth (15–24 years) are disproportionately impacted by the disease (Human Sciences Research Council, 2017; Mabaso et al., 2021; World Health Organization, 2016). Despite youth making up 16 % of South Africa's population,

they accounted for 34 % of new infections in 2020 (Joint United Nations Programme on HIV/AIDS, 2021; Statistics South Africa, 2021a). Youth are at high risk for HIV due to a range of multi-level factors which affect risky sexual behaviours (Kaufman et al., 2014; Max et al., 2015). Previous research has identified several challenges facing young people, including lack of parental support and communication, limited sexual health knowledge, peer pressure, poor role models, harmful social norms, alcohol or drug abuse, gender disparities, lack of school

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attendance, unemployment and poverty, which impact their ability to adopt healthy sexual behaviours (Khuzwayo & Taylor, 2018; Mabaso et al., 2021; Visser, 2017). In addition, engagement in risky sexual behaviours, such as non-condom use, early sexual debut, multiple sexual partnerships, intergenerational sex, transactional sex, unintended pregnancies and sex under the influence of drugs or alcohol increases the risk of HIV infection among youth (Visser, 2017; Zgambo et al., 2018; Zgambo et al., 2022).

To curb the spread of HIV among youth, effective HIV prevention strategies focused on reducing risky sexual behaviours are urgently needed. However, systematic reviews suggest that interventions targeting youth are more successful at changing non-behavioural outcomes, such as sexual health knowledge, and less successful at changing behavioural outcomes, such as multiple sexual partnerships (Mwale & Muula, 2017; Sani et al., 2016; Scott-Sheldon et al., 2013). The limited intervention impact on behavioural outcomes has been attributed to the failure of the interventions to successfully address numerous factors influencing risky sexual behaviours among young people (Visser, 2017). Resilience-based interventions have been suggested as a multifaceted approach to avert risky sexual behaviours linked to HIV infection among youth (Fergus & Zimmerman, 2005; LoVette et al., 2019; Wang et al., 2015). Resilience theory suggests that individual protective factors, such as sexual health knowledge, and environmental protective factors, such as parental support promote resilience in people and prevent them from engaging in risky sexual behaviours (Fergus & Zimmerman, 2005; LoVette et al., 2019; Wang et al., 2015). Previous research has established positive associations between resilience or protective factors and healthy sexual behaviours (Govender et al., 2019; Hodder et al., 2018; McNair et al., 2018; Pilgrim & Blum, 2012). Research from United States of America provides evidence for the impact of resilience-based HIV prevention interventions in reducing young people's risky sexual behaviours (Sieving et al., 2011, 2013).

In South Africa, little is known about the effectiveness of resilience-based HIV prevention interventions aimed at reducing risky sexual behaviours among youth. To address this gap, this study sought to evaluate the impact of a resilience-based HIV prevention intervention (*You Only Live Once*) on risky sexual behaviours, resilience and protective factors among youth in South Africa. It was hypothesized that the intervention would (1) reduce risky sexual behaviours and (2) improve resilience and protective factors at 3-month follow-up.

## 2. Materials and methods

### 2.1. Intervention

*You Only Live Once* curriculum was developed in 2016 by the South African Department of Social Development (South African Department of Social Development, 2016). Over the past few years, South African Department of Social Development in partnership with the South African National AIDS Council, Government Capacity Building and Support programme, community-based organisations and not-for-profit organisations has implemented the *You Only Live Once* intervention in most geographical areas of South Africa with high HIV prevalence (Kgaphola & Jacob, 2020; LiveMoya, 2018). The intervention targets youth (15–24 years) to reduce new HIV infections by building resilience or promoting protective factors that enable them to overcome multi-level factors which influence risky sexual behaviours (South African Department of Social Development, 2016). *You Only Live Once* intervention is based on an integrated theoretical framework that comprises aspects of the socio-ecological model and theory of change (LiveMoya, 2018). The socio-ecological model provides a framework for understanding multi-level factors influencing risky sexual behaviours among youth (Kaufman et al., 2014; Max et al., 2015). The theory of change is a device for formulating solutions to complex social problems and describes the causal mechanism on how the intervention's activities will result in achieving expected outcomes (Akintobi et al., 2016; Brest, 2010). The

intervention contains 12 sessions that promote individual protective factors: self-identity; self-esteem; self-efficacy/confidence [sessions 1, 2 and 6]; communication skills [sessions 3 and 11]; decision-making skills [session 12]; skills in dealing with emotional and social challenges [session 9]; and knowledge on sexual health, HIV, unintended pregnancies, contraception, sexual and reproductive rights, risky sexual behaviour [sessions 4, 5, 7 and 8], and environmental protective factors: improved relationships with parents, peers and community members [session 10]; and access to basic services [sessions 4, 5, 7, 8, 9] (LiveMoya, 2018; South African Department of Social Development, 2016).

In this study, the intervention was delivered in two sessions per day with each session lasting 1–2 h, over a period of one week. Five trained adult facilitators delivered the sessions in a mixed-gender group format of 15–20 youth using a variety of participatory approaches, such as group discussions and dialogues, participant reflections, role-plays, short seminars and take-home activities. To enhance session attendance, the sessions were conducted on days and times agreed between the youth and facilitators, and in venues located in the same neighbourhood where the youth and facilitators live (mostly in facilitators' homes).

### 2.2. Study design

This study was part of a larger project evaluating the *You Only Live Once* intervention using a mixed methods approach. The current study reports findings from the quantitative component which utilised a one-group pretest-posttest design to assess the impact of the intervention on risky sexual behaviours, resilience and protective factors. A one-group pretest-posttest design is used when the study seeks to examine causality between an intervention and outcome (Knapp, 2016).

### 2.3. Setting

The study was conducted at a not-for-profit organisation implementing the *You Only Live Once* intervention in Maluti-a-Phofung Local Municipality, South Africa. The organisation provides a range of free services, including HIV prevention programmes to vulnerable children and youth based on the South African Children's Act [No.38 of, 2005]. The *You Only Live Once* intervention was first introduced at the organisation in 2017. Maluti-a-Phofung Local Municipality is located within the Thabo Mofutsanyana District in the Free State Province. It is bordered by the KwaZulu-Natal Province to the east, Dihlabeng Local Municipality to the west, the Kingdom of Lesotho to the south and Phumelela Local Municipality to the north. The municipality is about 4421 km<sup>2</sup> in size and has a population of about 336,000 people with black South Africans of the BaSotho tribe comprising majority of the total population (Municipal Demarcation Board, 2018). Youth below the age of 20 years constitute nearly half of the municipality's total population (Statistics South Africa, 2021b). The municipality has high levels of poverty and unemployment (Statistics South Africa, 2021b). Maluti-a-Phofung Local Municipality had HIV prevalence of 11.3 % in 2017 (Free State Provincial Council on AIDS, 2018).

### 2.4. Participants

A convenience sampling approach was used to recruit 197 participants from 216 youth who had been identified by the not-for-profit organisation to participate in the *You Only Live Once* intervention [Fig. 1]. To be included in the study, youth had to be: (1) 15–24 years; (2) Never participated in the *You Only Live Once* intervention before; (3) Able to read, understand and write English and/or Sesotho; (4) Willing and able to provide informed consent/assent. According to Krejcie and Morgan (1970)'s method of determining sample size for research purposes, the sample size required for a population of 216 youth is 140 youth. Anticipating a 40 % attrition to follow-up, the initial sample size would increase to 196 youth. Therefore, the sample size of 197

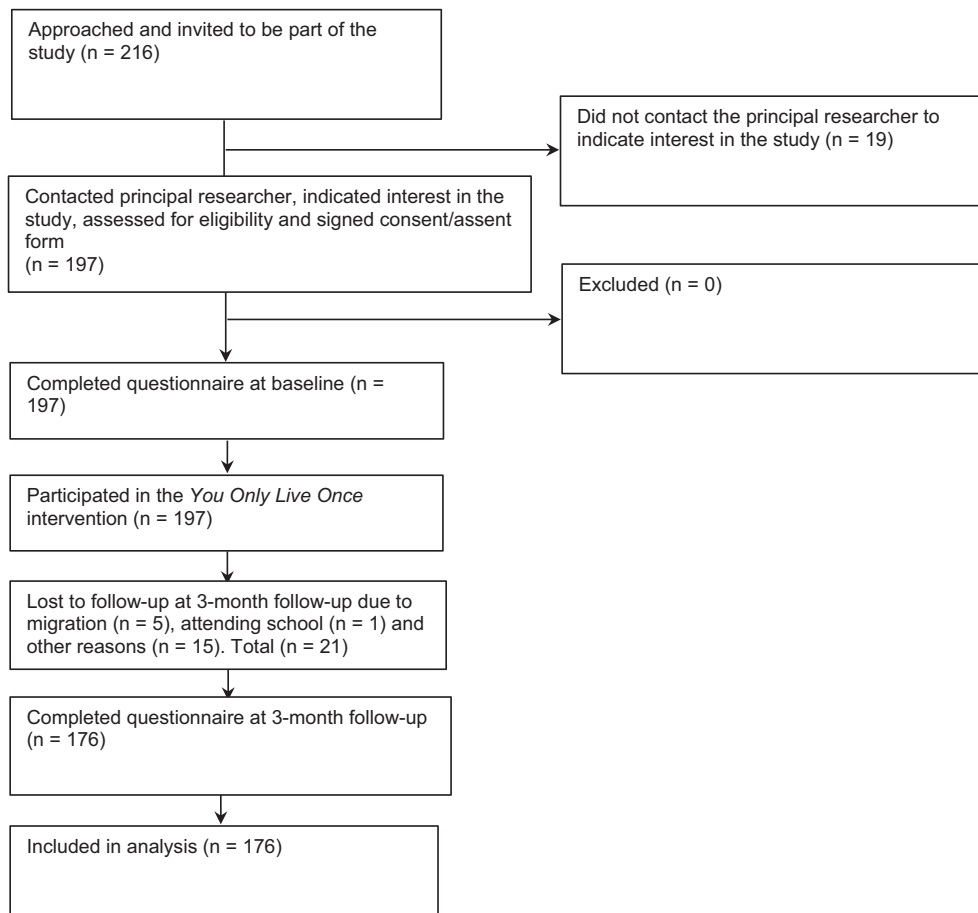


Fig. 1. Flow of study participants from recruitment to final analysis sample.

participants was considered adequate.

## 2.5. Procedure

The study was approved by the Edith Cowan University Human Research Ethics Committee in Australia (reference number 2019–00925) and Human Sciences Research Council Research Ethics Committee in South Africa (reference number 5/19/02/20). Permission was also obtained from the management of the not-for-profit organisation.

Five *You Only Live Once* facilitators at the non-for-profit organisation were approached face-to-face by the principal researcher (FM) to assist him with participant recruitment. The facilitators were briefed on the study objectives and recruitment procedures. The principal researcher and facilitators explained the study to the youth before giving them information sheets and consent/assent forms. Youth who were interested in the study were requested to contact the principal researcher, and an appointment was made to meet them in their preferred location. Participants aged 18 years and older were asked to provide written informed consent, and those below 18 years were requested to give written assent and parental consent if they agreed to participate.

Data collection was conducted from October 2020 to February 2021. Participants completed a self-report questionnaire at baseline ( $n = 197$ ) and 3-month follow-up ( $n = 176$ ) [Fig. 1]. The questionnaire took approximately 15–20 min to complete. The completion of the questionnaires took place at the intervention venue and was supervised by the principal researcher. Participants read and answered the questionnaire on their own. In South Africa, 94 % of the youth are able to speak, write and read in their respective languages (Statistics South Africa, 2016, 2017). Thus, the questionnaire was written in both Sesotho and

English to enable participants to answer the questionnaire in their preferred language. Translation of the questionnaire from English into Sesotho was undertaken using recommended translation guidelines by Tsang et al. (2017). Furthermore, the questionnaire was piloted among 10 youth who were not part of the *You Only Live Once* intervention to ensure its relevance to the South African socio-cultural context.

Participants were assured of their privacy, confidentiality, and their right to withdraw from the study at any time without penalty. To enhance anonymity, participants were instructed to write same unique identifiable number (e.g., date of birth and identity numbers) on the questionnaire instead of their real names each time they completed the questionnaire. To reduce social desirability bias, participants were informed about the importance of responding honestly as their responses would be used to create interventions for other youth. Measures to prevent the spread of Coronavirus disease of 2019 (COVID-19) such as mask wearing, social distancing and hand washing were adhered to. Participants received no financial incentives for completing the questionnaire. However, refreshments were provided to the participants at the end of each session and a certificate of attendance given at the end of the intervention.

## 2.6. Study measures

The questionnaire was made up of three sections which included; sociodemographic characteristics of participants; and measures of risky sexual behaviours, resilience and protective factors.

### 2.6.1. Sociodemographic characteristics

This section collected information on variables, such as age, gender, race, religion, level of education, living arrangement and number of *You*

Only Live Once sessions attended.

2.6.2. Risky sexual behaviours

Seven questions which have been previously used among young people in South Africa (Govender et al., 2017, 2019; Human Sciences Research Council, 2017; Reddy et al., 2010, 2013; Shisana et al., 2014; Visser, 2017) were used to collect data on risky sexual behaviours. Participants were asked the age of sexual debut (<15 years/15 years and more/never had sex). Youth who reported their age of sexual debut as <15 years/15 years and more were regarded as sexually active. Furthermore, participants responded to questions on non-condom use at last sex, multiple sexual partnerships, pregnancy incidence, sexual regret, transactional sex and intergenerational sex in the last three months. A positive answer to each of the questions was given a score of one.

2.6.3. Resilience and protective factors

The Child and Youth Resilience Measure [CYRM-28] (Resilience Research Centre, 2016) which has been previously used among youth in South Africa and in similar contexts (Govender et al., 2017; Kaunda-Khangamwa et al., 2020; van Rensburg et al., 2019) was used to measure resilience and protective factors. The internal consistency of the instrument in the present study was high (Cronbach's alpha = 0.89). The instrument is made up of 28 items that are grouped into three subscales, including individual capacities/resources (11 items), relationship with primary caregiver (7 items) and contextual factors that facilitate a sense of belonging (10 items). The individual capacities subscale comprises of items addressing the following protective factors: personal skills (5 items), peer support (2 times) and social skills (4 questions). The relationship with primary caregiver subscale is made up of items describing the following protective factors: physical caregiving (2 items) and psychological caregiving (5 items). The contextual factors that facilitate a sense of belonging consists of items addressing the following protective factors: spiritual support (3 items), education support (2 items) and cultural support (5 items). The items are responded to on a 5-point Likert scale: 1 = not at all, 2 = a little, 3 = somewhat, 4 = quite a bit, 5 = a lot, with a higher score representing high resilience or protective factors.

2.7. Data analysis

Unique identifiable numbers, such as date of birth and identity numbers were used to match participants' baseline and 3-month follow-up data. Descriptive statistics were used to analyse sociodemographic characteristics and distribution of risky sexual behaviours, resilience and protective factors scores. Differences in socio-demographic characteristics between the participants who remained in the study at 3-month follow-up and those lost to follow-up was assessed using the Chi-square test. Mixed effect logistic regression models were used to examine the impact of the intervention on risky sexual behaviours. Mixed effect linear models were used to determine the impact of the intervention on resilience and protective factors. The analyses adjusted for sociodemographic characteristics, such as gender, age, religion, level of education and living arrangement. The p value of <0.05 was considered as the level of significance. Data were analysed using the R Statistical Software, version 4.0.2.

3. Results

3.1. Sociodemographic characteristics

The sociodemographic characteristics of the participants are shown in Table 1. The majority of the participants (98.5 %) reported their race as black South Africans and more than half of the participants (60.4 %) identified their gender as female. The age group 15–17 years comprised more than half of the participants (55.8 %). Nearly three quarters of the participants (72.1 %) were Christians and more than three quarters of

Table 1 Sociodemographic characteristics and Chi square test results.

Sociodemographic characteristics	Baseline n = 197 n (%)	3-month follow-up n = 176 n (%)	Attrition n = 21 n (%)	X <sup>2</sup>	p-value
Gender				1.173	0.279
Male	77 (39.1 %)	67 (38.1 %)	10 (47.6 %)		
Female	119 (60.4 %)	108 (61.4 %)	11 (52.4 %)		
Transgender	1 (0.5 %)	1 (0.6 %)			
Age				28.489	0.001
15–17 years	110 (55.8 %)	100 (56.8 %)	14 (66.7 %)		
18–20 years	53 (26.9 %)	47 (26.7 %)	4 (19.1 %)		
21–23 years	28 (14.2 %)	23 (13.1 %)	2 (9.5 %)		
24 and above	6 (3 %)	6 (3.4 %)	1 (4.8 %)		
Religion				2.400	0.301
Christianity	142 (72.1 %)	128 (72.7 %)	15 (71.4 %)		
Islam	1 (0.5 %)	1 (0.6 %)			
Traditional	53 (26.9 %)	46 (26.1 %)	6 (28.6 %)		
Other	1 (0.5 %)	1 (0.6 %)			
Education level				0.368	0.985
No formal education	5 (2.5 %)	4 (2.3 %)	1 (4.8 %)		
Primary education	17 (8.6 %)	16 (9.1 %)	1 (4.8 %)		
Secondary education	148 (75.1 %)	133 (75.6 %)	19 (90.5 %)		
Tertiary education	27 (13.7 %)	23 (13.1 %)			
Race				9.975	0.002
Black	194 (98.5 %)	174 (98.7 %)	19 (90.5 %)		
Coloured	3 (1.5 %)	2 (1.3 %)	2 (9.5 %)		
Living arrangement				4.466	0.813
Both parents	62 (31.5 %)	58 (33 %)	8 (38.1 %)		
One parent	102 (51.8 %)	88 (50 %)	11 (52.4 %)		
Another relative	22 (11.2 %)	20 (11.4 %)	2 (9.5 %)		
A friend	5 (2.5 %)	4 (2.3 %)			
Alone	4 (2 %)	4 (2.3 %)			
Other	2 (1 %)	2 (1.1 %)			
You Only Live Once sessions attended					
1–3		2 (1.1 %)			
4–6		5 (2.8 %)			
7–9		4 (2.3 %)			
10–12		165 (93.8 %)			

n = frequency; % = percentage; X<sup>2</sup> = Chi-square; p-value = level of significance <0.05.

the participants (75.1 %) had secondary education. More than half of the participants (51.8 %) were living with one parent. Chi-square test analyses did not reveal any significant differences in sociodemographic characteristics between participants who remained in the study at 3-month follow-up and those lost to follow-up except for age and race. Majority of the participants who remained in the study at 3-month follow-up (93.8 %) indicated that they attended 10–12 sessions. (Table 1).

3.2. Impact of the intervention

3.2.1. Risky sexual behaviours

Between baseline and 3-month follow-up, there was a 7.4 % increase in the number of youth who were sexually active. Table 2 shows the impact of intervention on non-condom use, multiple sexual

**Table 2**  
Univariable and multivariable mixed effect logistic regression estimates for risky sexual behaviours before and after the intervention.

Outcome	Measurement	Crude		Adjusted	
		Est (se)	Odds [95 % CI]	Est (se)	Odds [95 % CI]
Non-condom use	Baseline	0.921 (0.535)	2.511 [0.880, 7.167]	1.132 (0.599)	3.102 [0.959, 9.912]
	3-month follow-up	(Ref)		(Ref)	
Multiple sexual partnerships	Baseline	-0.508 (0.448)	0.602 [0.250, 1.446]	-0.506 (0.463)	0.603 [0.243, 1.494]
	3-month follow-up	(Ref)		(Ref)	
Pregnancy incidence	Baseline	0.006 (0.947)	1.006 [0.157, 6.440]	0.004 (0.974)	1.004 [0.149, 6.776]
	3-month follow-up	(Ref)		(Ref)	
Sexual regret	Baseline	0.255 (0.494)	1.291 [0.490, 3.401]	0.245 (0.556)	1.278 [0.430, 3.797]
	3-month follow-up	(Ref)		(Ref)	
Transactional sex	Baseline	-0.947 (1.063)	0.388 [0.048, 3.113]	-0.680 (1.080)	0.507 [0.061, 4.207]
	3-month follow-up	(Ref)		(Ref)	
Intergenerational sex	Baseline	-0.281 (0.435)	0.755 [0.322, 1.772]	-0.294 (0.442)	0.746 [0.314, 1.772]
	3-month follow-up	(Ref)		(Ref)	

NB: The reported adjusted odds estimates are also age-gender adjusted. The estimates provided are for the “yes” responses to the risky sexual behaviours before and after the intervention, with ‘no’ responses as the reference group.

partnerships, pregnancy incidence, sexual regret, intergenerational sex and transactional sex. The intervention seemed to have positively impacted non-condom use, sexual regret and pregnancy incidence, whilst multiple sexual partnerships, transactional sex and intergenerational sex were not positively impacted. At 3-month follow-up, participants were 68 % less likely to have unprotected sex during sexual intercourse compared to baseline (odds ratio [OR] = 3.102; 95 % confidence interval [CI] = 0.959 to 9.912). Participants at 3-month follow-up were 22 % less likely to regret their decision to engage in sexual activity in the last three months than baseline (OR = 1.278; 95 % CI = 0.430 to 3.797). Additionally, at 3-month follow-up participants were 0.4 % less likely to be pregnant or made someone pregnant in the last three months compared to baseline (OR = 1.004; 95 % CI = 0.149 to 6.776).

Conversely, participants at 3-month follow-up were 66 % more likely to have multiple sexual partnerships in the last three months than baseline (OR = 0.603; 95 % CI = 0.243 to 1.494). Additionally, at 3-month follow-up, participants were 97 % more probably to be involved in transactional sex in the last three months compared to baseline (OR = 0.507; 95 % CI = 0.061 to 4.207). Furthermore, participants at 3-month follow-up were 34 % more likely to engage in intergenerational sex in the last three months than baseline (OR = 0.746; 95 % CI = 0.314 to 1.772).

### 3.2.2. Resilience and protective factors

Fig. 2 depicts the individual response to the intervention on the scales of resilience and protective factors. Individuals responded differently to the measures, but it can be observed that the magnitude of positive impacts of intervention on the scores of resilience and

contextual factors that facilitate a sense of belonging were mostly larger compared to instances of negative impacts. Overall, there was a significant improvement in the mean resilience scores at the 3-month follow-up compared to baseline (115 vs 120,  $p = 0.013$ ). Individual capacities scores increased at 3-month follow-up (44 vs 47;  $p = 0.004$ ). There were significant differences in the mean scores of contextual factors that facilitate a sense of belonging between baseline and 3-month follow-up (42 vs 44,  $p = 0.007$ ). At 3-month follow-up, improvements were seen in the mean scores of relationship with a primary caregiver; however these improvements were not significant ( $p = 0.943$ ) [Table 3].

## 4. Discussion

This study assessed the impact of a resilience-based HIV prevention intervention (*You Only Live Once*) on risky sexual behaviours, resilience and protective factors among youth in South Africa. Findings suggest that a resilience-based HIV prevention intervention has potential to mitigate some risky sexual behaviours associated with young people's vulnerability to HIV. At 3-month follow-up, participants had less likelihood to have unprotected sex, regret their decision to engage in sexual activity and be pregnant or made someone pregnant. On the other hand, the intervention did not positively impact some risky sexual behaviours linked to HIV infection among youth including multiple sexual partnerships, transactional sex and intergenerational sex. Also, a slight increase in the number of participants who were sexually active was observed between baseline and 3-month follow-up, implying that the intervention did not delay initiation of sexual activities. Furthermore, findings indicate that the intervention has ability to improve resilience and protective factors of youth. Significant improvements were observed in resilience and protective factors: individual capacities and contextual factors that facilitate a sense of belonging at 3-month follow-up. However, the intervention did not significantly impact protective factors: relationship with primary caregiver.

Findings of this study concur with those of previous research, for example, an evaluation an intervention targeting female youth in United States of America by Sieving et al. (2011, 2013) also found that the intervention reduced non-condom use. It is important to note that the intervention evaluated by Sieving et al. (2011, 2013) differed to the one in the present study in that it was 18 months in length. Furthermore, Castillo-Arcos et al. (2016) in their intervention targeting youth in Mexico also observed that the intervention did not positively impact risky sexual behaviours. Castillo-Arcos et al. (2016) did not mention the length of their intervention. However, findings of the present study are inconsistent with those of Sieving et al. (2011, 2013) who found that the intervention significantly improved youth's relationship with parents.

*You Only Live Once* curriculum included topics on sexual health knowledge including HIV and risky sexual behaviours which may have increased participants' awareness of the consequences of engaging in risky sexual behaviours and in turn positively influenced some risky sexual behaviours, such as non-condom use. Factors that may have contributed to the limited impact of the intervention on some risky sexual behaviours, such as multiple sexual partnerships, transactional sex and intergenerational sex include the immediate and wider context within which the intervention was implemented; the dosage, duration and content of the intervention; and methodological limitations.

The immediate and wider context within which the *You Only Live Once* intervention was implemented could have contributed to the limited impact of the intervention. Evidence suggests that several factors such as poverty, limited resources (Mwale & Muula, 2017), gender and cultural issues (Chandra-Mouli et al., 2015; Dancy et al., 2014) hinder the implementation of interventions targeting youth. It is possible that the intervention was not able to adequately deal with these challenges.

The dosage, duration and content of the intervention could have contributed to the limited impact of the intervention. The intervention comprised of 12 sessions, as such the dosage of the intervention may have been inadequate to influence risky sexual behaviours. Moreover,

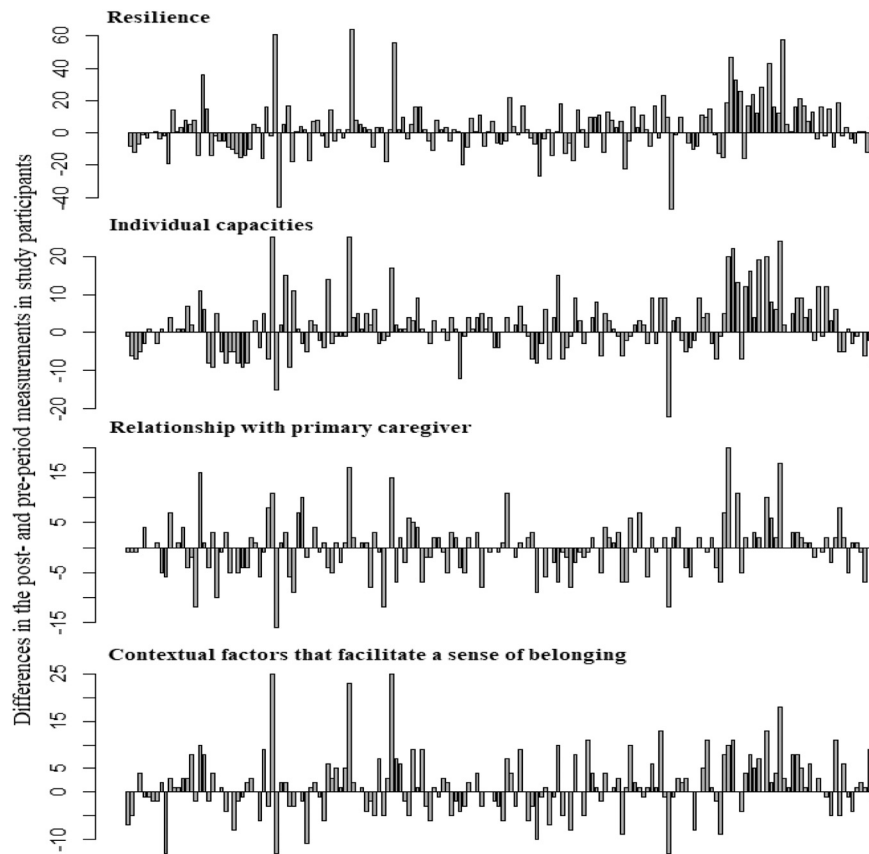


Fig. 2. Distribution of individual's response to the *You Only Live Once* intervention across resilience and protective factors.

Table 3

Mixed effect model estimates for measuring the impact of the intervention on resilience and protective factors, adjusting for key demographic variables.

Study variable		Resilience		Individual capacities		Relationship with primary caregiver		Contextual factors that facilitate a sense of belonging	
		Mean (se)	p-value	Mean (se)	p-value	Mean (se)	p-value	Mean (se)	p-value
Measure	Baseline	<b>-2.966 (1.182)</b>	<b>0.013</b>	<b>-1.580 (0.545)</b>	<b>0.004</b>	-0.028 (0.396)	0.943	-1.258 (0.460)	0.007
	3-month follow-up	(Ref)		(Ref)		(Ref)		(Ref)	
Gender	Male	(Ref)		(Ref)		(Ref)		(Ref)	
	Female	0.889 (2.079)	0.670	-0.328 (0.894)	0.714	-0.030 (0.769)	0.969	1.186 (0.766)	0.124
Age	Transgender	4.828 (13.467)	0.720	-1.351 (5.788)	0.816	4.007 (4.983)	0.422	0.575 (4.965)	0.908
	15-17	(Ref)		(Ref)		(Ref)		(Ref)	
	18-20	-0.771 (2.365)	0.745	-0.399 (1.016)	0.695	-1.287 (0.863)	0.138	0.985 (0.876)	0.263
	21-23	-0.772 (3.093)	0.803	0.013 (1.328)	0.992	-1.409 (1.129)	0.214	0.805 (1.146)	0.483
Religion	24 and above	-5.833 (5.621)	0.301	-2.585 (2.414)	0.286	<b>-4.253 (2.051)</b>	<b>0.040</b>	0.823 (2.083)	0.693
	Christianity	(Ref)		(Ref)		(Ref)		(Ref)	
	Islam	<b>-31.528 (13.155)</b>	<b>0.018</b>	<b>-12.579 (5.685)</b>	<b>0.028</b>	-6.350 (4.912)	0.198	-12.693 (4.889)	0.010
	Traditional	1.845 (2.237)	0.411	0.613 (0.967)	0.527	0.852 (0.835)	0.309	0.222 (0.832)	0.790
Education level	Other	-17.028 (13.155)	0.197	-5.079 (5.685)	0.373	-7.850 (4.911)	0.112	-4.193 (4.889)	0.392
	No formal education	(Ref)		(Ref)		(Ref)		(Ref)	
	Primary education	-0.313 (7.482)	0.967	-0.219 (3.221)	0.946	1.188 (2.762)	0.668	-1.781 (2.765)	0.520
	Secondary education	-3.268 (6.792)	0.631	-0.322 (2.924)	0.912	-0.473 (2.508)	0.851	-2.848 (2.510)	0.258
Living arrangement	Tertiary education	-2.929 (7.250)	0.687	0.234 (3.121)	0.940	-0.984 (2.677)	0.714	-2.141 (2.680)	0.425
	Both parents	(Ref)		(Ref)		(Ref)		(Ref)	
	One parent	0.563 (2.241)	0.802	0.594 (0.969)	0.541	-0.849 (0.783)	0.280	0.800 (0.839)	0.342
	Another relative	-0.456 (3.435)	0.985	0.493 (1.486)	0.740	-1.582 (1.200)	0.189	0.731 (1.287)	0.571
	A friend	<i>-12.681 (6.849)</i>	<i>0.066</i>	-1.832 (2.962)	0.537	<b>-11.707 (2.393)</b>	<b>&lt;0.001</b>	0.306 (2.565)	0.905
	Alone	-2.5056 (6.849)	0.764	1.793 (2.962)	0.546	<b>-4.967 (2.393)</b>	<b>0.040</b>	1.556 (2.565)	0.545
Other	14.819 (9.528)	0.122	7.293 (4.121)	0.079	2.043 (3.329)	0.540	5.431 (3.568)	0.130	

Bold text indicates significance effect at 5 % level of significance. Italicised text indicates a trend towards significance.

the intervention was implemented over a period of one week and is an inadequate period to expect change of behaviours, and a more extended period should have been included. Research shows that interventions delivered with higher dosage or for a longer duration are more effective

than shorter interventions (Chandra-Mouli et al., 2015; Ibrahim & Sidani, 2014; Scott-Sheldon et al., 2013; Sieving et al., 2011, 2013), perhaps because such interventions allow for more in-depth discussion and reflection on topics that have powerful effect on changing individual



behaviours. Additionally, the intervention's lack of content addressing structural drivers of risky sexual behaviours among youth (Dana et al., 2019; Sathiyasuman, 2015; Onoya et al., 2015) could have contributed to the limited impact of the intervention on risky sexual behaviours. Addressing structural determinants of young people's risky sexual behaviours, such as poverty, unemployment and harmful social norms improves the impact of the intervention in reducing risky sexual behaviours (Baird et al., 2012; Mavedzenge et al., 2014; Stoner et al., 2020; Svanemyr et al., 2015).

The present study had methodological limitations which may have contributed to the limited impact of the intervention. The length for follow-up was short (three months), and because health-related behaviours are known to take time to adopt and become routine (Rogers, 2003), it is possible that the short duration for follow-up could have contributed to the limited impact of the intervention on risky sexual behaviours. The use of a one-group pretest-posttest design which does not have a comparison group and control other factors beside the intervention, such as history, maturation and testing effects could have mitigated the true impact of the intervention. Moreover, the study findings are based on self-reported data, therefore because of the sensitive nature of some questions, some participants may have provided socially desirable answers. Furthermore, the sample size used to assess the impact of the intervention was small ( $n = 176$ ) which could have limited the study's statistical power to detect effects of the intervention.

In addition to the likely influence of methodological limitations on the impact of the intervention, the present study had other limitations. A convenience sampling approach was used to recruit participants, it is possible that there was selection bias in participants who agreed to be in the study. In addition, the study was conducted among youth in a single organisation, therefore findings may not be generalizable to all South African youth. Nonetheless, the study's strengths includes the matching of participants' baseline and 3-month follow-up data for analysis, low attrition rates and use of validated instruments.

The study suggests areas of improvements for future research. More rigorous evaluation approaches for the intervention are recommended. Future studies should examine the factors that influence the outcomes of the intervention to guide future research and intervention development. Finally, future studies should investigate whether using a large sample size; improving the content of the intervention to address structural determinants of young people's risky sexual behaviours (e.g., gender-based violence, poverty and unemployment); and increasing the duration and dosage of the intervention, and length for follow-up improves the impact of the intervention.

## 5. Conclusion

Overall, there is limited literature on the effectiveness of resilience-based HIV prevention interventions aimed at reducing risky sexual behaviours among youth in South Africa. Findings indicate that the intervention positively impacted some risky sexual behaviours, and resilience and protective factors, whilst some risky sexual behaviours and protective factors were not positively impacted. To the authors' knowledge, this study is the first impact evaluation of a resilience-based HIV prevention intervention aimed at reducing risky sexual behaviours among youth in South Africa. The study provides initial evidence about the potential of resilience-based HIV prevention intervention to reduce risky sexual behaviours, and improve resilience and protective factors in South African youth. Given the methodological limitations highlighted in this study, there is need for further evaluation of the intervention with a rigorous study design, larger sample size and longer period for follow-up to strengthen evidence on the impact of the intervention.

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## Declaration of competing interest

The authors declare that they have no competing interests.

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