

The HIV Epidemic and Cognitive Psychology: Negative Affect and Associative Imagery of HIV/AIDS among Young Adults in Cameroon

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Abstract Background: Although HIV/AIDS negatively affects socio-economic development in many countries, there are limited studies that have applied concepts in cognitive psychology to investigate population level attitudes towards HIV/AIDS. The objectives of this study were to: (1) investigate the affective imagery of HIV/AIDS; and (2) identify the predictors of “worry” about the negative consequences of HIV/AIDS among young adults. **Methods:** A population-based study was conducted in Kumba, Southwest Cameroon among youth aged 21-35 years. Data were collected from September to October 2016 by trained interviewers using paper-based questionnaires. Respondents were asked the extent to which they were worried about the negative consequences of HIV/AIDS on themselves, family, community, society, current and future generation. Respondents were also asked to identify the first thought/image that comes to their mind when they think of HIV/AIDS. Qualitative data were analyzed by the grounded theory tradition while weighted hierarchical linear regression was used to analyse quantitative data to identify the predictors of worry about the negative consequences of HIV/AIDS. The statistical level of significance was set at $p < 0.05$. **Results:** The median age of the 767 respondents who participated in the study was 26 years (IQR: 23-29), 58.2% were males while 41.8% were females. 68.1% of respondents had negative feelings about the consequences of HIV/AIDS. Respondents who attained high school education and above ($\beta = 1.12$, $p < 0.001$), who had negative feelings about HIV/AIDS ($\beta = 1.11$, $p < 0.001$) and who had a high self-perceived risk of contracting HIV ($\beta = 1.49$, $p < 0.001$) were significantly more likely to be worried about the negative consequences of HIV/AIDS. However, males ($\beta = -0.75$, $p = 0.003$) compared to females were less likely to be worried about the negative consequences of HIV/AIDS. Most respondents associated HIV/AIDS to death and conjures images such as “death sentence”, “deadly disease”, “disease with no cure” and “killer disease”. This was followed by images associated with fear, sadness and anxiety. **Conclusions:** Most respondents were worried about the consequences of HIV/AIDS and associated the epidemic to death and fear. These findings underscore the need for the psychosocial and cognitive processes of young adults to be considered during the design of HIV prevention and risk communication messages.

Keywords: HIV/AIDS, psychology, negative feelings, epidemic, images

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1. Introduction

Over the past decades, international donor institutions and governments have allocated substantial resources to curb the HIV/AIDS epidemic. Despite the gains and achievement made, the epidemic still represents a significant public health threat [1,2]. By the end of 2017, an estimated 36.7 million people around the world were

living with HIV [3] with the vast majority in sub-Saharan Africa (SSA). A more serious challenge today, is the growing infection rates among young adults. Young people are vulnerable to HIV because of early sexual debut, lack of knowledge, risky sexual behaviour including having multiple sexual partners, low condom use [4,5,6] alcohol and drug use before sex [7] and the presence of sexually transmitted infections [8].

HIV/AIDS has been reported to impact socio-economic development as the epidemic has and continues to affect

individuals, families, communities, societies and nations. HIV/AIDS is associated with morbidity and mortality [9] and people living with HIV may fall sick; and experience stigma and discrimination in their communities [10,11]. They also experience emotional and psychological distress which has been associated with poor mental health [12,13]. HIV/AIDS has also been associated with reduced income, food productivity and livelihoods among families [14]. A study in South Africa among rural and urban households found a 40% to 50% decrease in income levels among households affected by HIV/AIDS compared to those not affected [15]. In some settings in SSA, HIV/AIDS has made children to become heads of households caring for their chronically ill parents or orphans and vulnerable children [16].

In the field of cognitive psychology, the concept of negative affect has extensively been studied in many different areas. Negative affect refers to the negative feelings which individuals may have about a particular object and it has been reported to determine how people receive and process information about the object [17,18]. Moreover, individuals have been reported to make decisions based on their affective reactions which is strongly related to worry [19]. Worry refers to a chain of thoughts processes and images about a real or imagined problem or threat and is a natural response to either past or anticipated future problems which usually evokes negative emotions [20,21]. Worry has also been associated with other psychological states including anxiety, sadness and depression [22]. Additionally, associative imagery (i.e., the forms of mental representation that individuals may have over a particular stimulus) has also been widely researched in the field of psychology [23]. Despite the relevance of these concepts, they have not been adequately studied in the field of HIV/AIDS.

In Cameroon, a nationally representative survey conducted in 2011 estimated the HIV prevalence at 4.3% among individuals aged 15-49 years with women more infected than men. The prevalence increased from 2% among 15-24 year olds to about 10% among the 30-34 age group [24]. Despite the socio-economic consequences of HIV/AIDS in the country and the fact that young adults are highly vulnerable to HIV, there has been no research that has examined the cognitive processes of HIV/AIDS among young adults in the country. The objectives of this study were to: (1) investigate the associative imagery of HIV/AIDS among young adults; and (2) identify the predictors of “worry” about the negative consequences of HIV/AIDS among young adults. The findings of this study may inform the design and dissemination of HIV prevention and risk reduction strategies among young adults. This paper reports part of the findings of a larger study that was conducted among young adults. The results of the other part have been published elsewhere [25].

2. Methods

2.1. Study Design, Sampling and Data Collection

This study was a population-based study conducted among young adults (21-35 years) in the municipality of

Kumba in the Southwest region of Cameroon. A detailed description of the study design and setting, the study population, sample size estimation and data collection has been published elsewhere [25]. Briefly, a modified version of cluster sampling technique was used to sample respondents and 24 neighbourhoods were selected in the city of Kumba based on probability proportionate to size. Trained interviewers visited every third household in the selected neighbourhoods and screened respondents based on the study eligibility criteria. Respondents were eligible to participate if they were unmarried permanent residents in the selected households or visitors who spent the previous night, aged between 21-35 years at the time of the study and willing to provide written informed consent. Data were collected from September to October 2016 using a pre-tested and validated paper-based questionnaire.

2.2. Measures

2.2.1. Outcome Variable

The outcome variable was “worry” about the negative consequences of HIV/AIDS. This variable was assessed by asking respondents: “How worried are you about the negative consequences of HIV/AIDS?” on seven domains: 1) yourself, 2) family, 3) community, 4) society, 5) current generation, and 6) future generation. The response choices for each of the domains included: not at all worried; a little worried; very worried and extremely worried (scored from 1 to 4 respectively). A composite index variable was then constructed by summing the scores of “worry” about the negative consequences of HIV/AIDS on yourself, family, community, society, current generation and future generation (Cronbach alpha=0.74).

2.2.2. Independent Variables

The independent variables included sociodemographic variables: age was classified in three age groups (21-25, 26-30 and 31-35 years); gender (male/female), educational attainment-in terms of highest level of education completed (below high school; high school and above); employment status (student, unemployed and employed), and religious affiliation (Catholic, Presbyterian, Pentecostal and Others).

Negative feelings (affect) of HIV/AIDS was gathered using separate, unipolar measures of negative “affect”. This variable was assessed by asking respondents: “Do you have any negative feelings about HIV/AIDS?” Those who responded “Yes” were asked to rate the strength of their negative feelings on a 4-point Likert scale ranging from slightly negative (-1) to extremely negative (-4).

Other independent variables included: “knowledge of someone currently living with HIV”, “knowledge of someone who has died of AIDS” and self-perceived risk of contracting HIV. We measured self-perceived risk of contracting HIV by asking respondents the question: “How do you rate your personal risk of contracting HIV?” Self-perceived risk of contracting HIV was coded “1” if respondents considered themselves to have no risk, “2” if they considered themselves to have small risk, “3” if they considered themselves to have moderate risk, and “4” if they considered themselves to have high risk.

2.2.3. HIV/AIDS Associative Imagery

Associative imagery of HIV/AIDS was assessed by asking respondents, “What is the first image or thought that comes to your mind when you think of HIV/AIDS?” The question was open ended, so respondents were free to provide associations in the form of either a single word response or a short narrative statement.

2.3. Data Analysis

Both qualitative and quantitative data were analyzed separately. Qualitative data gathered from respondents’ associative imagery were compiled into a computer database. A rich dataset of respondents’ images were generated. A content analysis was performed by 2 independent coders; and their images were coded into broad categories or themes. Affective image code categories were derived in the grounded theory tradition, in which respondents’ images are inductively categorized to reveal dominant themes, rather than imposing a priori categories derived from theory [27].

Quantitative data were weighted prior to analyses and clustering effects were adjusted using STATA survey commands. As a first step in the analysis, descriptive statistics were computed for all main variables. A step-wise multiple regression analysis was used to identify the predictors of “worry” about the negative consequences of HIV/AIDS. First, we conducted an analysis to ensure that all relevant statistical assumptions were met. We checked for multicollinearity among the predictor variables. We found that the variable “strength of the negative feelings” was collinear with “has negative feelings about HIV”, so we eliminated the variable “strength of the negative feelings”.

Additionally, we conducted other regression diagnostic tests including residual and scatter plots in STATA to verify that our data have meet the assumptions underlying regression analysis [28]. Our verification indicated that the assumptions of normality (using the Kendel density), linearity (scatter plot) and homoscedasticity (using Breusch-Pagan test) were all met. We then performed a three-step hierarchical multiple regression model.

In Model 1 we included the socio-demographic variables to control for background factors. Model 2 included the significant variables in Model 1 and the variables: negative affect (feelings), knowledge of someone living with HIV, and knowledge of someone who has died of AIDS. The final model included significant variables in Model 2 and the variable: self-perceived risk of contracting HIV. This final model enabled us to identify the independent predictors of “worry” about the negative consequences of HIV/AIDS. A p-value of <0.05 was considered statistically significant. All quantitative analyses were performed using STATA 13.0 (Stata Corp, College Station, TX).

2.4. Ethical Considerations

The study protocol, including the design, recruitment, participant information sheet and informed consent form were reviewed and approved by the Cameroon National Research Ethical Committee for Human Health (No 2016/11/841/CE/CNERSH/SP). Administrative clearance was also obtained from the Southwest Regional Delegation

of Public Health. Local administrative authorities in the city of Kumba were informed prior to the commencement of data collection in the neighbourhoods. All eligible respondents provided written informed consent.

3. Results

3.1. Characteristics of Respondents

Table 1 shows the characteristics of respondents who participated in the study. A total of 767 individuals aged 21-35 years participated and their median age was 26 years (IQR=23-29 years). Less than half (45.5%) were aged 21-25 years, 58.2% were males while 41.8% were females. Slightly over half (51.2%) of the respondents attained high school education and below. More than half (64.1%) were employed and 27.1% were Presbyterian. About 68.1% of respondents had a negative feeling about HIV/AIDS. Of these, 46.9% had extremely negative feelings about HIV/AIDS.

Table 1. Characteristics of respondents

Variable (s)	Frequency (N)	Percentage (%)
Age group (years)		
21-25	349	45.5
26-30	287	37.4
31-35	131	17.1
Gender		
Female	321	41.8
Male	446	58.2
Educational attainment		
High school and below	393	51.2
Above high school	374	48.8
Employment status		
Student	141	18.4
Unemployed	134	17.5
Employed ¹	492	64.1
Religion		
Catholic	192	25.1
Presbyterian	208	27.1
Pentecostal	205	26.7
Others ²	162	21.1
Has negative feelings about HIV/AIDS		
No	245	31.9
Yes	522	68.1
Strength of the negative feelings³ (n=520)		
Slightly negative (-1)	48	9.3
Somewhat negative (-2)	37	7.1
Very negative (-3)	191	36.7
Extremely negative (-4)	244	46.9
Know someone currently living with HIV		
No	567	73.9
Yes	200	26.1
Know someone who has died of AIDS		
No	446	58.2
Yes	321	41.8
Self-perceived risk of contracting HIV		
No risk	178	23.2
Small risk	236	30.8
Moderate risk	188	24.5
High risk	165	21.5

Notes: ¹Employed=Part-time, Full-time and Self-employed; ²Other religion= Baptist, Islam, Apostolic, Jehovah’s Witness etc. ³Of the 522 respondents who had negative feelings about HIV/AIDS, 520 responded to the follow-up question.

3.2. Attitudes towards Worry about the Negative Consequences of HIV/AIDS

Figure 1 presents respondents' attitudes towards "worry" about the negative consequences of HIV/AIDS for each of the six domains. About 39.8% and 37.3% of respondents were "extremely worried" about the negative consequences of HIV/AIDS on themselves and their society respectively. An estimated 39.8% and 36.2% respectively were "very worried" about the negative consequences on their families and communities. Less than half (46.1%) were very worried about the negative consequences of HIV/AIDS on the current generation; and 21.9% were worried about the future generation. An estimated 22.3% were "a little worried" about the negative consequences on their community.

Table 2 presents the mean and standard deviation for the statements that generated the composite index for worry about the negative consequences of HIV/AIDS. Our analysis shows that the statements were highly correlated (Cronbach alpha=0.74).

3.3. Associative Images of HIV/AIDS

Table 3 presents respondents' associative images of HIV/AIDS. Our analysis identified a total of nine (9) distinct thematic categories of affective images associated with HIV/AIDS. The top four categories represented 83%

of respondents. Associations related to "death" was the highest category of responses which indicates that it was the most salient in their minds. Examples of images included: "death sentence", "deadly disease", "disease with no cure", and "killer disease". The second highest category was associations related to Fear. Examples of images included: "fear", "scared", and "horror". Among this category, fear was the highest salient image in the minds of respondents. The third category of images salient in the minds of respondents was associations of rejection. Example included: "rejection in society", "isolation", "discrimination", and "stigma".

3.4. Predictors of "worry" about the negative consequences of HIV/AIDS

Table 4 shows the step-wise multiple regression analysis for predictors of "worry" about the negative consequences of HIV/AIDS. In Step 1, the model examined the demographic factors and was statistically significant $F(9,758) = 6.71, p < 0.001$ explaining 6% of the variance. Respondents who attained high school education and above ($\beta = 1.67, p < 0.001$) were significantly more likely to be worried about the negative consequences of HIV/AIDS than those who attained below high school education. Compared to females, men ($\beta = -0.86, p = 0.001$) were significantly less likely to be worried about the negative consequences of HIV/AIDS.

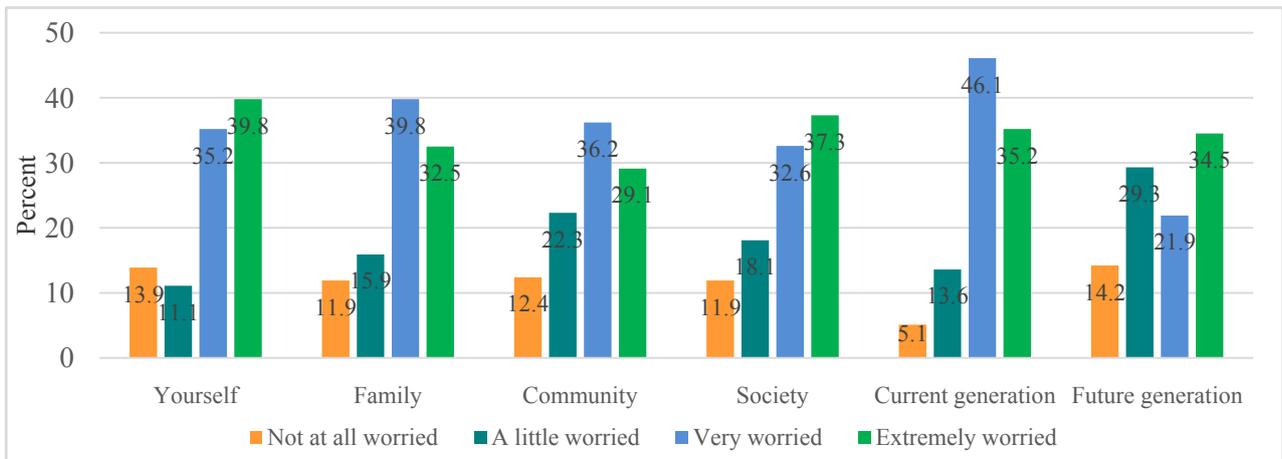


Figure 1. How worried¹ are you about the negative consequences of HIV/AIDS? (N=767: Scales range from 1 (Not at all worried) to 4 (Extremely worried))

Table 2. Composite Index for "Worry" about the negative consequences of HIV/AIDS

	Mean	Standard deviation	Alpha if item deleted	Alpha
Index for worry about HIV/AIDS¹	17.6	3.90		0.74
How worried are you about the negative consequences of HIV/AIDS on:				
Yourself	3.01	1.03	0.68	
Family	2.92	0.97	0.64	
Community	2.82	0.98	0.65	
Society	2.95	1.02	0.67	
Current generation	3.18	0.02	0.73	
Future generation	2.92	0.03	0.78	

N=767: Scales range from 1(Not at all worried) to 4 (Extremely worried).

¹Composite Index for "worry" about the negative consequences of HIV/AIDS was computed by summing the scores of worry about the negative consequences of HIV/AIDS on yourself, family, community, society, current and future generation.

In step 2, the model consisted of the significant demographic variables from Model 1 and the following variables: Having negative (affect) feelings about HIV/AIDS, “know someone living with HIV” and “know someone who has died of AIDS”. The model was statistically significant $F(5,762) = 17.91, p < 0.001$ and explained 8% of the variance. Respondents who attained high school education and above ($\beta = 1.30, p < 0.001$), who had negative feelings about HIV/AIDS ($\beta = 1.05, p < 0.001$) were significantly more likely to be worried about the negative consequences of HIV/AIDS. Males ($\beta = -0.70, p = 0.005$) were significantly less likely to be worried about the negative consequences of HIV/AIDS compared to women.

A final model was developed which included only significant variables from Model 2 and adding the variable “self-perceived risk of contracting HIV”. The final model was statistically significant $F(6,761) = 15.51, p < 0.001$ and accounted for 9% of the variance. Respondents who attained high school education and above ($\beta = 1.12, p < 0.001$); who had negative feelings about HIV/AIDS ($\beta = 1.11, p < 0.001$) and who had a high self-perceived risk of contracting HIV ($\beta = 1.49, p < 0.001$) were significantly more likely to be worried about the negative consequences of HIV/AIDS. However, males ($\beta = -0.75, p = 0.003$)

compared to females were less likely to be worried about the negative consequences of HIV/AIDS.

Table 3. What is the first image or thought that comes to your mind, when you think of HIV/AIDS? (n=730)

Image Category	Frequency (N)	Percentage (%)
Death	427	58.5
Fear	86	11.8
Deadly disease	39	5.3
Normal disease	28	3.8
Sickness	24	3.3
Stigma and discrimination	20	2.7
Dreadfulness	19	2.6
Poverty/Misery	18	2.5
Depression	18	2.5
Sadness	15	2.1
Suffering	12	1.6
Hope in God	8	1.1
Reduced life expectancy	6	0.8
Prevention	5	0.7
Antiretroviral therapy	5	0.7

Note: A total of 730 respondents answered this question.

Table 4. Multiple linear regression models for predictors of worry about the negative consequences of HIV/AIDS

Characteristics	Model 1			Model 2			Final Model		
	B	β (95% CI)	p-value	B	β (95% CI)	p-value	B	β (95% CI)	p-value
Age group (years)									
26-30 (ref: 21-25)	1.59	0.46 (-0.11, 1.04)	0.113						
31-35	1.95	0.75 (-0.01, 1.52)	0.052						
Gender									
Male (ref: Female)	-3.31	-0.86 (-1.37,-0.35)	0.001	-2.79	-0.70 (-1.19, -0.21)	0.005	-2.98	-0.75 (-1.24,-0.26)	0.003
Educational attainment									
High school and above (ref: Below HS)	6.58	1.67 (1.17, 2.17)	<0.001	5.06	1.30 (0.79, 1.80)	<0.001	5.75	1.12 (0.96, 1.96)	<0.001
Employment status									
Unemployed (ref: Student)	-0.01	-0.01 (-0.85, 0.84)	0.989						
Employed	0.46	0.17 (-0.55, 0.89)	0.643						
Religion									
Pentecostal (ref: Catholic)	1.26	0.45 (-0.25, 1.14)	0.208						
Protestant	0.47	0.16 (-0.53, 0.86)	0.638						
Others ¹	-0.00	-0.01 (-0.71, 0.71)	0.998						
Has negative feelings about HIV/AIDS									
Yes (ref: No)				3.74	1.05 (0.50, 1.61)	<0.001	3.96	1.11 (0.55, 1.65)	<0.001
Know someone living with HIV									
Yes (ref: No)				1.81	0.59 (-0.04, 1.23)	0.071			
Know someone who has died of AIDS									
Yes (ref: No)				1.94	0.56 (-0.01, 1.14)	0.053			
Self-perceived risk of contracting HIV									
Small risk (ref: No risk)							1.88	0.68 (-0.31, 1.41)	0.061
Moderate risk							1.30	0.49 (-0.25, 1.24)	0.195
High risk							3.66	1.49 (0.69, 2.29)	<0.001
F		6.71			17.91			15.51	
Adjusted R-squared		0.06			0.08			0.09	
N		767			767			767	

Dependent variable: **Worry** about the negative consequences of HIV/AIDS; Entries are standardized regression coefficients. All analyses are weighted.

4. Discussion

This study applied concepts in cognitive psychology and examined the extent to which young adults were “worried” about the negative consequences of the HIV/AIDS epidemic and identified the images they associated with HIV/AIDS. To our knowledge, this is among the first study that has examined worry and associative imagery associated with HIV/AIDS in SSA. Overall, our findings show that most respondents were “worried” about the negative consequences of HIV/AIDS and associated HIV/AIDS to death and fear. This study found that men were less likely to be worried about the negative consequences of HIV/AIDS. There is substantial evidence that women often experience the consequences of HIV/AIDS more severely than men as they are more vulnerable and disproportionately affected than men [9] due to a combination of social, economic and biological factors [26,29,30]. Additionally, the burden of care falls on women as they often provide care and support to sick relatives [31,32]. The above reasons could have explained why females were more likely to be worried about the negative consequences of HIV/AIDS.

Our study also found that respondents who attained high school education and above were more likely to be worried about the negative consequences of HIV/AIDS compared to those who were educated at high school level and below. It has been reported that people with higher level of education are more likely to have greater awareness of and accurate knowledge of HIV/AIDS including its consequences [33]. Respondents who had attained high school education and above in this study may have acquired knowledge about HIV/AIDS and its consequences through formal schooling, media outlets, the internet and through social interactions [34]. The knowledge they had gained about HIV/AIDS may have explained why they were more likely to be worried about its negative consequences.

This study also found that those who had negative feelings (affect) of HIV/AIDS were more likely to be worried about HIV/AIDS. This finding is consistent with a previous study which found that people with negative emotions are more likely to be worried about threats [35]. Consequently, individuals with such negative affect (emotions) of HIV/AIDS would be worried about the negative consequences of HIV/AIDS to their families, community and society. It should be noted that negative emotions have also been associated with depression, sadness and anxiety [22], which coincidentally were some of the images which respondents associated with HIV/AIDS in this study.

This study also found that most respondents associated HIV/AIDS to death and fear. In the early days of the HIV epidemic, HIV was considered a deadly disease and most people were gripped with a paranoia of fear [36]. However, the scale-up of antiretroviral therapy (ART) over the past decade has reduced AIDS-related death by 48% from about 1.9 million in 2015 to 1.0 million deaths in 2016 [9]. The success of increased ART availability has also witnessed a reduction in HIV-related morbidity in many settings [37]. ART has significantly improved health outcomes of HIV patients, increased their life expectancy and has substantially reduced the risk of HIV transmission

[38]. As a result, HIV/AIDS is gradually being considered as a chronic disease in many countries in SSA [39]. The associative images of death and fear may have been due to respondents’ previous experience of knowing someone who had died of AIDS or recollections triggered by images of AIDS-related deaths they had previously seen via television channels, photographs and videos on the internet of people who had died of AIDS [40]. Such images could arouse people’s fear appeal and anxiety levels towards HIV/AIDS which perhaps explain the findings of this study.

The present study has a few limitations. First, the use of respondents’ self-report for knowledge of their sexual partner’s HIV status, knowledge of someone living with HIV or who had died of AIDS may have led to social desirability and recall bias. Second, due to the cross-sectional nature of the study, the cause-effect relationship cannot be inferred. Third, the study may have suffered from non-response bias as there were some respondents who refused to participate in the study [25]. Nevertheless, this study has enable us to understand how the HIV/AIDS epidemic resonates in the minds of young adults in a setting in SSA. These findings may have implications for HIV-related prevention and risk reduction communication strategies targeted at young adults. Further research is needed to better understand the cognitive processes of HIV/AIDS among young adults in other settings. Future studies should examine the relationship between HIV-related negative affect (as well as imagery) and sexual behavior.

5. Conclusions

Our study concludes that most young adults were worried about the HIV/AIDS and had negative emotions about the epidemic. Respondents associated HIV/AIDS to death, fear and horror. These findings suggest the need to strengthen psychosocial services for those with negative emotions towards HIV/AIDS. The findings also underscore the need for the psychosocial and cognitive processes of young adults to be considered during the design and implementation of HIV prevention and risk communication messages.

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Statement of Competing Interests

The authors declare that they have no potential conflicts of interest.

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