Published in final edited form as:

AIDS Behav. 2017 September ; 21(9): 2736–2745. doi:10.1007/s10461-016-1534-3.

Psychological stressors and coping strategies used by adolescents living with and not living with HIV infection in Nigeria

Morenike O. Folayan¹, Carlos F. Cáceres², Nadia A. Sam-Agudu^{3,4}, Morolake Odetoyinbo⁵, Jamila K. Stockman⁶, and Abigail Harrison⁷

¹Institute of Public Health and Department of Child Dental Health, Obafemi Awolowo University, 22005 Ile-Ife, Nigeria

²Center for Interdisciplinary Studies in Sexuality, AIDS and Society, Universidad Peruana Cayetano Heredia, Lima, Peru

³Institute of Human Virology Nigeria, Abuja, Nigeria

⁴Division of Epidemiology and Prevention, Institute of Human Virology, University of Maryland Baltimore, Baltimore, USA

⁵Positive Action for Treatment Access, Lagos, Nigeria

⁶Division of Global Public Health, Department of Medicine, University of California, La Jolla, San Diego, CA 92093, USA

⁷Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence RI USA

Abstract

Introduction—Little is known about stressful triggers and coping strategies of Nigerian adolescents and whether or not, and how, HIV infection modulates these sources of stress and coping. This study evaluated differences in stressors and coping strategies among Nigerian adolescents based on HIV status.

Method—We analysed the data of six hundred 10–19 year old adolescents recruited through a population-based survey from 12 States of Nigeria who self-reported their HIV status. Data on stressors and coping strategies were retrieved by self-report from participants, using a validated structured questionnaire. We compared results between adolescents with and without HIV with respect to identification of specific life events as stressors, and use of specific coping strategies to manage stress. Logistic regression analysis adjusted for age and sex.

Results—Adolescents living with HIV (ALHIV) had significantly increased odds of identifying ‘having to visit the hospital regularly’ (AOR: 5.85; 95%CI: 2.11–16.20; P=0.001), and ‘having to take drugs regularly’ (AOR: 9.70; 95%CI: 4.13–22.81; P<0.001) as stressors. ‘Seeking social support’ (AOR: 3.14; 95%CI: 1.99–4.93; p<0.001) and “using mental disengagement” (OR: 1.64;

Conflict of interest

The authors declare that they have no conflict of interest

95%CI: 0.49–1.84; $p=0.001$) were coping strategies. Adolescents not living with HIV had significantly increased odds of identifying ‘argument with a friend or family member’ as a stressor (AOR: 6.59; 95%CI: 3.62–11.98; $P<0.001$).

Conclusion—Life events related to adolescents’ HIV positive status were significant stressors for ALHIV. Providing targeted psychosocial support could help reduce the impact of such HIV status-related stressors on ALHIV.

Keywords

HIV; adolescents; stressors; coping strategies; Nigeria

INTRODUCTION

The World Health Organization defines adolescents as individuals between 10 and 19 years of age, in a transition period between childhood and adulthood, during which they experience events or challenges that may present or may be perceived as life stressors [1]. These stressors include concerns with body image, social identity, sexuality and conformity, peer networks, and independence [2], issues that are often seen as central in their development [2]. Some adolescents find ways to cope with such stressors, while others repeatedly fail to do so. The inability to effectively cope with life stressors may lead to depression [3], maladaptive behavior [4], anxiety, posttraumatic stress disorder [5, 6], and suicidal behaviors including attempts and ideation [7].

Stress and its effects often emerge during adolescence, given the role of emotional changes in this period [8]. Stress from the social environment appears to be more intense than other types of stressors and significantly contributes to psychopathology if left unmanaged [9,10]. Social stress arises from the need to develop healthy relationships with peers, meet the expectations of school and peers, and manage family-related responsibilities [11].

Adolescents living with HIV (ALHIV) and those affected by HIV may experience a higher level of stress than their HIV-uninfected peers [12–14]. HIV infection often fundamentally alters the social ecology underlying healthy child development by disrupting variables at the individual, family and peer/community levels, which often serve to mitigate risks and promote resilience [15]. For example, considering parents as a family level variable, HIV may threaten an adolescent’s mental health when it negatively impacts their parents’ mental health and results in parental depression and possibly risk behaviors such as substance use [16], poor interpersonal functioning and intimate partner violence [17], the need to change schools, or a death in the family [18].

At the individual level, ALHIV have to deal with issues relating to their HIV status, including issues related to receiving information about their HIV status, disclosing their HIV status to others, choosing partners and practicing safe sex, and adhering to HIV treatment [2] and living with the stress and trauma of being diagnosed with HIV infection [19]. The concurrent presence of other HIV-related stressors such as stigma and discrimination, sexual abuse and abandonment [18, 20] further predisposes ALHIV to psychological distress which

may be expressed through problematic behavior, including poor treatment adherence, risky sexual practices, and the use of recreational drugs [21–23].

Recent studies suggest that the potential of a stressor to cause mental health problems depends not only on the severity of the stress exposure but also on the resilience of the individual [24, 25] and the coping strategies employed [26]. To cope with stressors, individuals often develop or adopt different coping strategies to help moderate the stressors [27]. Coping strategies can be emotional (e.g. crying, excessive eating, confrontation) [27, 28], avoidance-based (e.g. isolation, mental disengagement, behavioral disengagement, alcohol and other psychoactive drug use, suppression of competing activities) [28,29] or adaptive strategies (e.g. seeking social support, problem-solving, positive re-appraisal, acceptance, humor, journaling, religion) [28, 29]. The ability to cope with stressors from chronic illnesses such as HIV infection however differs by age, gender and cultural context [30,31]: younger children generally lack specific coping strategies while male adolescents report greater use of avoidance/distraction techniques when compared to females [32, 33].

Unfortunately, little is known about the major sources of stress experienced by African adolescents living with HIV, and what types of coping strategies, if any, they adopt to mitigate stress. Studies conducted in adolescents in Rwanda, Uganda and Kenya showed that repeated experiences of loss and stigma due to HIV/AIDS were a cause of stress [32, 34], and so were medical difficulties and relationship challenges associated with HIV status disclosure [32]. Coping strategies often used are religion, [32, 35], social support [32], avoidance [32], and distraction [32].

The need to study country context of mental health and its expression had been highlighted as culture modulates how stress is perceived, expressed and coped with [34]. It is important to explore how adolescents deal with HIV in Nigeria, located in West Africa, as the most populous country in Africa experiencing the second highest burden of ALHIV in the world. At the end of 2013, it was estimated that 54,633 new infections occurred among young Nigerians 15 to 24 years of age [36], and these young people are likely living in highly stressful environments. Nigeria was rated the most stressful country in a 74-country Bloomberg rankings study using 7 variables (homicide rate, gross domestic product per capita, income inequality, corruption, unemployment rate, air pollution, and life expectancy) [37]. With an unemployment rate of nearly 25% and life expectancy of only 53 years [37]-sources of stress and responsive coping strategies among Nigerian adolescents may differ from those described elsewhere; and hence, programmatic strategies to promote mental health among these adolescents may require the conduct of additional research aimed at identifying and fine-tuning specific elements that can ensure effectiveness [38]. This study was therefore developed to explore the main sources of mental stress and describe the coping strategies used, if any, to mitigate stress by ALHIV in Nigeria. A comparative group of adolescents living without HIV infection was included to highlight any differences in the context of the presence or absence of HIV infection.

METHODS

This is a secondary analysis of data generated through a cross-sectional survey conducted in 2012 to assess the sexual and reproductive health of ALHIV in Nigeria. Data collected included details on stressors and coping strategies employed when faced with life events. Independent analyses of the original data, with description of the study methodology, have previously been reported by Folayan et al [29, 39, 40]. Study participants comprised female and male adolescents aged 10–19 years with diverse ethnic backgrounds in Nigeria. This study also builds on an earlier analysis by these authors on stress factors and coping mechanisms used by adolescents who self-reported forced sexual initiation [29]. Our analysis was limited to 600 (38.1%) of the 1,574 study participants who reported a prior HIV test and indicated their HIV status was positive or negative.

Recruitment

Details about the sample recruitment procedures have been described elsewhere [29, 39]. Briefly, the first stage of recruitment involved the stratification of the 18 states hosting the first 25 antiretroviral therapy (ART) treatment sites in Nigeria into six geopolitical zones. Two states were randomly selected from each of the six geopolitical zones, including Lagos, Oyo, Imo, Enugu, Edo, Rivers, Kaduna, Kano, Borno, Adamawa, Plateau and Benue.

Next, two groups of adolescents were recruited from each State, based on self-report of HIV status: (1) ALHIV; and (2) adolescents who reported being HIV negative and those who did not know their HIV status

To recruit ALHIV, the study was introduced to physicians managing people living with HIV (PLHIV) at treatment centres, PLHIV attending support group meetings and members of the Network of Youths Living with HIV in each state. These contacts helped share information about the study and referred ALHIV interested in participating in the study to research team members. A maximum of 80 HIV positive adolescents were to be recruited in each of the 12 states for a total of up to 960 study participants.

Recruitment of adolescents aged 10–19 years who were HIV negative took place at youth centres or places frequented by adolescents and youths. Clusters of youths from which study participants were recruited were located within the geographical areas where treatment sites were located, to ensure that the recruitment sites for ALHIV and HIV-negative/untested adolescents did not differ significantly. No recruitment of study participants took place in schools, to ensure that both out-of-school and in-school youths were adequately represented in the study sample.

Data Collection

Data were collected using a face-to-face interviewer-administered structured questionnaire in English, adopted from the 2007 National AIDS and Reproductive Health Survey [41]. Some key and sensitive words/phrases for each selected community were translated into local dialects during the training of interviewers. Interviewers used the semi-translated versions as master copies. A similar approach was successfully used for other studies with adolescents and youth in Nigeria [42–45].

Information collected included gender, age and self-reported HIV status. The structured questionnaire also contained questions regarding 19 potentially stressful life events and 13 coping strategies. The 19-item stress scale included questions related to family, peers and school. The 13-item coping scale included questions that explored the use of avoidance and adaptive coping strategies. Study participants were required to respond “Yes” or “No” to each of the questions inquiring whether those life events caused stress to them regularly, and “Yes” or “No” to each of the questions inquiring whether they used those coping strategies regularly. This instrument measuring stress inducers and coping strategies had been previously validated and used in Nigeria [29].

Study Variables

Our independent variable was self-reported HIV status. Study outcomes were life events self-perceived as stressors, and coping mechanisms used.

Data Analysis

Participants’ self-reported HIV status was categorised into two groups: self-reported negative status, and self-reported HIV positive status. Age was grouped into 10–14 years (younger adolescents) and 15–19 years (older adolescents). Pearson’s Chi square was used to determine the association between self-reported HIV status and the life events perceived as stressors. We also explored whether or not there was an association between self-reported HIV status and coping strategies. Where a statistically significant association was found between the self-reported HIV status and any of the stressor or coping strategy, a logistic regression analysis using forward selection was used for the inferential analysis. Only factors whose p value was ≤ 0.05 during the tests of association entered into the model to determine the odds of an adolescent living with or not living with HIV identifying that item as a stressor or using a coping strategy. Each analysis was controlled for age group and gender. Analyses were conducted using STATA version 11.0 (StataCorp LP, College Station, USA).

Compliance with ethical standards

Ethics approval for the study was obtained from the National Institute of Medical Research Institutional Review Board, the Health Research Ethics Committee of Plateau State, and the Health Research Ethics Committee of the Federal Capital Territory, Abuja. Informed consent was sought from adolescents 15 years and older. Parental consent and participant assent were obtained for participants 10 to 14 years old.

RESULTS

Demographic profile of study participants

Table I highlights the age, gender and HIV status profile of the study participants. The study participants consisted of 151 (25.2%) self-reported HIV negative and 449 (74.8%) self-reported/contact-referred HIV positive adolescents. There were 285 (47.5%) males and 315 (52.5%) females in the sample; approximately one third was in the 10–14 years old age group and approximately two-thirds were in the 15–19 age group. There was no significant difference in the distribution of study participants recruited by gender and HIV status

($p=0.06$), but there were more 10–14 years old adolescents who were HIV positive and more 15–19 years old adolescents who were HIV negative recruited into the study ($p<0.001$).

Experience of stressors

Table II highlights the proportion of adolescents who experience events as stressors, according to their HIV status. When compared with adolescents not living with HIV, significantly more ALHIV identified the following as stressors: ‘having to visit the hospital regularly’ ($p<0.001$); ‘having to take drugs regularly’ ($p<0.001$); ‘handling the death of a loved one’ ($p<0.001$); ‘dealing with stigma and discrimination’ ($p<0.001$); ‘thinking about death’ ($p<0.001$); ‘body looks different from others’ ($p<0.001$); ‘may never have children’ ($p=0.02$); and ‘not adhering to my medications’ ($p<0.001$). Likewise, significantly more HIV- negative adolescents identified the following as stressors when compared with ALHIV: ‘pressure from peers to do what I do not believe in’ ($p<0.001$), ‘pressures from parents to do what I do not believe in’ ($p=0.008$), ‘need to excel in my academic performance in school’ ($p=0.001$), ‘extra work from school or home’ ($p<0.001$), ‘argument with a friend or family member’ ($p<0.001$), ‘having problems with boy/girlfriend or spouse’ ($p<0.001$), and ‘someone saying something about you that you don’t like’ ($p=0.006$).

Table III highlights the results of multiple logistic regression analysis to determine the factors that caused stress for adolescents living with HIV when compared with adolescents not living with HIV in Nigeria, controlling for age-group and gender. ALHIV had significantly increased odds of identifying the following factors as stressors when compared with adolescents not living with HIV, respectively: ‘having to visit the hospital regularly’ (AOR: 5.85; 95%CI: 2.11–16.20; $p=0.001$); and ‘having to take drugs regularly’ (AOR: 9.70; 95%CI: 4.13–22.81; $p<0.001$).

Table IV highlights the results of multiple logistic regression analysis to determine the factors that caused stress for adolescents not living with HIV when compared with adolescents living with HIV in Nigeria, controlling for age-group and gender. Adolescents not living with HIV had significantly increased odds of identifying ‘Argument with a friend or family member’ as a stressor when compared with ALHIV (AOR: 6.59; 95%CI: 3.62–11.98; $p<0.001$).

Coping strategies

Table V highlights the proportion of adolescents who use different coping mechanisms when faced with stress, according to their HIV status. More ALHIV used the following coping mechanisms when faced with stress when compared with adolescents not living with HIV: ‘seeking social support’ ($p<0.001$), religion ($p=0.004$); and mental disengagement ($p=0.03$). Likewise, more adolescents not living with HIV used the following strategies when compared with ALHIV: ‘positive appraisal’ ($p=0.03$) and humour ($p=0.02$).

Table IV displays the results of the multiple logistic regression analysis to determine the independent associations between HIV infection and specific coping strategies, controlling for age group and gender. ALHIV had significantly increased odds of identifying ‘seeking social support’ (OR: 3.14; 95%CI: 1.99–4.93; $p<0.001$) and using mental disengagement (OR: 1.64; 95%CI: 0.49–1.84; $p=0.001$) as coping strategies when compared with

adolescents not living with HIV. No coping strategy was found independently associated with being HIV negative.

DISCUSSION

The study was able to highlight two key findings. First, there were significant differences in events perceived as stressors by ALHIV and by adolescents not living with HIV: “having to visit the hospital” and “having to take drugs regularly” were significant stressors for ALHIV; while “argument with a friend or family member” was a significant stressor for adolescents not living with HIV. Second, there were differences in the use of specific coping strategies by HIV status: to cope with stress, ALHIV were more likely to use both social support and mental disengagement versus adolescents not living with HIV.

The findings of this study showed that an adolescent’s HIV status bears a significant impact on the type of events that cause them stress. This can be interpreted to imply that HIV infection is associated with unique stressors among adolescents. Like other studies [22, 46, 47], this study highlights that adherence to antiretroviral therapy can be stressful and challenging for ALHIV. Similarly, the proximity to adulthood thrusts upon them an increasing responsibility over their own health care, which also becomes stressful [48]. One other stressor identified for ALHIV in this study is the need for regular hospital visits. Reports from Nigeria have identified that hospital visits can be challenging for people living with HIV due to stigma [51–53], the poor attitudes of staff in HIV treatment facilities [51], high cost of transportation [52], long waiting hours [52] and concerns with confidentiality [53, 54].

Providing psychosocial support helps to improve adherence to antiretroviral therapy among ALHIV [21, 48, 49] and this study highlights that ALHIV use a lot more of social support to cope with stress than do their peers not living with HIV. Moreover, psychosocial support can help enhance the ability of adolescents to handle long-term consequences of risk behaviors beyond drug adherence [50]. As social support is not necessarily available to all ALHIV in Nigeria, access to it should be facilitated to help them deal with challenges associated with both hospital visits and adherence to medications.

Importantly, this study shows that HIV infection affects adolescents’ experiences in complex ways. Given the social and health-related meaning of HIV infection, ALHIV seem subject to stress caused by individual-level health concerns, while they seem less worried about issues that are more salient to adolescents not living with HIV, particularly issues that affect their relationships with others. Further studies are required to understand those differences and their implications for psychosocial support in the management of HIV infection amongst adolescents.

Likewise, more ALHIV than adolescents not living with HIV used social support as a coping strategy. While the characteristics of the social support sought after to improve their coping ability were not explored, the finding may point to the need to explore the viability of support groups for ALHIV in Nigeria. Prior studies had identified support groups for ALHIV as vital for facilitating coping with stress [55, 56].

This study also demonstrated that more ALHIV used mental disengagement as a coping strategy just as previous studies had identified [3, 57]. While further assessments of the way this strategy is used are warranted, it is likely that mental disengagement is used as a denial-based coping strategy, which may be socially sustained by the persistence of stigma and discrimination against persons living with HIV in Nigeria, leading to frequent feelings of shame, fear, humiliation, and anger [58]. Future studies will need to explore the operation and correlates of mental disengagement as a coping strategy by ALHIV in Nigeria, and identify interventions needed to enhance the ability of ALHIV to cope with personal contexts associated with the use of mental disengagement.

This study has a number of limitations. First is the prospect for type I error: the sample size for this data analysis was less than 40% of the original sample for the study. Second, there was skewness in the proportion of study participants recruited: more adolescents aged 15–19 years old and more adolescents living with HIV were recruited to the study. Furthermore, the study only included 600 participants who reported their HIV status hence limiting the generalizability of our study findings to adolescents who get tested for HIV. Also, the use of self-reports for HIV status may not accurately reflect the actual HIV status of some study participants, mainly those reporting negative or unknown serostatus, possibly due to stigma, confidentiality concerns or social desirability. We were unable to control for adverse physical and mental health effects in our analysis as this was not collected in the primary study, neither were the time points of measurements that took place specified. Finally, in order to prevent the scenario of too few ALHIV and needing to recruit similar sub-samples of HIV positive and HIV negative adolescents, the primary study purposefully sought to recruit more ALHIV to obtain similar numbers of both groups. However, given the low proportion of adolescents who test for HIV in Nigeria [59], recruitment of HIV negative adolescents proved more difficult and the study ultimately recruited a higher number of ALHIV. In any event, the proportion of ALHIV was defined by our recruitment strategy, and does not affect the validity of our analysis; importantly, it should not be interpreted as an estimate of the prevalence of HIV among adolescents in Nigeria.

Despite these limitations, this study has contributed to further our understanding of how HIV infection in a setting with high levels of stress and stigma such as Nigeria, modulates perceptions about stressors and the use of coping strategies. It is the first study to highlight the association between stressors, coping strategies and HIV among ALHIV in Nigeria. Our findings stress the need for targeted programs in school, clinic, and community-based settings in Nigeria that address stigma and discrimination specific to HIV while bolstering social and peer support networks. Policies that promote health care provider education focused on the unique issues that ALHIV face can facilitate integration of social support services within HIV care services. Collectively, these approaches can maximize improvements in HIV care and treatment for ALHIV.

CONCLUSION

In conclusion, there are significant differences in the type of events that cause stress, and the stress coping strategies used by adolescents living with and without HIV infection in Nigeria. Psychosocial support targeting the highly-ranked HIV-related stressors, for example

through peer mentors and support groups, may be successful in supporting the development of positive coping mechanisms and improving mental health among adolescents living with HIV. Future studies should develop/adapt and validate relevant strategies to address this need.

References

1. United Nations Population Fund. Women's empowerment and reproductive health. Links throughout the life cycle. 2000:10
2. Folayan MO, Odetoyinbo M, Harrison A, Brown B. Addressing the socio-development needs of adolescents living with HIV/AIDS in Nigeria: a call for action. *Afr J Reprod Health*. 2014; 18: 93–101.
3. Compas BE, Orosan PG, Grant KE. Adolescent stress and coping: implications for psychopathology during adolescence. *J Adolesc*. 1993; 16(3):331–49. [PubMed: 8282901]
4. Zimmer-Gembeck MJ, Skinner EA. The Development of Coping: Implications for Psychopathology and Resilience. Available at: [https://www.pdx.edu/psy/sites/www.pdx.edu/psy/files/2014-Zimmer-Gembeck%26Skinner-DP-FINAL%20copy%20\(2\)%20\(1\).pdf](https://www.pdx.edu/psy/sites/www.pdx.edu/psy/files/2014-Zimmer-Gembeck%26Skinner-DP-FINAL%20copy%20(2)%20(1).pdf). Accessed 28th January, 2016
5. Kendler KS, Karkowski LM, Prescott CA. Causal relationship between stressful life events and the onset of major depression. *Am. J. Psychiatry* 1999; 156(6): 837–41. [PubMed: 10360120]
6. Javidi H, Yadollahie M. Post-traumatic stress disorder. *Int. J. Occup. Environ. Med* 2012;3(1): 2–9. [PubMed: 23022845]
7. Wilburn VR, Smith DE. Stress, self-esteem, and suicidal ideation in late adolescents. *Adolescence*. 2005; 40(157):33–45. [PubMed: 15861616]
8. Seiffge-Krenke I Causal links between stressful events, coping style, and adolescent symptomatology. *J Adolesc*. 2000; 23:675–91. [PubMed: 11161332]
9. Almeida M Resilience and vulnerability to daily stressors assessed via diary methods. *Curr. Dir. Psychol. Sci* 2005; 14: 64–8.
10. Bjorkqvist K Social defeat as a stressor in humans. *Physiol. Behav* 2001; 73(3):435. [PubMed: 11438372]
11. Chandra A, Batada A Exploring stress and coping among urban African American adolescents: the Shifting the Lens study. *Prev Chronic Dis*. 2006; 3(2):A40. [PubMed: 16539781]
12. Doku PN. Psychosocial adjustment of children affected by HIV/AIDS in Ghana. *Journal of Child and Adolescent Mental Health*. 2010; 22(1):25–34. [PubMed: 25859697]
13. Zhao G, Li X, Fang X, Zhao J, Hong Y, Lin X, Stanton B. Functions and sources of perceived social support among children affected by HIV/AIDS in China. *AIDS Care*. 2011; 23(6):671–9. [PubMed: 21287421]
14. Fang X, Li X, Stanton B, Hong Y, Zhang L, Zhao G, Zhao J, Lin X, Lin D. Parental HIV/AIDS and psychosocial adjustment among rural Chinese children. *J Pediatr Psychol*. 2009; 34(10):1053–62. [PubMed: 19208701]
15. Betancourt TS, Meyers-Ohki SE, Charrow A, Hansen N. Annual research review: mental health and resilience in HIV/AIDS-affected children-- a review of the literature and recommendations for future research. *J Child Psychol Psychiatry*. 2013; 54(4):423–44. [PubMed: 22943414]
16. Roachat TJ, Richter LM, Doll HA, Buthlezi NP, Tomkins A, Stein A. Depression among pregnant rural South African women undergoing HIV testing. *JAMA*. 2006; 295(12):1376–8. [PubMed: 16551708]
17. Forehand R, Biggar H, Kotchick BA. Cumulative risk across family stressors: short- and long-term effects for adolescents. *J Abnorm Child Psychol*. 1998; 26(2):119–28. [PubMed: 9634134]
18. Murphy DA, Mosicki AB, Vermund SH, Muenz LR. Psychological distress among HIV(+) adolescents in the REACH study: effects of life stress, social support, and coping. The Adolescent Medicine HIV/AIDS Research Network. *J Adolesc Health*. 2000; 27(6):391–8. [PubMed: 11090741]
19. Radcliffe J, Fleisher CL, Hawkins LA, et al. Posttraumatic stress and trauma history in adolescents and young adults with HIV. *AIDS Patient Care STDS*. 2007; 21(7):501–8. [PubMed: 17651031]

20. Kelly JA, Murphy DA. Psychological interventions with AIDS and HIV: Prevention and treatment. *J Consult Clin Psychol* 1992; 60:576–85. [PubMed: 1506505]
21. Sibinga EMS, Stewart M, Magvaru T, Welsh CK, Hutton N, Ellen JM. Mindfulness-based stress reduction for HIV-infected youth: A pilot study. *Explore (NY)*. 2008; 4(1): 36–37. [PubMed: 18194789]
22. Tival Bermúdez MP, Buéla-Casal G Sexual sensation seeking, social stress, and coping styles as predictors of HIV/STD risk behaviors in adolescent. *Youth and Society*. 2010; 42(2): 255–77.
23. MacDonnell K, Naar-King S, Huszti H, Belzer M. Barriers to medication adherence in behaviorally and perinatally infected youth living with HIV. *AIDS Behav*. 2013; 17(1):86–93. [PubMed: 23142855]
24. Pietrzak RH, Cook J. Psychological resilience in older U.S. veterans: results from the national health and resilience in veterans study. *Depress Anxiety*. 2013; 30(5): 432–43. [PubMed: 23468170]
25. Veenema AH, Meijer OC, de Kloet ER, Koolhaas JM. Genetic selection for coping style predicts stressor susceptibility. *J. Neuroendocrinol* 2003; 15(3):256–67. [PubMed: 12588514]
26. Southwick SM, Vythilingam M, Charney DS. The psychobiology of depression and resilience to stress: implications for prevention and treatment. *Annu. Rev. Clin. Psychol* 2005; 1:255–91. [PubMed: 17716089]
27. Terje A, Murberg EB. The role of coping styles as predictors of depressive symptoms among adolescents: A prospective study. *Scand J Psychol*. 2005; 46(4):385–93. [PubMed: 16014083]
28. Raheel H Coping strategies for stress used by adolescent girls in Riyadh, Kingdom of Saudi Arabia. *Pak J Med Sci*. 2014; 30(5): 958–62. [PubMed: 25225507]
29. Folayan MO, Harrison A, Odetoynbo M, et al. The relationship between forced sexual initiation and HIV status, sexual risk, life stressors and the use of coping strategies among adolescents in Nigeria. *Plos One*. 2016; 11(5):e0155210. [PubMed: 27163436]
30. Lewis CL, Brown SC. Coping strategies of female adolescents with HIV/AIDS. *ABNF J*. 2002; 13(4):72–7. [PubMed: 12244842]
31. Laungani P Cultural differences in stress and its management. *Stress Medicine*. 1993; 9(1): 37–43.
32. Mutumba M, Bauermeister JA, Musiime V, et al. Psychosocial challenges and strategies for coping with HIV among adolescents in Uganda: a qualitative study. *AIDS Patient Care STDS*. 2015; 29(2):86–94. [PubMed: 25607900]
33. Lewis CL, Brown SC. Coping strategies of female adolescents with HIV/AIDS. *ABNF J*. 2002; 13(4):72–7. [PubMed: 12244842]
34. Betancourt TS, Rubin-Smith JE, Beardslee WR, Stulac SN, Fayida I, Safren S. Understanding locally, culturally, and contextually relevant mental health problems among Rwandan children and adolescents affected by HIV/AIDS. *AIDS Care*. 2011; 23(4):401–12; [PubMed: 21271393]
35. Puffer ES, Watt MH, Sikkema KJ, Ogwang-Odhiambo RA, Broverman SA. The protective role of religious coping in adolescents' responses to poverty and sexual decision-making in rural Kenya. *J Res Adolesc*. 2012; 22(1):1–7. [PubMed: 22505794]
36. UNICEF. Global HIV Database. 2014 Available at: <http://data.unicef.org/hiv-aids/global-trends>. Accessed 28th January, 2016.
37. Bloomberg Company Rankings. Most stressed out: Countries. Available at: <http://www.bloomberg.com/graphics/best-and-worst/#most-stressed-out-countries> Accessed 6 January 2016.
38. Ananworanich J, Melvin D, Amador JT, et al. Neurocognition and quality of life after reinitiating antiretroviral therapy in children randomized to planned treatment interruption. *AIDS*. 2016 1 4.
39. Folayan MO, Odetoynbo M, Brandon B, Harrison A. Differences in sexual behaviour and sexual practices of adolescents in Nigeria based on sex and self-reported HIV status. *BMC Reproductive Health* 2014; 11:83.
40. Folayan MO, Odetoynbo M, Harrison A. Differences in use of contraception by age, sex and HIV status of 10–19-year-old adolescents in Nigeria. See comment in PubMed Commons below *Int J Adolesc Med Health*. 2015 11 10 pii: /j/ijamh.ahead-of-print/ijamh-2015-0059/ijamh-2015-0059.xml.

41. Federal Ministry of Health. National HIV/AIDS Reproductive Health Survey (NARHS Plus). Nigeria Federal Ministry of Health, Abuja, Nigeria 2007.
42. Federal Ministry of Health. National HIV/AIDS and Reproductive Health Survey, Federal Ministry of Health, Abuja, Nigeria 2005.
43. Federal Ministry of Health. HIV/STI integrated biological and behavioural surveillance survey (IBBSS). Federal Ministry of Health, Abuja, Nigeria 2008.
44. Federal Ministry of Health. HIV/STI integrated biological and behavioural surveillance survey (IBBSS). Federal Ministry of Health, Abuja, Nigeria 2010.
45. Folayan MO, Adebajo S, Adeyemo A, Ogungbemi KM. Prevalence and pattern of anal sex, and sexual behaviour of young adults in rural and urban Nigeria Plos One 2015; 10(7):e0129106. [PubMed: 26171859]
46. Murphy DA, Wilson CM, Durako SJ, Muenz LR, Belzer M; Adolescent Medicine HIV/AIDS Research Network. Antiretroviral medication adherence among the REACH HIV-infected adolescent cohort in the USA. AIDS Care 2001;13:27–40. [PubMed: 11177463]
47. Naar-King S, Templin T, Wright K, Frey M, Parsons JT, Lam P. Psychosocial factors and medication adherence in HIV-positive youth. AIDS Patient Care STDs. 2006;20(1):44–7. [PubMed: 16426155]
48. Mellins CA, Brackis-Cott E, Dolezal C, Abrams EJ. The role of psychosocial and family factors in adherence to antiretroviral treatment in human immunodeficiency virus-infected children. Pediatr Infect Dis J. 2004; 23(11): 1035–41. [PubMed: 15545859]
49. Ammassari A, Trotta MP, Murri R, et al. Correlates and predictors of adherence to highly active antiretroviral therapy: Overview of published literature. J Acquir Immune Defic Syndr 2002; S15:S123–S127.
50. Martinez J, Chakraborty R; American Academy of Pediatrics Committee on Pediatric Aids. Psychosocial support for youth living with HIV. Pediatrics. 2014; 133(3):558–62. [PubMed: 24567016]
51. Hembah-Hilekaan SK, Swende TZ, Bito TT. Knowledge, attitudes and barriers towards prevention of mother-to-child transmission of HIV among women attending antenatal clinics in Uyam District of Zaki-Biam in Benue State, Nigeria. Afr J Reprod Health. 2012; 16(3):28–35. [PubMed: 23437497]
52. Okoli CI, Cleary SM. Socioeconomic status and barriers to the use of free antiretroviral treatment for HIV/AIDS in Enugu State, south-eastern Nigeria. Afr J AIDS Res. 2011; 10(2):149–55. [PubMed: 25859737]
53. Aransiola J, Imoyera W, Olowookere S, Zarowsky C. Living well with HIV in Nigeria? Stigma and survival challenges preventing optimum benefit from an ART clinic. Glob Health Promot. 2014; 21(1):13–22. [PubMed: 24569837]
54. Fadare JO, Desalu OO, Jemilohun AC, Babatunde OA. Knowledge of medical ethics among Nigerian medical doctors. Niger Med J. 2012; 53(4):226–30. [PubMed: 23661883]
55. Moosa MYH, Jonsson G, Jeenah FY, Michael J, De Wee L. Support groups for HIV positive mentally ill patients. International Journal of Psychology and Counseling. 2009; 1(9): 147–53.
56. Makoe LN, Greeff M, Phetlhu RD, et al. Coping with HIV/AIDS Stigma in Five African Countries. J Assoc Nurses AIDS Care. 2008; 19(2): 137–46. [PubMed: 18328964]
57. Antelman G, Kaaya S, Wei R, et al. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. Journal of Acquired Immune Deficiency Syndromes. 2007; 44(4):470–7. [PubMed: 17179766]
58. Rotheram-Borus MJ, Lee M, Lin YY, Lester P. Six-year intervention outcomes for adolescent children of parents with the Human Immunodeficiency Virus. Archives of Pediatrics and Adolescent Medicine. 2004; 158(8):742–8. [PubMed: 15289245]
59. Sam-Agudu N, Folayan MO, Ezeanolue E. Seeking wider access to HIV testing for adolescents in sub-Saharan Africa. Pediatrics Research. 2016 6;79(6):838–45. doi: 10.1038/pr.2016.28. Epub 2016 Feb 16.

Table I:

Age and gender distribution of study participants by HIV status (N=600)

Variables	Total (N=600) n (%)	HIV status		X ² (p value)
		HIV-negative (N=151) n (%)	HIV-positive (N=449) n (%)	
Gender				
Male	285 (47.5)	68 (45.0)	217 (48.3)	3.64 (0.06)
Female	315 (52.5)	83 (55.0)	232 (51.7)	
Age				
10–14 years	187 (31.2)	11 (7.3)	176 (39.2)	53.65 (<0.001)
15–19 years	413 (68.8)	140 (92.7)	273 (60.8)	

Table II:

Perceived stressors and HIV status among adolescents in Nigeria (N=600)

Stressors	HIV status		X ²	P value
	HIV-negative (N=151) n (%)	HIV-positive (N=449) n (%)		
Pressure from peers to do what I do not believe in	66 (43.7)	127 (28.3)	12.32	<0.001
Pressure from parents to do what I do not believe	50 (33.1)	100 (22.3)	7.08	0.008
Having to visit the hospital regularly	6 (4.0)	259 (57.7)	132.19	<0.001
Having to take drugs regularly	10 (6.6)	280 (62.4)	140.58	<0.001
Need to excel in my academic performance in school	57 (37.7)	105 (23.4)	11.83	0.001
Conforming to religious beliefs	24 (15.9)	54 (7.6)	1.49	0.22
Handling the death of a loved one	19 (12.6)	121 (26.9)	13.04	<0.001
Dealing with stigma and discrimination	15 (9.9)	215 (47.9)	20.25	<0.001
Thinking about death	13 (8.6)	171 (38.1)	46.17	<0.001
Body looks different from others	10 (6.6)	97 (21.6)	17.31	<0.001
May never have children	8 (5.3)	55 (12.2)	5.81	0.02
Do not have friends	12 (7.9)	51 (11.4)	1.40	0.24
Not in a sexual relationship with someone	9 (6.0)	31 (6.9)	0.16	0.69
Do not have good relationship with my care provider	14 (9.3)	37 (8.2)	0.15	0.69
Not adhering to my medications	8 (5.3)	110 (24.5)	26.37	<0.001
Extra work from school or home	64 (42.4)	103 (22.9)	21.27	<0.001
Argument with a friend or family member	59 (39.1)	40 (8.9)	74.63	<0.001
Having problems with boy/girlfriend or spouse	43 (28.5)	59 (13.1)	18.84	<0.001
Someone saying something about you that you don't like	47 (37.1)	97 (21.6)	7.52	0.006

Table III:

Independent associations between perception of live events as stressors for adolescents living with HIV as compared to adolescents not living with HIV in Nigeria (N=600)

Variables	Adjusted Odds ratio	Confidence interval	P value
Having to visit the hospital regularly			
Adolescents not living with HIV	1	-	-
ALHIV	5.85	2.11–16.20	0.001
Having to take drugs regularly			
Adolescents not living with HIV	1	-	-
ALHIV	9.70	4.13–22.81	<0.001
Handling the death of a loved one			
Adolescents not living with HIV	1	-	-
ALHIV	0.94	0.43–2.04	0.88
Dealing with stigma and discrimination			
Adolescents not living with HIV	1	-	-
ALHIV	1.63	0.71–3.73	0.25
Thinking about death			
Adolescents not living with HIV	1	-	-
ALHIV	2.20	0.96–5.03	0.06
Body looks different from others			
Adolescents not living with HIV	1	-	-
ALHIV	0.54	0.19–1.52	0.24
May never have children			
Adolescents not living with HIV	1	-	-
ALHIV	0.34	0.09–1.20	0.09
Not adhering to my medications			
Adolescents not living with HIV	1	-	-
ALHIV	2.03	0.65–6.30	0.22

Table IV:

Independent associations between perception of live events as stressors for adolescents not living with HIV as compared to adolescents living with HIV in Nigeria (N=600)

Variables	Adjusted Odds ratio	Confidence interval	P value
Pressures from peers to do what I do not believe in			
ALHIV	1	-	-
Adolescents not living with HIV	1.45	0.85–2.47	0.17
Pressure from parents to do what I do not believe in			
ALHIV	1	-	-
Adolescents not living with HIV	0.74	0.40–1.37	0.34
Need to excel in my academic performance in school			
ALHIV	1	-	-
Adolescents not living with HIV	1.28	0.75–2.19	0.37
Extra work from school or home			
ALHIV	1	-	-
Adolescents not living with HIV	1.59	0.93–2.73	0.09
Argument with a friend or family member			
ALHIV	1	-	-
Adolescents not living with HIV	6.59	3.62–11.98	<0.001
Having problems with boy/girlfriend or spouse			
ALHIV	1	-	-
Adolescents not living with HIV	1.67	0.92–3.02	0.09
Someone saying something about you that you don't like			
ALHIV	1	-	-
Adolescents not living with HIV	0.60	0.32–1.11	0.10

Table V:

Reported use of coping strategies, as related to HIV status among adolescents in Nigeria (N=600)

Coping strategies	HIV status		X ²	P value
	HIV negative (N=151)	HIV positive (N=449)		
Confrontation	54 (35.8%)	148 (33.0%)	0.4	0.53
Seek social support	61 (40.4%)	271 (60.4%)	18.21	<0.001
Planful problem solving	56 (37.1%)	160 (35.6%)	0.1	0.75
Religion	62 (41.1%)	245 (54.6%)	8.25	0.004
Positive appraisal	57 (37.7%)	128 (28.5%)	4.52	0.03
Acceptance	54 (35.8%)	175 (39.0%)	0.49	0.48
Escape/denial	25 (16.6%)	74 (16.5%)	0.0005	0.98
Mental disengagement	30 (19.9%)	112 (24.9%)	4.99	0.03
Behavioral disengagement	27 (17.9)	115 (25.6%)	3.74	0.053
Alcohol/drug use	13 (8.6%)	43 (9.6%)	0.13	0.72
Humor	45 (29.8%)	91 (20.3%)	5.86	0.02
Suppression of competing activities	29 (19.2%)	66 (14.7%)	1.72	0.19
Journaling	16 (10.6%)	46 (10.2%)	0.02	0.9

Table VI:
Independent Associations between Coping Strategies and HIV Status among Adolescents in Nigeria (N=600)

Variables	N (%)	Adjusted Odds ratio	Confidence interval	P value
Coping strategies used adolescents living with HIV compared with adolescents not living with HIV				
Seek social support				
Adolescents not living with HIV	61 (40.4)	1	-	-
ALHIV	271 (60.4)	3.14	1.99–4.93	<0.001
Religion				
Adolescents not living with HIV	62 (41.1)	1	-	-
ALHIV	245 (54.6)	1.34	0.85–2.10	0.20
Positive appraisal				
Adolescents not living with HIV	57 (37.7)	1	-	-
ALHIV	128 (28.5)	0.90	0.76–1.07	0.23
Mental disengagement				
Adolescents not living with HIV	30 (19.9)	1	-	-
ALHIV	112 (24.9)	1.64	0.49–1.84	0.001
Humor				
Adolescents not living with HIV	45 (29.8)	1	-	-
ALHIV	91 (20.3)	0.94	0.78–1.13	0.49