Assessing the Moderating Role of Secular Schooling in a Structural Model of HIV/AIDS Media Exposure, Knowledge, Attitude and Practice using Multi Group PLS SEM Analysis

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Abstract

Studies suggested that knowledge, attitude and practice on HIV/AIDS and media exposure seem related, but sparse literature is there on the role of formal schooling in such interrelationships. While different models of investigating community health issues abound, cognitive, affective and behavioral approach surveyed as KAP seemed more attractive to researchers because of its ability to reveal plausible pathways to addressing health concerns especially by identifying misconceptions about diseases and affective barriers or obstacles to prevention or protection A KAP on HIV/AIDS survey of 487 adolescent *Islamiyya* girls in Bauchi, Northern Nigeria as a predominantly Muslim culture was conducted. The study finds that while HIV/AIDS does not directly predict HIV/AIDS practice, it does with the moderation of exposure to secular formal schooling. HIV/AIDS media exposure does predict HIV/AIDS knowledge and HIV attitude. It was thus concluded that media exposure is a necessary but not a sufficient precursor of HIV/AIDS safe practice.

Keywords: Media Exposure; HIV/AIDS Knowledge; HIV/AIDS Attitude; HIV/AIDS Practice, Moderating Role, Formal Schooling

Introduction

Although studies in media and health practices have corroborated that knowledge, attitude and practice on HIV/AIDS and media exposure are interrelated, scarce literature is there on the role of formal schooling in such interrelationships. This study is an attempt in remedying such paucity in literature. Being the sixth among items of Millennium Development Goals, HIV/AIDS prevention has continued to draw the attention of key stakeholders among national, regional and global players because AIDS poses a serious challenge, which can really devastate whole regions and crack decades of national development (Ugande, 2007). The sub-Saharan Africa bears the largest burden of HIV/AIDS (about 70%) (Bankole, Singh, Woog & Wulf, 2004). According to a recent figure of HIV/AIDS prevalence, out of the global 34 million people living with the disease, 23.5 million (69 percent) are in sub-Saharan Africa. In Nigeria, the figure stood at 1.9 million people living with it, 74 000 new infections and 51 000 AIDS related deaths (Be-in-the-Know, 2021). In sub-Saharan Africa, the further south, the more startling the figures of new HIV infections, with South Africa ranking fourth.

Curbing the HIV epidemic by focusing on the needs of adolescents becomes an urgent priority. Adolescence presents a window of opportunity for introducing policies on media and educational programs and

reproductive health services that could change the course of the HIV/AIDS epidemic in sub-Saharan Africa. Young people and their future contributions to the society are crucial to the survival and wellbeing of the entire region of sub-Saharan Africa Against this background, World Health Organization (cited in Bankole, et al.,2004: 5) points out, "[d]uring early adolescence, HIV rates are the lowest of any period during the life circle. The challenge is to keep them this way. Focusing on young people is likely to be the most effective approach to confronting the epidemic, particularly in high prevalence countries." Extensive surveys have shown that adolescents are at greater risk of acquiring HIV than adults. For example,

Bankole et al. (2004) stated that behavioral, psychological and socio cultural factors make young people more vulnerable to HIV infection. Adolescence is a time when young people naturally explore and take risks in many aspects of their lives, including sexual relationship. For example, those who have sexual experience may change partners frequently or desire to have many partners at the same period or carelessly engage in unprotected sex. Young people's chance or risk of contracting HIV is heightened by their behavior. Marriage is also another factor which increases the adolescent girl's risk of contracting HIV in sub-Saharan Africa (UNFPA, 2023).

Theoretical background

HIV/AIDS Media Exposure and KAP

While different models of investigating community health issues abound, the cognitive, affective and behavioral approach surveyed as KAP seemed more attractive to researchers because of its ability to reveal plausible pathways to addressing health concerns especially by identifying misconceptions about diseases and affective barriers or obstacles to prevention or protection. Buttressing this point, Launiala (2009) stated that the hallmark of KAP model lies in its characteristic of apt presentation of results, generalizability of results from small sample to wider population, ease of design, administration and results interpretation. Even though it is very dangerous to assume linear progression from knowledge to favorable attitude and ultimately to safe practice, the KAP model presumes that decisions on behavior change have cognitive and psychological dimensions.

Despite the growing acceptance and popularity of the KAP model in investigating social and community health issues, this study considers using the KAP model alone as theoretically inadequate, lacking full explanatory power. In the sequence of the theoretical direction of the KAP model, the knowledge variable is first, theoretically assumed to associate with the rest of the variables of attitude and practice to make some meaning in explaining behavior change. Nevertheless, the knowledge variable itself cannot exist independent of a possible precursor variables as media exposure or even interpersonal communication on HIV/AIDS, for example. Therefore, as a remedy, this study invokes the Advertizing Research Foundation's (hereinafter referred as ARF's) version of Hierarchy of Effects (hereinafter, HoE) model to attempt a more exhaustive explanation of the subject. The ARF's HoE model assumes a linear progression from exposure to a source of information (mass media in this case) on HIV/AIDS for example, to HIV/AIDS knowledge, favorable attitude and safe practice (Barry, 1987; Hanan, 2009).

In addition, propounded by DeFleur and Ball-Rokeach in 1976, the media system dependency theory which is based on writings in traditional sociology suggests that media and their audiences should be analyzed as

an integral aspect of broader "social systems" for example, schooling. The propounders showed how the relationship between mass media, culture, and audience is one of "mutual dependency". Part of the overall modern culture in Northern Nigeria is formal schooling. The media system dependency theory (Mkperedem et al., 2023) provides a complementary explanation to the direct or indirect role of formal schooling on the assumed linear relationship between media exposure and HIV/AIDS behavior as theorized by the HoE model. The dependence model of media effects was delivered as a theoretical line in which it is supposed that much of the impacts of media on students and schools are substantially directly determined by the configuration of the tripartite interaction between students, media, and schools.

Further, related theoretical underpinning to explain the moderation of Formal schooling in the theoretical path from media exposure to HIV/AIDS practice is the commonly assumed social scientific mechanism of 'information-transfer' conceptualization, suggesting that experience of formal schooling enhances a person's basic information about the physical causes and prevention of a disease. Besides, these information are expected to translate linearly into better decisions about risk and health (Baker, Leon & Collins, 2010). Regarding HIV/AIDS, it is supposed that information about elementary facts on mother-to-child and heterosexual transmission of the virus, and about condoms are taught in school or learned through school peer group and clubs' mechanisms lead to resolve and engagement in protective behavior. Another most normally assumed causal mechanism is the 'attitude-change' chain, presuming that formal education conveys a more positive attitude on HIV/AIDS and people living with the syndrome, and such an attitude lowers stigma, thereby creating openness and an adopting of protective strategies among more educated persons.

Mass media, in ideal situations are expected to complement governments' efforts in achieving set objectives on such important issues as combatting HIV/AIDS, such as contained in the cardinal tenets of Development Media Theory. This is more so, given that the effective remedy for the epidemic is prevention through advocacy on the promotion of safe practices. Mass media play a central role in this direction. Evidence on media reportage of HIV/AIDS in countries with high prevalence rates like Nigeria adds on existing literature on the role of the media, and is expected to further guide global and national policy on HIV/AIDS prevention strategy. In addition, the media are adjudged as potent tools for HIV/AIDS awareness and increasing protective and preventive behavior; but 'media exposure on HIV/AIDS' as a major independent variable, interacting with other KAP variables appears to be conspicuously missing in all HIV/AIDS KAP studies in West Africa, which is a potent conceptual and methodological gap. Li, Wu, Lin, Guan, Rotheram-Borus and Lu (2009) and Bekalu and Eggrmont (2013) and similar other studies e.g. Moore (2008); Letamo (2011) and Aung, et al. (2013) suggested there seems to be a correlation among the HIV/AIDS KAP variables and media exposure, and that respondents' major sources of information on HIV/AIDS are the mass media. However, there appears to be no study that went ahead of the direct effects, to predicting such dimensions as possible moderating factors on a possible structural relationships among the constructs given that empirical evidence on this subject is unstable.

Again, previous studies on knowledge, attitude and behavior have their focus and analysis centered on either purely descriptive statistics or classical test theory approach by the use of sum scores (e.g. Zhou, Sun & Mantell, 2007). However, according to Bouanchaud (2011) the summed composite scores render easy calculations, hence more statistically powerful approach is needed, citing that the disadvantages of classical test theory approach included the assumption that all of the questionnaire items concerning knowledge,

attitude and behavior on HIV/AIDS have equal weights. Against this backdrop the present study jettisoned the summed scores approach by considering media exposure and the KAP variables as reflective latent constructs in a structural model, which considers the differing item loading in the outer model .

Among the few studies that assessed relationships between media exposure construct and HIV/AIDS knowledge attitude and practice are Li et al.(2009), Sznitman et al. (2011) and Xiao et al. (2014). Majority of these studies except for Bekalu and Eggrmont (2011)Rahnama (2009), Mahtab (2010), figured out positive relationships among the media exposure and KAP variables as theoretically assumed. These discrepancies between the empirical renderings could possibly be attributed to contextual differences, possibly related to cultural and religious underpinnings. The above cited types of study are virtually nonexistent in Africa, the stronghold of HIV/AIDS, hence the object in this study to render an empirical descriptive account of, and relationships between HIV/AIDS media exposure and HIV/AIDS KAP variables from Nigeria a country in sub-Saharan Africa, which is another unique cultural context.

Hence, the following Research Question was posed

1) What are the interrelationships among HIV/AIDS media exposure, Knowledge Attitudes and Practices among adolescent Isalamiyya girls in Northern Nigeria?

Based on the direction of the literature, to respond to the foregoing Research Question, the following hypotheses were posed:

H1 HIV/AIDS media exposure positively affects HIV/AIDS behavior/practice
H2 HIV/AIDS media exposure positively affects HIV/AIDS knowledge.
H3 HIV/AIDS media exposure positively affects HIV/AIDS attitude.
H4 HIV/AIDS knowledge positively affects HIV/AIDS attitude.
H5 HIV/AIDS knowledge positively affects HIV/AIDS practice.
H6 HIV/AIDS attitude positively affects HIV/AIDS behavior/practice

Formal Secular Schooling and HIV/AIDS KAP

Being the key issue examined in this article, even if media exposure and HIV/AIDS KAP are positively related as suggested by some of the literature discussed above, such relationships have the prospect of being moderated by secular schooling experience among adolescents. Related literature hinted on such a dimension of relationship by showing education as being closely linked to the ability of young persons to protect themselves from HIV/AIDS. Therefore, if the variability of media exposure and HIV/AIDS knowledge and attitude have a significant effect on HIV/AIDS behavior, the strength of such variability could be moderated by formal schooling experience, as empirical evidence seems to suggest. Specifically, in Zambia, throughout the 1990s, Bankole et al. (2004), citing UNICEF (2002) reported that the prevalence of HIV among young females 15 to 19-year-old, with some schooling decreased, but the prevalence remained the same among women with no schooling experience. Generally, according to the report, in a number of sub-Saharan African countries, bigger proportions of adolescents that are not married, who are not in school engaged in unprotected sexual intercourse than of their counterparts in-school. As it is, such findings could have damning implications for the HIV/AIDS epidemic future in the region, given the challenges of

particularly the girl-child school enrolment. According to the report, most young women were not in school; only 7-12% are still in school in 12 countries in the region. Only Gabon and South Africa have substantially appreciable percentage of adolescent girls attending school (70–80%).

In the sparse literature that is available suggesting the association between formal schooling and greater HIV/AIDS protective behavior, the mechanism of the assumed logical progression from exposure to secular schooling to HIV/AIDS protection are mainly identified to be two.. First, usually the commonly assumed mechanism is the 'information-transfer' assumption, suggesting that exposure to formal schooling enhances a person's basic information about the physical causes and prevention of a disease. Moreover, that these information are expected to translate linearly into better decisions about risk and health (Baker, Leon & Collins, 2010)). In the case of HIV/ AIDS, it is assumed that information about basic facts on mother-to-child and heterosexual transmission of the virus, and about condoms are taught in school or learned through school peer group and clubs' mechanisms lead to resolve and engagement in protective behavior. The second most commonly assumed causal mechanism is the 'attitude-change' chain, presupposing that formal education imparts a more positive attitude on HIV/AIDS and people living with the syndrome, and such an attitude lowers stigma, thereby creating openness and an adopting of protective strategies among more educated persons.

The above chains simply suggest that exposure to formal schooling is associated linearly to higher-order cognitive skill, and higher-order cognitive skill, sometimes expressed as better numeracy is hypothetically linked to the quality of risk assessment and enhanced decision making (Baker et al.,2010). Numeric skills are chiefly acquired in formal schools (ibid) and the *Islamiyya*, particularly in northern Nigeria hinges on Arabic and Islamic theology and jurisprudence, but completely bereft of numeric skills. However, in spite of all that has been contended, evidence supporting direct link between exposure to formal secular schooling and health attitudes and behavior remains inconclusive.

Generally, literature on the relationship between exposure to formal schooling and health status has yielded unstable results as indicated above. For example according to Baker, et al. (2010), there exists much conjecture on the cause surrounding the widely reported suppositions on the association between formal schooling and health behavior. Baker, et al. (ibid) explain the conjecture by submitting that scholars reported frequent calls for more rigorous research endeavors on gaining a clearer scientific understanding of the role of schooling in that respect, but there has been virtually minimal effort in that direction to distinctly clarify such a role. For example, there appears to be no rigorous study filtering the role of formal schooling in health attitude, except for snippets on health behavior. This study is a response to such an observation, in the form of a broader media exposure and HIV/AIDS KAP model to attempt a holistic explanation of the subject. Studies in the area that are available focused on elsewhere, apparently none is from West Africa. This study focused on the *Islamiyya* system in Nigeria, which is robust a system that captures adolescent girls who are not attending formal secular schools as well as those who are. The system was deliberately chosen in order to distinctly test the moderation of formal secular schooling in media exposure and KAP model, which is the second object of this study. The propositions and assumptions adduced here as discussed so far form the basis for the hypothesis that follows

H7 The structural relationships hypothesized between HIV/AIDS media exposure and HIV/AIDS will be stronger for *Islamiyya* girls with exposure to formal schooling and not for those of them with no such exposure.

H7 breaks into three sub hypotheses:

H7a The effects of HIV/AIDS media exposure on HIV/AIDS practice will be stronger for *Islamiyya* girls with exposure to secular schooling than for those with no such exposure.

H7b The effects of HIV/AIDS media exposure on HIV/AIDS knowledge will be stronger for *Islamiyya* girls with exposure to secular schooling than for those with no such exposure

H7c The effects of HIV/AIDS media exposure on HIV/AIDS attitude will be stronger for *Islamiyya* girls with exposure to secular schooling than for those with no such exposure

Methodology

In this study, adolescent *Islamiyya* are girls between 11 and 19 years, who attend non-formal or non-secular Islamic night schools in Northern Nigeria. The study was an investigation of the girls *HIV/AIDS media exposure,* which is the aggregate of the respondents' responses to 14-item questionnaire on the extent of their attending to newspaper, TV, radio, Hausa novel, home video etc. on HIV/AIDS messages. The study investigated their *level of HIV knowledge,* which is the respondent's extent of knowledge of prevention, risk practice, basic facts of HIV, HIV testing, epidemiology and transmission, quantified in 29 item, 5-point scale from F*alse* to *True*. Also investigated is the girls' *attitude t*owardsthe syndrome, which is the mental state of readiness of a respondent that helps prevent the transmission of the HIV/AIDS syndrome among the members of a community, which includesthe tolerance for people living with AIDS (Lal, Vasan, Sarma, &Thankappan, 2000). In this study, this construct is measured by the aggregate of a respondent's reply to 12 items 5-point scale on reaction to HIV/AIDS and people living with it. The respondents*safepractice on HIV/AIDS,* which refers to the respondent's behavior that reduces his or her risk of contracting HIV/AIDS, which includes the intention to practice. The construct is measured in this study by the aggregate of the respondents' responses to 5-point scale of 17 items on HIV/AIDS safe practice.

Sample

From an estimated target population of 30 000 (Maulud 1437 a.h. {2016} estimates of Riyala), a sample of 500 adolescent *Islamiyya* girls (11 to 20 years) through the multi-stage probability sampling acrossthe *Islamiyya*schools under *Riyala* an *Islamiyya* coordinating body in Bauchi, Nigeria. The largest most organized *Islamiyya* schools (with class registers and classes 1 to 5 or 6 and different arms of classes e.g. A-E) were listed and 10 were randomly selected. Then two sets were selected in each school and from the two sets, two arms were selected e.g. 4c and 5b. And from the class registers, 25 students were randomly selected from the two classes. A post hoc Power Analysis was used to determine the statistical power of the sample size, which yielded an estimated Power of 0.997 (Power (1-β err prob.) = 0.997 at .05 alpha level. The sample contains 321 girls who are attending secular formal schools and 155 girls who are not. More than 70% of them belong to Hausa/Fulani ethnic group, the predominant one in Nigeria. Classroom situation

administration of questionnaire was adopted, and 487 of the girls turned up, which constitutes 97% response rate.

The Instrument

The questionnaire survey was mainly adapted from World Health Organization's Health Behavior among School Children (HBSC) questionnaire on HIV/AIDS among young persons, witha binaryvariable item on the formal schooling status of the girls. After reviewing a number of articles to decipher the effects of general media exposure on behavior, Annenberg Media Exposure Research Group (2008) reported that studies revealed mixed results; some finding substantial evidence for the effect of general media exposure, some finding moderate effect while others find no effect. The report pointed out that studies have recently become more methodologically sophisticated; instead of investigating the effects of general media exposure or exposure to particular media genre, researchers now began to use specific exposure measures, for example 'exposure to sexual content'. Sequel to this conclusion, the model tested in this study considers the specific measure of "HIV/AIDS media exposure". Again, after comparing various measures of media exposure, Romantan, Hornik, Price, Capella and Viswarath (2008) suggested that the most useful measure is that of closed ended, specific questions. For all the variables of media exposure, this study applied continuous scales as recommended by Bartholomew and Knott (1999)As considered by Bouanchaud's (2011) study also, each of the media exposure and HIV/AIDS KAB/P variables were applied as reflective latent variables, that is, each of them was approximated as a proxy, not measurable directly, however revealed partially, through a battery of individual responses to survey questions.Therefore, the scale on HIV/AIDS media exposure was adapted from Hirose, Nakaune, Ishizuka, Tsuchida, and Takanashi (1998), which conforms to such criterion.

The scale of HIV/AIDS knowledge was adapted from a cross-national WHO instrument on HBSC which sought information on knowledge on HIV/AIDS causes, symptoms, modes of transmission, prevention and epidemiology made of 29 items (as adapted by Thomson et al., 1999). The response scale of which was a 5-point Completely False – Completely True scale, adapted from Rhodes and Wolitslci (1989) as cited by Aiken (2002). HIV/AIDS attitude and attitude to those living with the syndrome (Thomson et al., 1999), consisted of 12 questions, response to which was also adapted from Rhodes and Wolitslci (ibid). In a similar study Shokoohi et al. (2016) reported the internal consistency reliability Cronbach alpha coefficient of .751 for HIV/AIDS knowledge construct, and .867 for attitudes towards HIV/AIDS in a study of young persons in Iran. While Lee, Hornik and Hennesy (2008) reported Cronbach alpha reliability estimate for exposure to different legacy mass media ranging from .54 to .66.

Questionnaire items which elicited information on the respondents' safe behavior on HIV/AIDS and intention to practice, consisting of 17 items was developed for the purpose of this study. The items were subjected to *arbiter analysis* with five Hausa speaking (Nigerian) medical doctors for face and content validity (Creswell, 2012).. Decision on retaining items was based on Lawshe's Content Validity Ratio calculations, in which the five doctors who are familiar with customs, traditions, culture and religion of northern Nigeria, all drawn from the region to score the questionnaire items on three categories: 1) Essential 2) Not Essential 3) Not Necessary. Lewshe's formula (Ayre&Scally, 2014) was used to calculate the content validity screening of the 17 items, and all of them were retained. Lawshe's CVR values ranged from -1 (perfect disagreement among arbiters) to +1(perfect agreement among arbiters). CVR above zero indicate more than 50% of arbiters

agreed item is essential (Ayre&Scally, ibid). All the items gave CVRs above zeroFive-point response scale was used throughout the instrument for the reasons observed by Johns (2010), that practice of social science research gives distorted results if scale points fall below 5 or above 7. The HBSC instrument has been adapted by several earlier studies on KAP HIV/AIDS on school-aged children such as Potsonen and Kontula (1999) (in Finland), Thomson, Currie, Todd and Elton (1999) (in Scotland), Dias, Matos, Gonkalve (2005) (in Portugal) and Gańczak et al. (2007) (in U.A.E).

Results and Discussion

Media Exposure and KAP on HIV/AIDS: Descriptive Analysis

This section was structured in three parts; brief descriptive hint of the latent constructs, the results of the significance of the structural paths in the model and the MGA moderation analysis. For media exposure and HIV/AIDS knowledge constructs, a description of the distribution of the respondents was provided in three levels: High, Moderate and Low for media exposure. Good, Moderate and Poor classify for HIV/AIDS knowledge as categorized in related literature such as Naugle and Hornik (2014) and Nubed and Akoachere (2016).The construct of media exposure on HIV/AIDS was computed to obtain overall composite score for each respondent. The maximum score was 70, and based on their scores, respondents were categorized into three to show their distribution based on their levels of media exposure on HIV/AIDS. The result shows majority of the respondents, 72%, have moderate HIV/AIDS media exposure i.e. scoring between 23.31 and 46.62, and there is a marginal difference (2%) between the percentages of those with high HIV/AIDS exposure and those with low exposure 15% and 13% respectively.

The respondents' knowledge on HIV/AIDS was measured in 29 questionnaire items with 145 as maximum scoring point. The composite scores, which reflect overall knowledge score were converted into percentage and categorized into three levels (Good, Fair and Poor). Respondents scoring ≥75% are categorized as having Good HIV/AIDS knowledge, 51-74, moderate knowledge and ≤50% Poor knowledge (Nubed&Akoachere, 2016). At the same time, majority of the respondents had moderate knowledge of HIV/AIDS (75% of them).. This finding is remarkable in that their moderate knowledge can be possibly attributed to media use because majority of them (41%) reported mass media as their major source of their HIV/AIDS information. This finding corresponds with the findings of Gańczak et al. (2009), Aung et al. (2013), Xiao et al. (2015) Mahtab (2019) and Rahnama (2009).

Respondents overall HIV/AIDS attitude score computed was categorized into 2, Good & Poor attitude as The maximum score was 70; and mean score 50. Any case below the mean score was considered as poor attitude and cases on the mean value and above were considered as good attitude (Nubed & Akoachere, 2016). The result shows that greater percentage (58%) of the respondents had Good attitude. to HIV/AIDS. This result is consistent with Mahtab (2010) and Rahnama (2009) but inconsistent with Aung et al (2013). RespondentsHIV/AIDS practice scores were also categorized in to two: Safe Practice and Risky Practice. The maximum score was 85 and the mean score 51. Any case below the mean score was also considered risky practice and cases on the mean value and above, safe practice (Nubed&Akoachere, 2016). The result breaks into exactly two equal groups: 50% with safe practice, and 50% with risky practice. This result matches almost exactly with Aung (2009) conducted in secondary schools in Malaysia, where result breaks exactly to

equal halves. The result is also consistent with Rahnama (2009). Respondents' descriptive HIV/AIDS media exposure and KAP is summarized by Table 1.

Table 1. Description of respondents by levels of HIV/AIDS media exposure, knowledge, attitude and practice

Variable	Range	Mean	SD	Percentage (N= 476)
HIV/AIDS media exposure		2.12	.89	
Low	0%-50%			15
Moderate	51%-74%			72
High	75%- 100%			13
HIV/AIDS knowledge		3.05	1.04	
Poor	0%-50%			14
Fair	51%-74%			75
Good	75%- 100%			11
Attitudes towards HIV/AIDS		3.51	.98	
Good	50 (mean composite score)-70(highest score)			58
Poor	0- 49 score			42
HIV/AIDS practice		2.82	1.14	
Safe practice	51(mean composite score)- 85 (highest score)			50
Risky practice	0-50 (scores)			50

PLS (SEM) Path Model Assessment

To test the hypotheses posed at the introduction of this article, the two-step procedure of estimating the PLS path modeling was followed: assessment of the outer model and the inner model based on bootstrapping procedure (Henseler, Ringle & Sinkovics, 2009; Awang, 2015). In this analysis, it is worth mentioning that Henseler and Serstedt (2013) indicated that the index of Goodness-of-Fit (GoF) for model validation is not suitable (see also Hair et al., 2014). For example, when simulated data are used in PLS path models, Goodness-of-Fit index for the validation of PLS models models has been found unsuitable because of its inability to separate invalid models from valid ones according to Hair, Ringle and Sarstedt (2013).

The outer model

Internal Consistency Reliability

Common estimators of internal consistency reliability of an instrument are composite reliability coefficient and Cronbach's alpha (Peterson & Kim, 2013).

Table 2 shows the factor loadings of each item retained, their composite reliability and Average Variance Extracted of each construct. The cut off value of composite reliability was based on rule of thumb suggested by Bagozzi and Yi (1988) and Hair et al. (2011), that coefficient of composite reliability should not be below the benchmark .70. Latent construct composite reliability coefficient for each latent construct as depicted in Table 5 ranged between .765 to .884; all above the minimum required level of .70, implying adequate internal consistency reliability of measures in the present study. This in a way means that all items in a construct are actually measuring the same construct.

Convergent Validity

Determining the extent to which latent constructs are truly represented by items and correlate with other measures in the same latent construct is important (Hair et al., 2006). Fornell and Larcker (1981) suggested that the measure of convergent validity can be determined from Average Variance Extracted (AVE) for each latent construct, while Chin (1998) posited that, to achieve acceptable convergent validity, each construct's Average Variance Extracted must be .50 and above. Therefore, the values of AVE as shown in Table 5 above are above .50 indicating adequate convergent validity. This means that there is correspondence among the constructs in this study, which are actually theoretically considered to be related to one another.

Discriminant Validity

To ascertain discriminant validity of the contructs i.e. extent to which the constructs discriminate one another empirically, indicator loadings are compared to cross loadings according to Chin(1998). And indicator loadings must be greater than the cross loadings. Table 6 below shows the comparisons between indicator loadings and cross loadings with other reflective indicators. The table indicates that all loadings of indicators were greater than the cross loadings, affirming the strength of discriminant validity for subsequent analysis.

Table 2. Item factor loading, AVE and composite reliability of constructs

Item	HIV Knowledge	HIV Attitudes	HIV Practice	HIV Media Exposure
HIV Kn1 (Once infected with HIV a person can infect others for his/her entire life.)	.758			
HIV Kn21 (A person can get HIV from toilet seats.)	.619			
HIV Kn28 (If a person is tested positive for HIV/AIDS then the test center will have to tell all of his or her partners.)	.781			
Att10 (People with HIV should inform others about their infection.)		.682		
Att5 (I don't feel sorry for people who caught AIDS because it is their own fault.)		.692		
Att6 (People with HIV should be made to live apart from the general population.)		.805		
Prc11 (If I need a tattoo design I will not mind using a needle which has been used by my friend or sisters.)			.618	
Prc15 (Once I love a person very much I obey all his wishes to sustain happiness between us.)			.870	
Prc4 (Once a person loves me and I also love him, I agree to all his wishes since it is good to be good to those who loved you.)			.757	
How often do you obtain information on HIV/AIDS from Billboard				.748
How often do you obtain information on HIV/AIDS from EngNpp				.727
How often do you obtain information on HIV/AIDS from HausaNpp				.664

How often do you obtain information on HIV/AIDS from Healthmag				.773
How often do you obtain information on HIV/AIDS from Inforadio				.718
How often do you obtain information on HIV/AIDS from InfoTV				.682
How often do you obtain information on HIV/AIDS from NewsMag				.741
AVE	**.523**	**.530**	**.570**	**.522**
Composite reliability	**.765**	**.771**	**.796**	**.884**

Structural model assessment: The inner model

Relationships between HIV/AIDS Media Exposure and HIV/AIDS KAP among the respondents

Assessment of the structural model was carried out with standard bootstrapping procedure of 5000 bootstrap samples with 476 cases applied to approximate the path coefficients significance (Hair et al., 2014; Hair et al., 2012). Table 3 depicts the structural model estimate.

Hypothesis 1 predicted HIV/AIDS media exposure to have significant positive effect on HIV/AIDS safe practice. Results in Table 7 below show H1 was rejected, implying there is no direct significant positive effect of HIV/AIDS media exposure on HIV/AIDS safe practice (β = .010, t = .237, p >0.05). Finding in this result shows HIV/AIDS awareness, education and information do not constitute anything as far as enhancing safe practice was concerned. This result becomes startling given the direction of evidence in related literature highlighted earlier, and posing a recalcitrant fact to the Hierarchy of Effects Model which underpins this study, predicting a linear progression from media exposure to safe practice. Checks of possible indirect interaction effect become instructive.

H2 predicted HIV/AIDS media exposure to have significant positive effect on HIV/AIDS knowledge. Results as in Table 7 and Figure 1 above show that HIV/AIDS media exposure has a significant positive effect on HIV/AIDS knowledge (β = .234, t = 6.357, p<0.01). Results for H1 and H2 matched the findings of Bessinger, Katende and Gupta (2004) in Uganda, except that the latter supported the effect of media exposure on HIV/AIDS campaigns on condom practices. Results here also mean that HIV/AIDS programs over the media are valuable; they contain required specific information about the disease. Conversely, HIV/AIDS specific information may invariably promote favorable attitude, but at the same time, all such would not necessarily linearly translate to safe practice as suggested by the result of H1 and H2. This suggests a further case for interrogating the subject matter or the data. H3 which predicted direct positive effect of HIV/AIDS media exposure on HIV/AIDS favorable attitude was rejected (β = -.008 t = .181 p> .05), H4 predicted a direct positive effect of HIV/AIDS knowledge on HIV/AIDS safe practice, and as Table 7 depicts, the hypothesis is supported (β = .270, t = 5.632, p< .01). This result is not consistent with Gemeda, Gandile and Bikamo (2017), which, through Confirmatory Factor Analysis of covariance-based Structural Equation Modeling (CB-SEM) found that both HIV/AIDS knowledge and attitude are not significant predictors of HIV/AIDS practice. This discrepancy in finding might possibly stem from the fact that the authors used HIV/AIDS knowledge and HIV/AIDS attitude scale that the present researchers consider to be a problematic scale measure the exogenous latent variables. The study used a 5-point self-report scale with scale-points 1= Don't know at all, to 5= Know very well, as response to questions on HIV/AIDS knowledge. This is considered problematic because a respondent might report 'Know very well' to a question on HIV/AIDS while in the actual sense, the respondent just felt he/she knows but they do not know, and vice

versa. This response scale cannot truly measure extent of HIV/AIDS knowledge. The correct scale points, as used by numerous other studies (e.g. Thomson et al., 2009) are the False or True scale or Completely false-Completely True scale, in which a respondent ticks either a statement is true or false and the scale points between Completely False - Completely True represent how certain the respondent is in his knowledge. This problematic nature of the HIV/AIDS knowledge and attitude measure in the study might have lead to the inconsistent finding.

H5 predicted a direct positive effect of HIV/AIDS knowledge on HIV/AIDS attitude, and the results indicate at the same time that H5 is supported ($\beta = .445$, $t = 11.644$, $p < .01$), HIV/AIDS safe attitude was predicted to have direct positive effect on HIV/AIDS safe practice in hypothesis 6. Results show a significant positive effect of HIV/AIDS favorable attitude on HIV/AIDS safe practice ($\beta = .271$, $t = 5.646$, $p < 0.01$). Invariably, finding here shows a direct linear progression from HIV/AID favorable attitude to safe practice.

Although empirical evidence using the Knowledge-gap hypothesis in HIV/AIDS studies has over the years revealed mixed results, Etemma et al. (1983) cited in Bekalu and Eggremont (2013) remarked that the application of the hypothesis has become much clearer in health communication campaigns. Over the years, the hypothesis, according to the Bekalu and Eggrmont (ibid), has become a powerful tool for conceptualizing media effect research by researchers seeking definitive evidence on audience knowledge disparities accounted for by differentials in media use concerning health communication. In consonance with these assertions, as is the case in the present study, while HIV/AIDS media exposure was not found to have significant effect on HIV/AIDS safe practice directly as predicted by H1; the results showed that HIV/AIDS media exposure was a significant predictor of HIV/AIDS knowledge. This result is not consistent with the findings of Bouanchaud (2011) and Bessinger, Katende and Gupta (2004) which revealed that mass media exposure was a significant predictor of HIV/AIDS safe practice. Again, it is also not in consonance with the results of a related study conducted by Sznitman, et al. (2011) on African American adolescents, which showed that mass media exposure had a remarkable effect on their STIs risk behavior. Apparent as they may seem, these differences in findings may only amount to contradistinction with the present study, but not contradiction. Largely, because of cultural and religious disparities, the scales for measuring HIV/AIDS safe practice differ: For example, Bouanchaud's (2011) scale was a binary variable of "ever used condom?", while the scale on condom use was deliberately ignored by this study because of religious sensitivity. This scenario could be explained away that perhaps mass media could be a significant predictor of the HIV/AIDS practice of condom use because of media obsession on condom use, which is likely to trigger desired response in perhaps other societies than those of Northern Nigeria.

Results for H2 found significant positive effect of media exposure on HIV/AIDS knowledge, which was consistent with the findings of Xiao et al. (2015) which detected that exposure to HIV/AIDS-related mass media information had significant relationship with HIV/AIDS knowledge and HIV/AIDS attitude. Apart from Xiao et al. (2015), Li et al. (2009) and Bessinger, Katende and Gupta (2004) were also consistent on this point, except forBekalu and Eggremont (2013) who found, without controlling for any other variable in the study, media exposure is not a significant predictor of HIV/AIDS knowledge.. Their finding is almost a loner in the literature under this subject, which may trigger implication for research.

Table 3 Results of hypothesis testing

Hypotheses	Hypotheses Paths	Path Coefficient	Standard Error	T Value	P Value	Decision
H1	Media Exposure -> HIV Safe Practices	.010	.043	.237	.406	Not Supported
H2	Media Exposure -> HIV Knowledge	.234	.037	6.357	.000	Supported
H3	Media Exposure -> HIV Attitude	-.008	.046	.181	.428	Not Supported
H4	HIV Knowledge -> HIV Safe Practices	.270	.048	5.632	.000	Supported
H5	HIV Knowledge -> HIV Attitude	.445	.038	11.644	.000	Supported
H6	HIV Attitude -> HIV Safe Practices	.271	.048	5.646	.000	Supported

Moderating role of exposure to secular schooling in the effect of media exposure on KAP on HIV/AIDS

The objective of investigating the moderating role of formal schooling in the above structural paths gives rise to hypothesis 7. The study used group comparison method or multi-group analysis for determining moderating effects. Literally, the direct relationship between HIV/AIDS media exposure and HIV/AIDS safe practice; between HIV/AIDS media exposure and HIV/AIDS knowledge and between HIV/AIDS media exposure and HIV/AIDS favorable attitude were compared across two groups of respondents attending formal schools and those who were not. The differences in the model parameters obtained between the two groups of data i.e. the group with exposure to formal schooling experience and those without such exposure are interpreted as moderating effect.

The values for the differences across the group with formal schooling and the group with no formal schooling are presented in Table 4 below. The table showed group comparisons between respondents with formal schooling and respondents with no formal schooling. As the table above indicates, among the 3 hypothesized interaction effects of formal schooling, only one is supported at alpha significance level $p< .10$ i.e. there is significant moderating effect of formal schooling between HIV/AIDS media exposure and HIV/AIDS safe practice (Path 1: $\beta = .096$, Path 2: $\beta = -.046$, Path1 – Path2 = .142, $t = 1.451$, $p<0.1$). This means that formal schooling is a factor that enhances the effect of HIV/AIDS media exposure on HIV/AIDS safe practice among the respondents. Put in other words, media exposure makes the respondents attending formal schools have more HIV/AIDS safer practice than those without formal secular schooling. This result in part matches perfectly with the assertion of Baker et al. (2010) discussed earlier.

On the significant moderating role of formal schooling between media exposure and HIV/AIDS practice detected in this study, the study is consistent with the results of the systematic review by Kirby (2002) of studies on the impact of school involvement on adolescent sex risk-taking. Among other key findings in the study, involvement in and attachment to school and plan by in-school adolescents for high educational attainment correlate with less sexual risk-taking and lower pregnancy rate. Suggestive to explaining the findings of this study, Kirby (ibid) also showed that some school programs demonstrated appreciative results in cutting down sexual behavior and increasing the use of condom and contraceptives. Overall, the review showed evidence for the impact of school on sexual risk behavior and other STIs behavior.

Table 4 PLS Multi-group Analysis (PLS-MGA) group comparisons between group 1 with formal schooling and group 2 with no formal schooling

		Group 1: Formal Schooling		Group 2: No Formal Schooling		Group 1 vs. Group 2			
Hypothesis	**Relationship**	Path1	SE(Path1)	Path2	SE(Path2)	Path1-Path2	t Value	Significance Level	p. Value
H7	Media Exposure -> HIV Safe Practices	.096	.058	-.046	.074	.142	1.451	*	0.074
H7	Media Exposure -> HIV Knowledge	.181	.049	.289	.161	-.107	0.819		0.207
H7c	Media Exposure -> HIV Attitude	.050	.060	-.033	.089	.083	0.783		0.217
	N	321		155					

Note: path1 (b^1) and path2 (b^2) are path coefficients of group 1 and group 2, respectively; SE(path1) and SE(path2) are the standard error of path1 and path2, respectively. *p<.10.

Possible explanation for this study's finding on the moderating effect of formal schooling could be alluded to yet other mechanisms for the impact of schooling on safe behavior apart from those identified by Baker et al. (2010) (i.e. effect of learning numeracy on risk assessment).Kirby (2002) summarized that other important mechanisms to this effect have empirical support. For example, school time is highly structured to the point that it leaves no free time for students to engage in illicit STI-risky practices involving sex. In addition, though how the school affects selection of friends is not fully understood according to Kirvy, evidence shows that in doing that, sometimes schools regulate adolescent sexual behavior. Further, schools generally create environments that decrease sexual risk-taking because it increases adolescents' attachment and interaction with adults who discourage risk-taking behavior. Moreover, schools make adolescents to believe in the future and in so doing, they plan for higher education and lifelong careers. The idea here is young persons who plan and have higher educational ambitions are driven by those ambitions to avoid sexual risk-taking which most of the times leads to STIs and early child-bearing. Studies reviewed also point out that schooling increases adolescents' self-esteem, communication competency and arms them with refusal skills (against unprotected sex). These factors therefore are also possible explanation for the impact path in this studies structural model between the moderator (secular formal schooling) and the endogenous latent variable (HIV/AIDS practice) in modeling moderation. Again, looking at the cultural context of Bauchi, which ranks high in number of out-of-school children in Northern Nigeria (about 1,239,759 in 2022 (Ogwo, 2022)), this result gains credence. Significantly, parents do not enroll especially the girl-child in formal schools for cultural reasons; somehow in the cultural contexts of those areas, the girl-child does not need any formal education to brace up for future challenges because they are expected to be house wives, whose all responsibilities are shouldered by their husbands. Against this backdrop, cultural context of Bauchi

relating to the status of the girl-child explains in part, the moderation of formal school in the effects of media exposure on HIV/AIDS practice.

The finding in this study is however not consistent with the findings of an experimental study on the subject in Turkey, in which Ergene, Çok, Tümer and Ünal found significant differences in all the variables of knowledge, attitude and practice as predicted by peer education. While the current study did not detect a significant moderating effect of formal schooling(the major agent of peer education) on HIV/AIDS knowledge and attitude of the respondents, the results of the two studies are consistent on significant differences on HIV/AIDS practice/behavior. The finding in the present study is also not consistent with the finding of the review of several studies in Iran by Behjati, Ayatollahi (2005), Taheri, Maleki, Baharvand, Tabatabaei (2009), Mazloumi, Abbasi (2006), that high knowledge of HIV/AIDS was limited to high-school students, while on the other hand, the review byTaj, Roushan (2004), Montazeri (2005), Roudsari, Kazemzadeh, Rezaeie, Ghabili, Shoja, Kamran (2008) reported that HIV/AIDS knowledge among the general population of young people give fairly low scores(cited in Shokoohi et al., 2016) Against this backdrop, in addition to Bakeret al.'s (2010) mechanismdiscussed earlier,Feldman and Madjasco (2005) adduced the evidence that in-school adolescents ideally should have better knowledge and attitude in their development, largely as a result of peer socialization in extra-curricular activities in schools. Though the authors suggested the need for overarching theory in the subject that pinpoints the mechanism through which the moderating effect of such activities takes place. They submitted that by participating in in-school extra-curricular activities, adolescents generate social and human capital through academic clubs; athletics; membership of cheerleading or drill team; school newspaper or yearbook; music, drama, or debate; and vocational clubs.

Further, explanation for the findings in the present could be adduced to suggestions of findings in studies on the effect of schooling on behavior. For example, Baker et al.,(201)) found that exposure to formal schooling is associated linearly to higher-order cognitive skill, and higher-order cognitive skill, sometimes expressed as better numeracy is linked to the quality of risk assessment and enhanced decision making. In this case, numeric skills are chiefly acquired in formal schools, whilst the *Islamiyya*, particularly in northern Nigeria run Arabic and Islamic theology and jurisprudence, but lacking in numeric skills

Conclusion

Based on the key findings of this investigation it is therefore concluded that media exposure is a necessary but not a sufficient precursor on HIV/AIDS safe practice, given that the relationship between the constructs can be significant by the moderation of exposure to formal schooling among the *Islamiyya* girls. Or by other environmental factors as suggested by DeFleur and Ball-Rokeach in the media system dependency theory, which suggests that media and their audiences should be analyzed as an integral aspect of broader "social systems" for example, schooling. This study also concludes that the relationship between mass media, schooling, and audience is one of "mutual dependency", considering that part of the overall modern culture in Northern Nigeria is formal schooling, thus providing a complementary explanation on the indirect interaction role of formal schooling on the assumed linear relationship between media exposure and HIV/AIDS behavior. Further, it can also be concluded that the theoretical gap between the in-school and out-of-school girls in terms of HIV/AIDS knowledge and attitude closes with increased media exposure. This

is clear from the moderation analysis, which reveals no significant differences between the two groups in terms HIV/AIDS knowledge and attitude, while mass media remain their major sources of information on HIV/AIDS. This conclusion means, with constant supply of HIV/AIDS messages over the media, it makes no difference whether a girl is attending formal school or not in terms of HIV/AIDS knowledge and attitude, while significant difference is there in terms of effect on behavior. Finally, the implication of the result of this study on the HoE model is the theoretical linear effect assumed of HIV/AIDS media exposure on HIV/AIDS KAP was only empirically true of HIV/AIDS knowledge. By the moderation of exposure to formal schooling, the effect also holds true on HIV/AIDS behavior/practice. Thus, in spite of cognate studies so far, evidence supporting direct link between exposure to formal secular schooling and health attitudes and behavior remains inconclusive. This is possibly due to the assertion of media system dependency theory that other factors in the broader social system could be playing varying degrees of roles in the effect path.

This study recommends a further inquiry on the possible specific mediation role of HIV/AIDS knowledge in the effect path between media exposure and HIV/AIDS attitude, since the direct path between the constructs is not significant in this study, neither in the direct effect test nor in the interaction effect of formal schooling experience. It is possible the effect would be significant with the mediation of HIV/AIDS knowledge.

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