

Adolescent religiosity and attitudes to HIV and AIDS in Ghana

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Abstract

This study investigated the relationships between adolescent religiosity and attitudes to HIV/AIDS based on two major techniques of analysis, factor and regression analysis towards informing preventive school education strategies. Using cross-sectional data of 448 adolescents in junior high school, the study incorporated survey in a self-administered questionnaire and sought to identify underlying factors that affect pupils' responses, delineate the pattern of relationships between variables and select models which best explain and predict relationships among variables. A seven-factor solution described the 'attitude' construct including abstinence and protection, and six for 'religiosity'. The results showed relatively high levels of religiosity and a preference for private religiosity as opposed to organisational religiosity. The regression analysis produced significant relationships between factors of attitudes to HIV/AIDS and of religiosity. Adolescent with very high private religiosity are more likely to abstain from sex but less likely to use condoms once they initiate: protection is inversely related to religiosity. The findings suggest that religious-based adolescent interventions should focus on intrinsic religiosity. Additionally, increasing HIV prevention information and incorporating culturally relevant and socially acceptable values might lend support to improved adolescent school-based HIV/AIDS prevention programmes.

Keywords: adolescent, attitudes, religiosity, HIV/AIDS, prevention, protection, Ghana

Résumé

Cette étude a pour but de rechercher les rapports entre la religiosité des adolescents et leur attitude envers le VIH/SIDA basée sur deux techniques d'analyse en l'occurrence celle du facteur et de la régression dans le but d'établir une stratégie d'éducation préventive en milieu scolaire. Des données croisées portant sur 448 adolescents collégiens ont été obtenues à travers une enquête basée sur des questionnaires auto-administrés. L'enquête était désignée à identifier les facteurs sous-jacents affectant les réponses des élèves, délimiter le motif des relations existantes entre les variables et choisir les meilleurs modèles qui expliquent et prédisent mieux les relations entre ces différentes variables. Une sept-facteur solution décrit le comportement construit comprenant l'abstinence et la protection tandis qu'une six-facteur solution attribue à la religiosité. Les résultats ont montré un degré relativement élevé de religiosité et une préférence pour une religiosité discrète opposée à celle d'organisation. L'analyse de régression a identifié une relation significative entre les facteurs de comportement orientés sur le VIH/SIDA et la religiosité. L'adolescent ayant une religiosité discrète et privée est plus susceptible de s'abstenir de rapport sexuel mais moins susceptible d'utiliser les condoms une fois initié: la protection est inversement liée à la religiosité. Les résultats suggèrent que les interventions par rapport aux adolescents religieux doivent être centrées sur la religiosité intrinsèque. En plus, la multiplication des informations préventives sur le VIH couple avec les valeurs culturelles et sociales acceptables devraient aider à l'amélioration des programmes de prévention VIH/SIDA des adolescents scolaires.

Mots clés: adolescent, comportements, religiosité, VIH/SIDA, prévention, protection, Ghana

Introduction/background

Despite reported lowering prevalence rates and the number of new infections globally (UNAIDS/WHO 2009) coupled with reported breakthrough of HIV vaccines of 31% protective effect (BBC 2009), HIV is still a threat to children's rights in sub-Saharan Africa and a major obstacle to the achievement of universal basic education (World Bank 2002). Studies from Africa show that children between the ages of 5 and 14, described as the

'Window of Hope', have the lowest HIV infection prevalence (Kelly 2000), yet Sub-Saharan Africa, remains heavily affected, accounting for 67% of all infected people.

Many young people still lack accurate, complete information on how to avoid HIV exposure including Ghana, categorised as generalised HIV epidemic where the national prevalence has been on

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a downward trend from 3.6% in 2003, 2.7% in 2005 to 1.9% in 2007 (UNAIDS 2008). Ghana's AIDS Commission (GAC 2008) acknowledges that though awareness levels of HIV is almost universal (98%) this has not yet translated into comprehensive knowledge and appropriate behaviour because people have a low perception of the risk of infection. Specific knowledge of HIV prevention and misconceptions about HIV/AIDS that propagate stigma and discrimination against infected people has varied over the years (Ghana Demographic and Health Survey (GDHS) 2003). Reports indicate a daily record of 70 new infections, about 23% of deaths in the Eastern Region due to HIV/AIDS in 2008; over 2,300 children under 15 died of AIDS-related diseases in 2007 and young people still have doubts about the prevalence of AIDS and therefore do not consciously protect themselves (GNA 2008a, 2008b, 2009, 2008c). Risk factors mostly cited as predictors of prevalent HIV and barriers to prevention include decreasing age of sexual debut, higher number of sexual partners and lack of condom use, lack of awareness and the coming of age of HIV-positive children (CDC 2008).

Adolescents are known as a population at risk of HIV infection (Eng & Butler 1997) because they consider themselves, immune from infection, exploring their sexual identities and often are experimenting; their behaviour tends to be impulsive and greatly influenced by peer pressure, often feel invulnerable and have trouble seeing long-term consequences (Liontos 1989).

Prevention education is recognised as the primary means of decreasing the rate of new HIV infections (Gallant & Maticka-Tyndale 2004) and the quest for improved educational approaches is still a challenge. The goal and essence of education is to prevent infection, reduce stigma and discrimination, change peoples' attitudes towards HIV/AIDS and infected persons and the adoption of lifestyles that will not predispose people to infection (CDC 2008). AIDS is first and foremost a consequence of behaviour (Fishbein 2000) but Ajzen (2001) suggests focussing on changing attitudes since we cannot sometimes directly influence behaviour but have to find an indirect agent.

Attitudes are generally explained as enduring disposition to social behaviour or readiness for action (Tones & Green 2004); *a relatively enduring organisation of beliefs around an object or situation predisposing one to respond in some preferential manner*. Whilst some predispositions are momentary . . . , the concept is typically reserved for more enduring, persistent organisation of beliefs (Rokeach 1976). Adolescent interventions are broadly divided into *behavioural*: seeks to change the knowledge, skills and attitudes of individuals and *structural*: tackles broader societal issues that drive the spread (Cowan 2002). Grunseit (1997) maintains that prevention programmes prior to sexual debut are the most effective before patterns of risky sexual behaviour are established. In order to motivate behaviour, additional variables such as values and protective factors as religious behaviour have been suggested (Loewenson, Ireland & Resnick 2004) in education programmes.

Religion has been identified as a major social institution with pervasive effects on various aspects of people's lives, attitudes and behaviours . . . important in helping understanding the behaviour

of individuals or groups, who professes it (Ryan, Rigby & King 1993). Mbiti (1989) underscores Africans religiosity as the strongest element in traditional background, exerting probably the greatest influence upon their thinking and living; it cannot be ignored in an attempt to understand African behaviour. Ghana's diverse culture has greatly been influenced by ethnic groupings, Christianity and Islam with a strong community and family life systems as parents pass on old traditions to younger ones.

However sexual issues considered a taboo subject as in many African societies are mostly exclude. A general change in the socialisation process of adolescents in sub-Saharan Africa has been observed from being based on family, both nuclear and extended, and society, to being based on school, church/mosque, and the media (Awusabo-Asare & Anarfi 1999).

Religion is a set or organised system of beliefs and practices shared by a group of people. Billy and associates (1994) define religiosity, as a composite, including measures of frequency of praying, church attendance, and personal importance of religion. In this study religiosity indicates, strength of religious faith rather than belief of a denomination or affiliation (Nicholas & Durrheim 1995). The concept of religiosity is best treated as a multi-dimensional phenomenon (Cornwall, Albrecht, Cunningham & Pitcher 1986) yet there is no consensus as to which components of religiosity are most protective. Cornwall *et al.* (1986) six dimensions of religiosity, is theoretically derived by a cross-classification of two constructs: the modes of religiosity (personal versus institutional) and the components of religiosity (belief, commitment, and behaviour) (Allport & Ross 1967). Allport's 'intrinsic-extrinsic' religious orientation model remains the most influential approach in psychological studies of religion in the USA (Nielsen 2000). The 'intrinsic' are more concerned with moral standards, discipline, greater sense of responsibility and consistency (Donahue 1985), but the 'extrinsic' uses religion to protect the self, gain social standing . . . (Ryan *et al.* 1993). Whilst the 'intrinsic' is more self-motivated and tend to have internal locus of control, the 'extrinsic' is more likely to be dogmatic, authoritarian, less self-directed, less internal locus of control . . . ; is characterised by outward observance (Wiebe & Fleck 1980).

Several scholars have pointed out that religion has emerged as a potent social force in both private and public life in Ghana (Kirby 1997; Yirenyki 2000). Gallup International Millennium Worldwide Survey (2000) found Ghanaians highly religious: 97% indicate God is very important in their lives; more than 90% belong to a religious denomination and 82% attend regular religious service. The types of religious organisations continue to change (Assimeng 1986), along the mainstream traditional Christian denominations, that include African syncretic, faith healing groups, Charismatic, Evangelical and Pentecostal churches have emerged (Yirenyki 1999).

Agadjanian (2001) stresses, church participation in Africa may create an environment for social exposure and interaction to new ideas, which could influence HIV prevention. However many individuals may become victims of abuse as some leaders take advantage and pretend to provide solutions. Cases of sexual abuse in some religious organisations are reported.

Though religious values are the source of moral proscriptions for many individuals and the teachings, likely to play a role in the formation of individual attitudes, values and decisions (Lehrer 2004; Thornton & Camburn 1989), religious doctrine and spiritual teachings can create barriers to HIV prevention. Significant is the debate between abstinence-only and comprehensive safer sex education where opinions differ. Also, people with HIV may avoid church services due to prejudices: the perception that infection is the consequence of leading a 'bad life' and opposition by some religious leaders to the use of condoms to prevent HIV infection (Anane 1999). Awusabo-Asare and Anarfi (1999) cite Christian fundamentalism in the school system, an obstacle to the discussion of HIV prevention strategies due to the tendency to defer to God for solutions and attitudes of 'predestined to happen' or 'punishment or act of God' responses to problems.

Research interest and literature abound on religiosity (Assimeng 1989; Kirby 1997; Yirenkyi 2000) and religious beliefs and norms may be salient, yet few studies have examined the impact of religion on AIDS-preventive behaviour (Takyi 2003). This study thus investigated the significance of adolescent religiosity and its relationship with attitudes to HIV/AIDS. The objective was to identify the strength of religion as a source of influence in their attitudes with a goal of commenting on future preventive HIV/AIDS education strategies in Junior High Schools in Ghana. Based on a survey in a self-administered questionnaire, this study sought to answer the following questions: what is the scope and pattern of adolescents' religiosity and knowledge of HIV/AIDS? What are adolescents' attitudes towards HIV/AIDS? What is the nature of relationship between adolescents' religiosity and attitudes towards HIV/AIDS and what are the most significant predictors?

Methodology: study design and setting

The study was based on a case study of a mixed public school, a Junior High School (JHS) in Obuasi, a municipal capital town of the Ashanti Region, synonymous with gold mining: the Anglo-Gold Ashanti Company which contributes significantly to the national economy. The area is characterised by a high population density estimated at 205,000 (GSS 2002), a 4% annual growth rate, high unemployment and cost of living, predominantly male workforce attracting a large number of commercial sex workers (UNICEF 2002). Obuasi has a history of a high HIV incidence; once with the highest rate and still a major HIV 'hotspot' one of the 23 urban sites among the general 40 sentinel sites strategically identified by the National AIDS Control Programme. HIV prevalence was 6.0 in 2002, to 3.4 in 2004, increased from 3.6 in 2006 (UNAIDS 2008) to 5% (GNA 2008b).

The selection of the town and the school was purposive based on 'the researcher's judgement as to typicality or interest' (Robson 2002). In purposive selection, particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices (Maxwell 2005). The JHS was chosen because the characteristics of the school satisfied the purpose and criteria set: it is not an unusual school and has no one particular feeding primary

school but structured to enrol pupils from various primary (6) schools, towns, suburbs and communities in the Obuasi municipality. Eligibility and enrolment is based on satisfactory performance in a common entrance examination among pupils from several primary schools. The process of enrolment enables a representation of more pupils of diverse backgrounds: age, tribal, religious and locality to join the JHS population, normally, can be representative of schools in Obuasi municipality and in Ghana as a whole.

The JHS had a total school population of 705 pupils and the school, JHS one to three, is made up of 11 classes: JHS 1 and 2, four classes each (A, B, C and D) and three classes (A, B and C) for JHS 3. The study was conducted with all pupils in only JHS two and three involving seven whole classes totalling 448 pupils because HIV/AIDS is not a topic taught as a class lesson in JHS one. The selection of the JHS allowed the researcher gain access to data (sample size) that best address the research questions and appropriate for the techniques for analysis. Comrey and Lee (1992) recommend that for a 'good' factor analysis solution a data set should contain at least 300 cases. Also the setting helped the researcher to collect a greater quantity of data at one location in a good time (Teddlie & Yu 2007). Whilst this certainly restricts the sample to a specific population and may give a distorted view in terms of the whole country, my concern was mostly focused on what was possible to achieve in the relatively 'privileged' urban sector (Barnett, de Koning & Francis 1995).

As a research strategy which focuses on understanding the dynamics present within single settings, Yin (1984) suggests that case studies are appropriate where the objective is to study contemporary events, and where it is not necessary to control behavioural events or variables. Stake (1994) maintains that a case is an integrated system with patterns of behaviour . . . ; each case study is a concentrated inquiry into a single case (p. 237). The study relied chiefly on self-administered questionnaire of 448 pupils mostly aged between 13 and 16. In addition the researcher was allowed access to the school to informally interact with pupils and teachers, and also observe trends of some activities. Prior to the study, the researcher was granted permission (ethical approval) by the directors of the Ghana Education Service: national and Obuasi district respectively, in addition to teachers' and parental consent. The respondents were also informed about the purpose of the study, assured of confidentiality, anonymity and their right to withdraw at any point, adding, that the data will not be publicly identifiable. Two major techniques, Factor and Regression Analysis were used to identify underlying factors that describe the data, and the selection, of models which best explain and predict relationships among variables.

Instruments

The instruments used for the study of *Attitudes, Belief and Knowledge* after reviewing literature were the Assessment Instruments for Measuring Students Outcomes *Grades 7-12*, by the Centers for Disease Control and Prevention (CDC 1992, 2005) and IOX Assessment Associates. These instruments were developed to assess and support knowledge and attitudes that frequently serve as instructional targets of HIV prevention education. They

originally, benefited substantially from five different review boards including panels of HIV evaluation experts comprising a number of field-testing and revisions to confirm that directions, items, and vocabulary were age-appropriate and to ascertain content validity (CDC 2005). Such review by expert panel is considered a valid method to ascertain an instrument's content (Aday 1996). Kirby, Short, Collins, Rugg, Kolbe, Howard, *et al.* (1994) instrument for an HIV intervention evaluation relied on qualitative reviews by a panel of HIV professionals which yielded valid and reliable results. In addition, this study drew on peer review and reflexivity which are among the strategies Johnson (1997) recommends to promote research validity. Further, the instruments were chosen based on their appropriateness after conducting two pilot surveys among JHS pupils at different schools in Ghana. They also benefited from the input of health professional at Kumasi Health Education Unit and School Health Education regional officers. The subject matter of the assessment instruments is consistent with the syllabus which serves as instructional targets of HIV education in Junior High Schools in Ghana and is theoretically important in preventing the transmission of HIV.

A 25-item instrument (based on five dimensions) attempted to identify attitudinal dimensions related to HIV-risk behaviours (Attitudes) and a 10-item instrument, attitudes toward people living with HIV/AIDS (Beliefs); a 15-item instrument with measurement focus on HIV/AIDS knowledge and confidence levels of knowledge related to HIV-risk behaviours. Also a 14-item measure befitting the level of the respondents was drawn from commonly used assessments such as frequency of

attendance at religious services, importance of religion (Miller & Gur 2002; Rostosky, Wilcox, Wright & Randall 2004) and the private-public dimensions of religiosity along the lines of the intrinsic-extrinsic orientations (Gorsuch & McPherson 1989). Reliable sources consulted include those used in studies in Africa and US (Fetzer Institute 1999; Odimegwu 2005) and consistent with the 10-item Santa Clara Strength of Religious Faith Questionnaire (Plante & Boccaccini 1997).

Results and analysis

Demographic information

The JHS had a total school population of 705 pupils made up of 11 classes: JHS 1 and 2, four classes each (A, B, C and D) and three classes (A, B and C) for JHS 3. The study was conducted with all pupils in JHS two and three involving seven whole classes totalling 448 pupils. JHS one was not included because HIV/AIDS is not a topic taught as a class lesson in that year group. The survey instruments totalling 71 items were put together and administered at one go one class after another in a classroom environment in the presence of the researcher and a teacher. The background information included, were gender, age, tribe and religion. There were a total of 17 tribes involved with the dominant being *Akan*, who are the indigenous and also form the majority, generally in Ghana (Table 1). All respondents indicated they are religious: religion is important to them, belonging to one of the three main religions in Ghana: Christianity (93.1%), Islam (6.5%) and African Traditional Religion (indigenous) (0.4%). About 67.6% (272) Christians noted their affiliated

Table 1. Tribe, gender and religion

Tribe (ethnicity)	Total %		Gender				Religion					
			Female		Male		Christian		Muslim		Traditional	
			F	F%	M	M%	F	M	F	M	F	M
Akan	364	81.3	196	43.8	168	37.5	193	163	3	5	0	0
Dagarti	19	4.2	10	2.2	9	2.0	9	8	1	0	0	1
Dagomba	3	0.7	0	0.0	3	0.7	0	2	0	1	0	0
Ewe	15	3.3	9	2.0	6	1.3	9	5	0	0	0	1
Frafra	5	1.1	2	0.4	3	0.7	2	1	0	2	0	0
Fulani	1	0.2	1	0.0	1	0.2	0	0	0	1	0	0
Ga	7	1.6	3	0.7	4	0.9	3	4	0	0	0	0
Gonja	1	0.2	0	0.0	1	0.2	0	0	0	1	0	0
Grushi	2	0.4	0	0.0	2	0.4	0	2	0	0	0	0
Hausa	11	2.5	7	1.6	4	0.9	0	0	7	4	0	0
Kotokori	1	0.2	0	0.0	1	0.2	0	0	0	1	0	0
Krobo	1	0.2	1	0.2	0	0.0	1	0	0	0	0	0
Kusasi	2	0.4	0	0.0	2	0.4	0	2	0	0	0	0
Moussi	1	0.2	1	0.2	0	0.0	0	0	1	0	0	0
Nzema	13	2.9	7	1.6	6	1.3	7	5	0	1	0	0
Sisala	1	0.2	0	0.0	1	0.2	0	0	0	1	0	0
Talensi	1	0.2	1	0.2	0	0.0	1	0	0	0	0	0
Total	448	100.0	237	52.9	211	47.1	225	192	12	17	0	2

denominations, altogether, numbered 55. In all cases respondents and their parents belonged to the same religious affiliation.

The data generated was subjected to statistical analysis looking at variables and their relational potentials using R (R Development Core Team 2009). As multi-dimensional constructs, exploratory factor analysis (FA) was run on the four constructs followed by regression analysis. Among the research aims of applying FA were to: determine the underlying factors that affect pupils' responses, delineate interrelationships between variables, reduce masses of data to a parsimonious subset required to 'explain' the pattern of relationships in the data and test hypothesis and theories. The choice of the number of components/factors was justified based on *eigenvalue* greater than 1.0 based on the Kaiser (1960) criterion, in line with theoretical expectations, scree plot and uniqueness.

In addition was the measure by the Kaiser–Meyer–Olkin statistics, sampling adequacy which predicts data are likely to factor well, based on correlation and partial correlation (Hutcheson & Sofroniou 1999) and Bartlett's test of sphericity which tests the hypothesis that, the correlation matrix is an identity matrix. FA was based on promax due to theoretical considerations about the nature of the factors and whether a degree of correlation between them might be expected (Hutcheson & Sofroniou 1999).

Eventually, the amount of variance in the sample which is accounted for and the number of interpretable factors, contributed to the basis to determine the optimum number of factors selection which were subjectively labelled. A seven-factor solution, six of which ('condom use' splits into two) are consistent with the five dimension of CDC (2005), was selected for 'Attitudes' and two for 'Beliefs' (Attitudes towards people with HIV/AIDS). In addition a six-factor solution best described 'Religiosity' (Table 2) but no factors were identified on the knowledge construct. Out of the six religiosity factors, only one suggests an institutional/public mode of religiosity (involvement) and the rest, non-organisational/private mode, generally subjective.

The analysis of HIV knowledge, primarily, was descriptive statistics mostly based on analysis of individual items of the measures to ascertain their scope to help identify those content areas that may require targeted instruction or have more or less prominence: analysis showed two variables based on two scoring

methods, *knowledge* and *confidence in knowledge*, which are, included in the regression analysis to identify their relationship with other variables. Generally, all statements received at least some incorrect responses. A third of the statements mostly about the mode of transmission and prevention by abstinence recorded the highest level of correct responses ranging from 70% to 80%.

Another one-third which mostly illustrates misconceptions about HIV transmission and testing had correct scores between 60% and 67%. Those between 40% and 50% correct were mainly about misconceptions about condoms and protection. A major worrying result was that 50% indicated confidence that '*you can't get AIDS if you have sex only once or twice without a condom*'. This seems to suggest a low perception of the risk of infection, a major worry which has the potential to endanger the sexually active and make them vulnerable to infections and other dangers. Also, 72% were confident that '*people infected with HIV are usually very thin and sickly*'. This is notable, since it could lead to targeting people with similar characteristics in communities where people with HIV/AIDS are stigmatised, thus, defeating a major goal of HIV education: to reduce stigma and discrimination (AVERT 2009, 2008).

The results in general, show awareness is high but some knowledge gaps still exist, corroborating previous findings of high awareness levels, almost universal (up to 98%), but yet to translate into comprehensive knowledge and appropriate behaviour because people have low perception of the risk of infection (GAC 2008). It has been reported that School Health Education Programme (SHEP) has assisted in raising awareness levels (up to 93%) amongst pupils but low levels of knowledge about the various sources of infection persist (Fayorsey 2002). One must be cautious not to attribute the results in this study, solely on the effort of SHEP since respondents are affected by other influences such as the media. AVERT (2009, 2008) stress that many people are dangerously ignorant about the virus, with surveys around the world showing alarmingly low levels of awareness and understanding about HIV.

Regression analysis

Various literatures argue that religion and religiosity may discourage risky behaviour and therefore serve as a barrier to HIV infection (Green 2003; Takyi 2003) yet it has been largely ignored in understanding adolescent health outcomes (Wallace & Williams 1997). When attention is given, 'the choices of measures employed, the methods of modelling religious variables and the skills with which coefficients of religious effects are interpreted often fall short' yet significant influences of religion often can be documented despite poor measurement (Regnerus, Smith & Fritsch 2003). Regression analysis was therefore used to determine relationships between pupils' religiosity and attitudes: to model response variables and derive a model which contains only those variables that are important for predicting a response variable of interest and test specific hypotheses.

The analyses address how knowledge, religiosity, age and gender could predict the response variables of interest and test specific hypotheses about the sample data. Thus, the factors of *Attitudes*

Table 2. Factors generated (after factor analysis)

Attitudes	Attitudes (beliefs)	Religiosity
Drugs inject	Tolerance	Attachment
Teen abstinence	Acceptance	Involvement
HIV threat		Cognitive
Protection		Coping
Peer pressure		Intensity
Responsibility		Confidence (in scripture)
Using condom		

Table 3. Summary of all variables entered in for regression analysis

Attitudes	Knowledge	Religiosity	Others
Drugs inject	Confidence in knowledge	Attachment	Gender
Teen abstinence	Knowledge	Involvement	Age
HIV threat		Cognitive	
Protection		Coping	
Peer pressure		Intensity	
Responsibility		Confidence (in scripture)	
Using condom			
Tolerance (<i>belief</i>)			
Acceptance (<i>belief</i>)			

were modelled using all-subset regression in *R* (R Development Core Team 2009) and the highest Adjusted R-squared values. Through a process of statistical permutations, the best models are identified in an all-subsets plot which provides a means to subject all variables into predictable mode. The aim of these analyses was to identify which selection of variables best represent the response variables and obtain estimates for these effects.

Burnham and Anderson (2004) suggest three general principles to guide model-based inference: simplicity and parsimony, multiple working hypotheses and strength of evidence. Table 3 shows variables (factors) entered in for the regression analysis. Whilst the attitudinal factors constitute the response variables, the rest, are explanatory.

The selection procedures and the relationships between the response and explanatory factors were confirmed through the selection procedures based on BIC which allows for the comparison of all possible submodels. BIC is more stringent, usually motivated by the mathematical context of nested models including a true model simpler than the most general model in the set. Models, by definition, are only approximations to unknown reality or truth... (Burnham & Anderson 2004) but clustered around the 'best' model will be a set of alternatives almost as good and not statistically distinguishable (McCullagh & Nelder 1989). The model with the largest adjusted R^2 based on both BIC and adjusted R^2 statistic plot were considered. There were many models that could be made from the available data but in order to give some structure and limit the statistical output only those models with the most predictive power and of theoretical interest were described: models of *teen abstinence*, *tolerance* and *protection* (Table 4). These are consistent with the goal, essence and workable approaches in HIV education known to help someone eliminate or reduce the risk of becoming infected by abstinence, using condoms for protection and, reducing discrimination and stigma (AVERT 2009, 2008).

A linear regression model involving all variables was computed as additional selection procedure for verification followed by regression diagnostics and effect plots. *Regression diagnostics* refer to the general class of techniques for detecting problems

Table 4. Adjusted R^2 values of response variables

	Respective attitudinal (response) variables	Highest adjusted R^2
1	Teen abstinence	0.20
2	Tolerance	0.14
3	Protection	0.06
4	Acceptance	0.05
5	Drugs inject	0.04
6	Peer pressure	0.03
7	Responsibility	0.02
8	Using condoms	0.02
9	HIV threat	0.02

in regression with either the model or the data set; ascertain how well models resemble the data actually observed and the effect of each case on estimation (Weisberg 1985). *Effect plots/displays* are tabular or more often graphical summaries of statistical models (Fox 2003), simply describe the relationships in the models... illustrate the effect sizes and allow estimates to be made for specific combinations of variables (Hutcheson & Moutinho 2008; McCullagh & Nelder 1989).

Discussion

The result, generally, is comparable to earlier studies that religion is important to all respondents and remains important in Ghana. The findings of Fayorsey (2002) in a key baseline study in selected schools in Ghana showed 95% Christians, 2.8% Moslems; 0.5% traditionalist and others 1.7%. The 2000 population census showed 69% Christians, 15.6% Muslims, 8.5% Traditionalists and 6.9% others (GSS 2002). One unanticipated finding was the number of denominations involved, which surprisingly, numbered 55 for the 67.6% of respondents who indicated their denominations, majority of which are Pentecostal independent churches which do not belong to any of the mainstream traditional Christian denominations therefore making it difficult to categorise them into a formal taxonomy. The reason for the multiplicity of denominations is not clear but can be likened to Meyer's (1995) observation, that the increasing popularity of spiritual and Pentecostal churches in contemporary society is related to their ability to provide assistance for a range of illnesses. Similarly, Assimeng (1986) suggested that this growing popularity of 'new' Christian groups is due to the often involvement of the use of 'healing' and 'salvation', which seems to appeal to the needs of an impoverished population dissatisfied with their current socioeconomic condition reflecting the growing disenchantment with the monotony of the old denominations and with the liturgy and beliefs of the mainstream churches.

In an environment where God is central to most lives (Anane 1999; Meyer 1995), the practice of religion a major social norm and most intense, differences in religiosity, is not easily accounted for. These initial results were not enough to determine any kind of relationships. In line with Bergin (1991) and Ryan *et al.* (1993)

this study also identifies with the statement ‘if one is religious, it matters how one is religious’ (p. 594). Consequently, the modelling of the three response variables (*teen abstinence, tolerance and protection*) was done and showed varied relationships between each of the response variables and other variables including religiosity.

In the selection procedure of the models, all variables were laid at the horizontal axis and their respective values and significance at the vertical axis (also *bic* of individual models). A number of models were shown and each row is a model which contains different number of parameters. The choice of the best model depends on a good balance of the number of parameters and how useful information they convey. The overall level of religiosity was relatively high and contributes significantly to the prediction of attitudes modelled below; relationships mostly, between private religiosity. The prediction interval of each of the predictors was calculated based on 25% (lower) and 75% (upper) values of their numerical summaries, respectively in *R* (R Development Core Team 2009); the focus primarily was the confidence interval for group mean and the gender effect.

Predicting teen abstinence

The modelling of *Teen abstinence* (Fig. 1) shows that it has a statistically significant relationship with religiosity factors. Comparing all possible models, the first two with the highest score (at the apex) are considered the most significant. These are distinguished from the rest. The second model was chosen as the best fitting because it includes gender, a variable of theoretical interest, together with attachment, confidence, coping and intensity (all private religiosity variables).

$$\text{Model 1: Teen abstinence} = \alpha + \beta_1 \text{Attachment} + \beta_2 \text{Confidence} + \beta_3 \text{Coping} + \beta_4 \text{Intensity} + \beta_5 \text{Gender.}$$

Table 5 shows the parameters and their significance. The adjusted R^2 , 0.1882 explains about 19% of the variance.

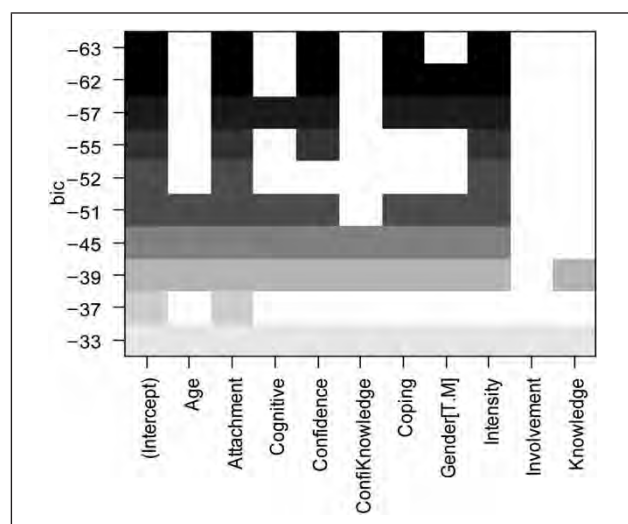


Fig. 1. Best model: teen abstinence.

Table 5. Final regression model of teen abstinence (regression parameters)

	Estimate	Std. error	t-Value	Pr(> t)
(Intercept)	0.10	0.063	1.520	0.129
Attachment	0.46	0.047	9.929	<2e-16***
Confidence in scripture	0.28	0.065	4.278	2.31e-05***
Coping	0.17	0.045	3.786	0.00018***
Intensity	0.25	0.045	5.451	8.35e-08***
Gender [T.M]	-0.21	0.092	-2.235	0.0259*

Notes: Multiple R^2 : 0.1973, adjusted R^2 : 0.1882. *F*-statistic: 21.68 on 5 and 441 DF, *p*-value: <2.2e-16.

The regression equation for the model (Table 5) shows:

$$\begin{aligned} \text{Teen abstinence} = & 0.10 + 0.46^* \text{attachment} + 0.28^* \text{confidence} \\ & + 0.17^* \text{coping} + 0.25^* \text{intensity} \\ & + -0.21^* \text{Gender[T.M]}. \end{aligned}$$

These partial regression coefficients identify the effect that each explanatory variable has on *teen abstinence* independent of other variables in the model (it identifies the unique contribution made by the explanatory variable in predicting teen abstinence) (Hutcheson & Moutinho 2008); represent the average change in teen abstinence that is expected to result from a change of one unit in that explanatory variables when all other variables are held constant. For each unit increase in attachment, confidence, coping and intensity, *teen abstinence* also increases but decreases with males. For example, for each unit rise in *attachment*, teen abstinence increases by an average of 0.46 (46%) whilst each unit rise in *confidence in scripture* leads to an increase of an average of 0.28 (28%) in teen abstinence. Further, teen abstinence increases by an average of 0.17 (17%) for each unit rise in *coping* and 0.25 (25%) for each unit rise in *intensity*. However, compared to girls, boys are 21% lower in terms of abstinence. *** indicate the most significant whilst and * indicate the least predictor of teen abstinence further explained by the effect plots below.

The diagnostic graphs below (Fig. 2, similar to those of models of *Tolerance and Protection*) showed that the data have not seriously violated the regression assumptions tested and suggest a linear relationship.

The residuals showed no obvious pattern when plotted against the predicted values; the residuals, roughly normally distributed. The cook’s distance showed no extreme and no unusual outliers but relatively well spread and do not lie far from the majority of observations. Fitted values are around zero and no systematic variation. Hutcheson and Sofroniou (1999) recommend a cut-off point calculated from the equation: cut-off = $4/n - p$ (where *p* is the number of model parameters including the intercept, and *n* is the number of cases). This is to see if the observation makes a significant difference to the fit of the model. The cut-off line occurs at $4/(448 - 6) = 0.010$ and about 16 cases are seen that may

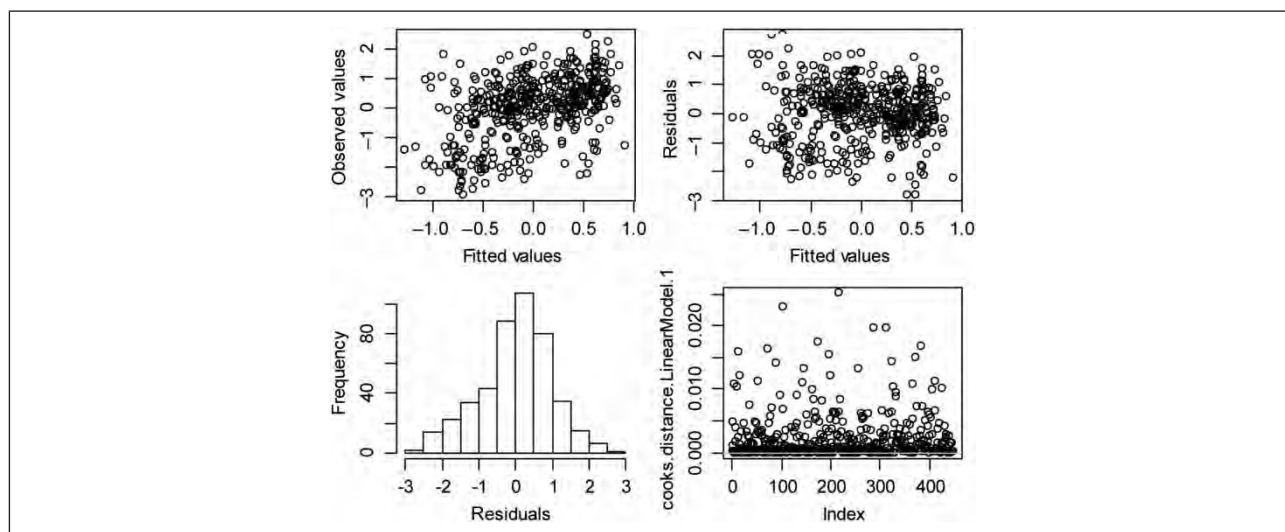


Fig. 2. Diagnostic graphs: teen abstinence model.

significantly alter the model fit. The pattern of outliers does not indicate extreme outliers; neither does it give cause for concern because 5% above the line was expected.

Effect plots

The effect of each of the explanatory variable (predictor) in the 'final model' on the response variable is displayed in Fig. 3. The vertical axis is labelled Teen Abstinence, the response variable (the scale of response) and the horizontal axis shows individual explanatory variable. The effect displays show size and direction; as a predictor increases, the response also increases. The approach goes a long way towards clarifying the fit of the model and simplifying their interpretation. All the religious factors (predictors) have effect on *teen abstinence* and show a linear relationship with the response variable but with varying degrees of effect. The strongest predictor is 'Attachment' at the top left panel and the weakest,

'Coping' at the bottom left. Attachment thus becomes the single biggest effect on teen abstinence, hence the major predictor.

Attachment theorists (Kirkpatrick 1997) have likened God to an attachment figure and individual's relationship with God considered as an attachment relationship. The theory suggests that people who experience a secure connection with God should also experience greater comfort in stressful situations and greater strength and confidence in everyday life. Attachment behaviour is designed to get children into a close, protective relationship with their attachment figures whenever they experience anxiety and the availability and responsiveness of an attachment figure, serves alternately as a haven and as a secure base . . . (Kirkpatrick 1997).

The 'rug plot' (one-dimensional scatterplot) at the bottom of each graph shows the distribution of the corresponding predictor. The broken lines give point-wise 95-percent confidence intervals

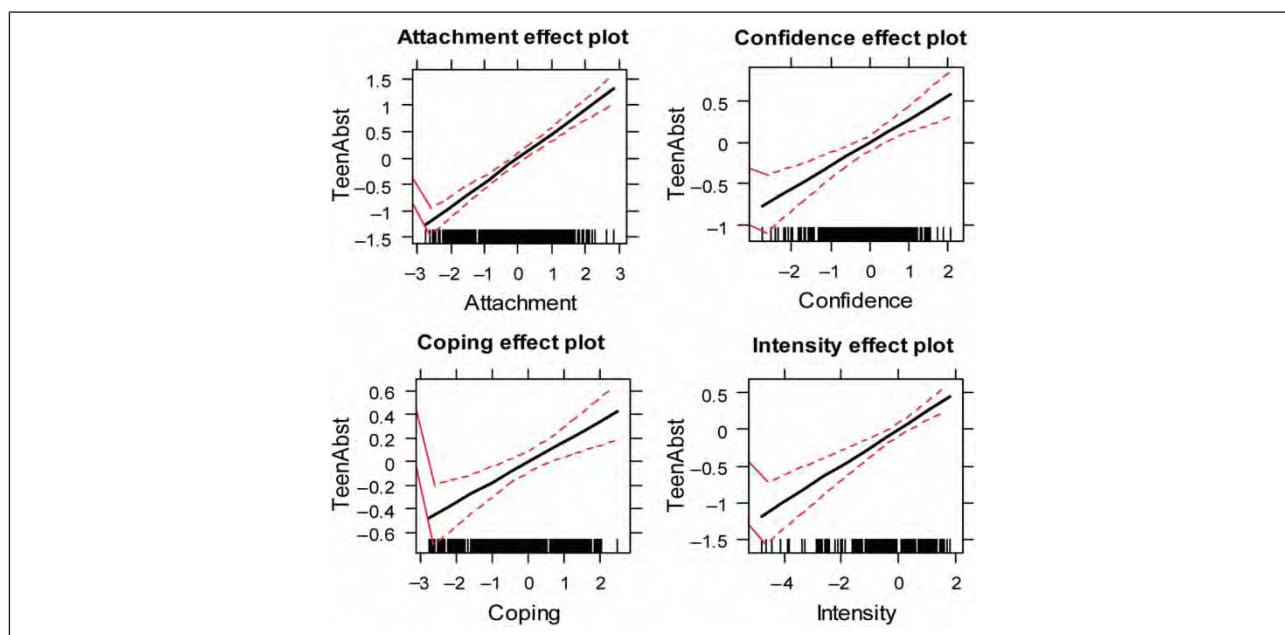


Fig. 3. Effect plots of predictors of teen abstinence: strength of predictors.

(envelopes) around the fitted values (effects) (Fox & Hong 2009). The confidence interval are indicated by the upper broken lines and the lower broken lines and between them the fit. People in high attachment have the highest probability to abstain whilst people in low attachment irrespective of what happens to other predictors (positive or negative) may not abstain. At the highest level of all the predictors corresponding distribution of religious predictors, is however sparse as shown in the one-dimensional 'rug plot': an indication that only those who attain a high level of religiosity are likely to abstain. A lower level of private religiosity means that a teenager may not abstain from sex. It is interesting to compare these results with an experimental abstinence programme without a moralistic tone reported to delay young teenagers from having sex in US study (Guardian News and Media Limited 2010). Assignments to help 662 black children, see drawbacks to sexual activity at their age (around 12), included, listing the 'pros' and 'cons' themselves. They found their 'cons' to sexual activity far outnumbered the 'pros'. The results whilst lending support for the plausibility of abstinence could be problematic as children grow and overcome these fears: sustaining their position.

Kabiru and Ezeh (2007), found 85% of Ghanaian male respondents aged 15–19 years reported no previous sexual activity similar to the findings of Fayorsey (2002) in Ghanaian study. They made recommendations endorsing abstinence until marriage as a preferred mode for HIV prevention and to serve as the basis 'to spearhead the drive toward abstinence and restore pride in virginity' (p. 16). However, Awusabo-Asare, Abane and Kumi-Kyereme (2004) consider virginity, which is an honour to the family of the female and a way to gain the respect of the family of the would-be husband, as double sexual standard for males and females, whereby parents expected only daughters to be virgins. Bersamin, Walker, Waiters, Fisher and Grube (2005) findings raise questions about the effectiveness of formal virginity pledges in preventing adolescent sexual behaviour but found informal pledge strongly and negatively associated with sexual intercourse.

Gender effect

Fig. 4 depicts the relationship between teen abstinence and gender showing teen abstinence is lower for males. Also in Table 5 the coefficient -0.21 for Gender means boys are 21% lower than girls for each unit rise. Girls have higher values than boys and therefore likely to be more religious than boys and are more likely to abstain than boys. On average, girls are 'more religious' than

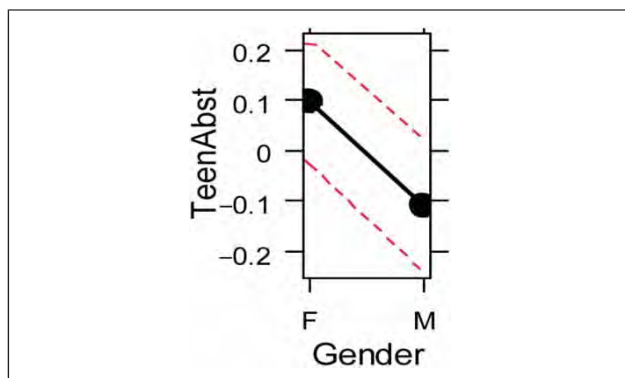


Fig. 4. Gender effect: teen abstinence.

boys, and more likely to attend services weekly and to report that religion is 'very important' to them (Regnerus *et al.* 2003).

The more one perceives that one can (i.e. has the necessary skills and abilities to) perform the behaviour, even in the face of specific barriers or obstacles, the stronger will be one's self-efficacy with respect to performing the behaviour (Fishbein 2000). However it is acknowledged that there is practical difference between what people believe and what they do when confronted with different environment. Influences on 'youth current beliefs' versus 'future intimate behaviours', especially, when they leave home for secondary school, outside daily scrutiny of parents, religious leaders and other social influences may be altered. For instance Regnerus (2007) notes that religious approaches to sexual issues that rely heavily on promoting abstinence until marriage may be problematic; adolescents who maintain that sex should be saved for marriage sometimes behave otherwise.

Predicting tolerance

The second model *Tolerance* (Fig. 5) was based on comparing all possible submodels. The fourth model, which also is a good fit, was considered the best model which provides some theoretical

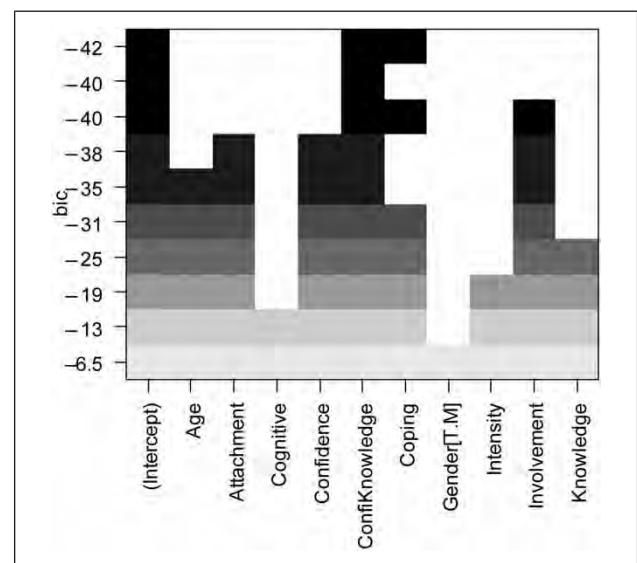


Fig. 5. Best model: tolerance.

Table 6. A regression model of tolerance (parameters)

	Estimate	Std. error	t-Value	Pr(> t)
(Intercept)	-1.91	0.27	-7.11	4.69e-12***
Attachment	0.08	0.03	2.55	0.01105*
Confidence in scripture	0.12	0.05	2.62	0.00917**
Confidence in HIV knowledge	0.04	0.00	7.17	3.07e-12***
Involvement	0.08	0.04	2.158	0.03144*

Notes: Multiple R²: 0.1422, adjusted R²: 0.1345. F-statistic: 18.37 on 4 and 443 DF, p-value: 5.646e-1.

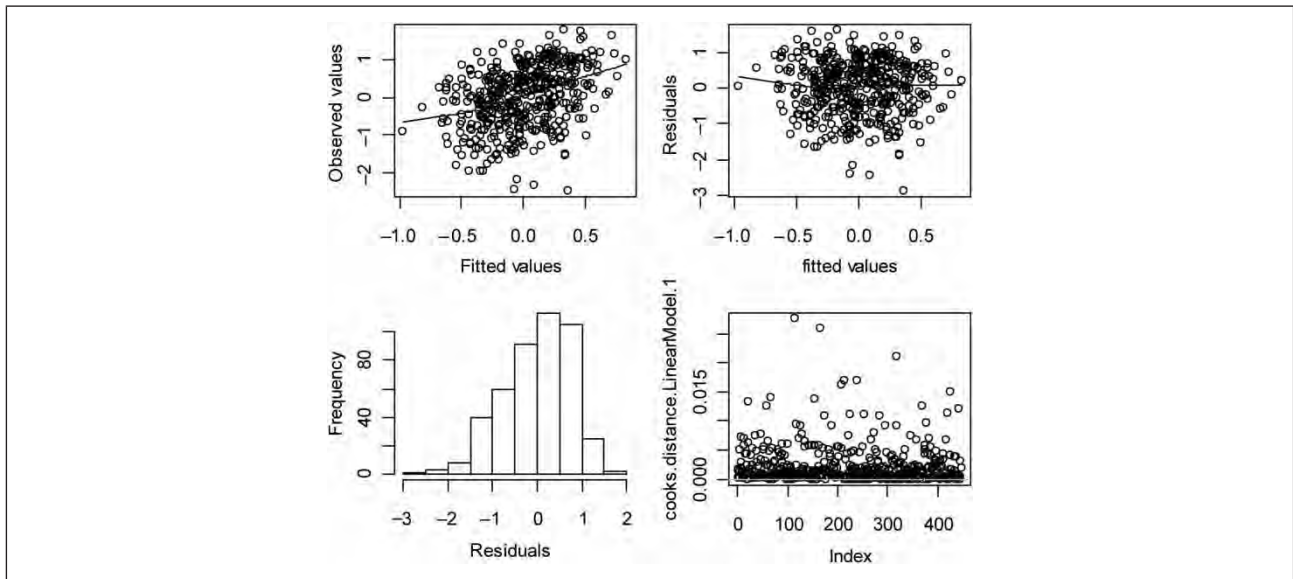


Fig. 6. Diagnostic graphs: tolerance.

interest. *Tolerance* had relationship with attachment, confidence (in scripture), involvement and confidence in knowledge.

Model 2: $Tolerance = \alpha + \beta_1 \text{ Attachment} + \beta_2 \text{ Confidence} + \beta_3 \text{ ConfiKnowledge} + \beta_4 \text{ Involvement}$.

Table 6 shows the parameters and their significance. The adjusted R^2 , 0.1345 explains about 13.5% of the variance.

The regression equation for the model (Table 6) shows:

$$Tolerance = -1.91 + 0.08 * \text{attachment} + 0.12 * \text{confidence} + 0.04 * \text{confiKnowledge} + 0.08 * \text{Involvement}.$$

The regression parameters of each of the explanatory variables represent the average change in *tolerance* that is expected to result from a change of one unit in that explanatory variables

when all other variables are held constant. For example, for each unit rise in *attachment*, tolerance increases by an average of 0.08 (8%) whilst each unit rise in *confidence in scripture* leads to an increase of an average of 0.12 (12%) in tolerance. However, tolerance increases by an average of 0.04 (4%) for each unit rise in *confidence in HIV knowledge* and 0.08 (08%) for each unit rise in *involvement*. *** indicate the most significant followed by ** whilst * indicate the least predictor of tolerance. These are further explained by the effect plots below. These partial regression coefficients identify the effect that each explanatory variable has on *tolerance* independent of other variables in the model (Hutcheson & Moutinho 2008:30). In the diagnostics (Fig. 6), the cut-off line occurs at $4/(448 - 5) = 0.010$ and about 18 cases are seen that may significantly alter the model fit. The pattern of outliers does not indicate extreme outliers; neither does it give cause for concern because 5% above the line was expected.

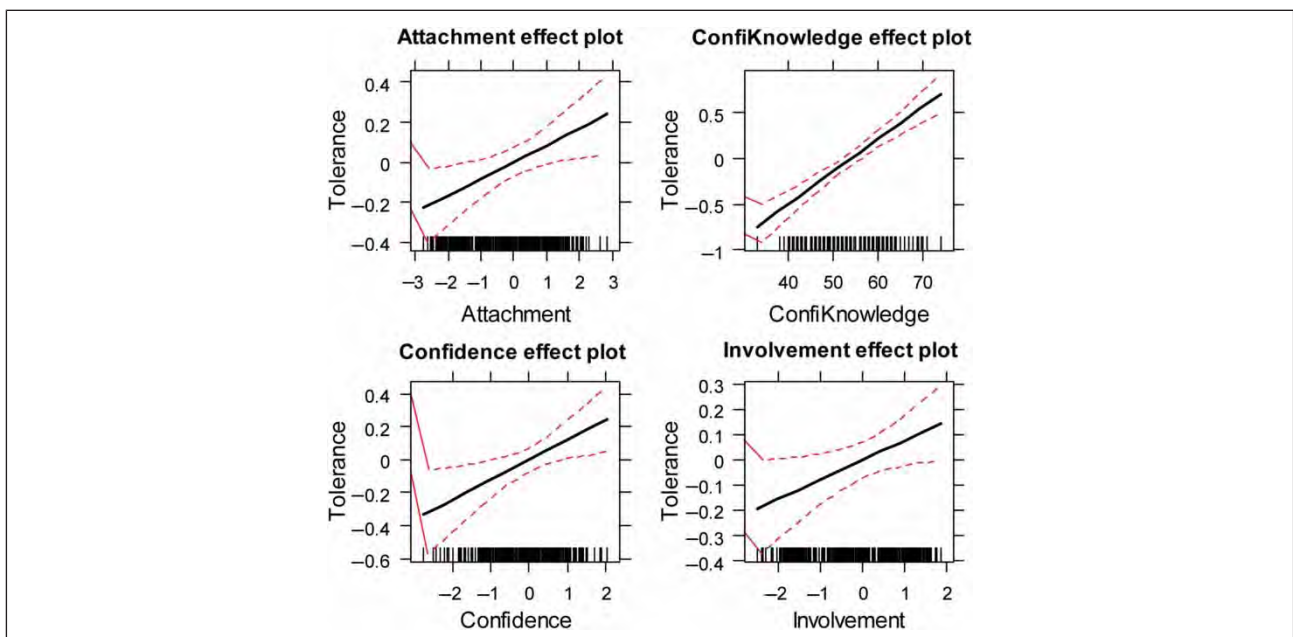


Fig. 7. Effect plots of predictors of tolerance.

Tolerance was best predicted by three religiosity factors: attachment, confidence (in scripture) and involvement, and confidence in HIV knowledge: they constitute the final model, where both private and public religiosity, combine to predict an outcome. Attachment and confidence (in scriptures) are both private religiosity, whilst involvement is a public religiosity. Individuals who attend religious services frequently and who value religion in their lives are probably more likely than others to develop sexual attitudes and behaviour that are consistent with their religious doctrines (Odimegwu 2005).

The effect of each of the explanatory variable in the ‘final model’ on the response variable is displayed in Fig. 7. The vertical axis is labelled *Tolerance*, the response variable and the horizontal axis shows individual explanatory variable. In general, tolerance increases as all the predictors also increase but confidence in HIV knowledge is the highest predictor of *tolerance*. Pupils with higher confidence in their HIV knowledge are more likely to tolerate people infected with HIV.

Predicting protection (with condoms)

Protection is the third response variable with the most predictive model. Fig. 8 shows the presentation of all variables in the

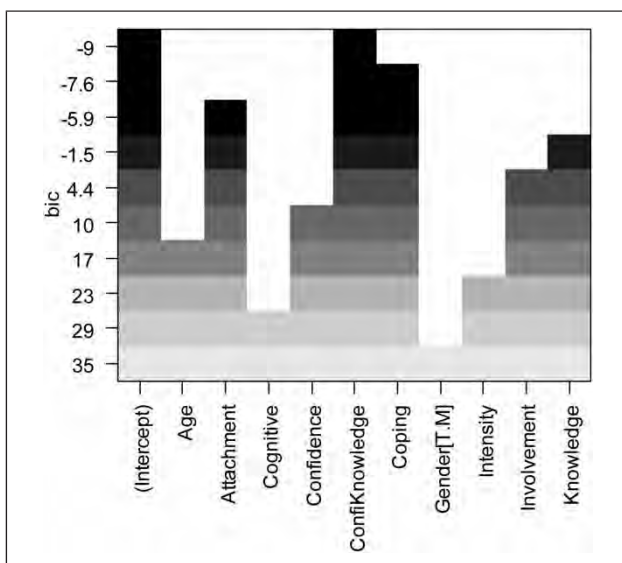


Fig. 8. Best model: protection.

Table 7. A regression model of protection (parameters)

	Estimate	Std. error	t-Value	Pr(> t)
(Intercept)	-1.74	0.35	-5.01	7.99e-07**
Attachment	-0.09	0.04	-2.09	0.0375*
Confidence in HIV knowledge	0.03	0.01	5.05	6.33e-07***
Coping	-0.11	0.04	-2.52	0.0121*

Notes: Multiple R²: 0.06559, adjusted R²: 0.05926. F-statistic: 10.37 on 3 and 443 DF, p-value: 1.323e-06.

selection procedure. Comparing all possible submodels, the first three models at the apex are the most significant and best-fitting but the third, more of theoretical interest.

$$\text{Model3:Protection} = \alpha + \beta_1 \text{Attachment} + \beta_2 \text{ConfiKnowledge} + \beta_3 \text{Coping}$$

Table 7 shows the parameters and their significance. The adjusted R², 0.05926 explains about 6% of the variance.

The regression equation for the model (Table 7) shows:

$$\text{Protection} = -1.74 + -0.09^* \text{attachment} + 0.03^* \text{confiKnowledge} + -0.11^* \text{coping}$$

The regression parameters of each of the explanatory variables represent the average change in *protection* that is expected to result from a change of one unit in that explanatory variables *when all other variables are held constant*. These partial regression coefficients identify the effect that each explanatory variable has on *protection* independent of other variables in the model (it identifies the unique contribution made by the explanatory variable in predicting *protection*) (Hutcheson & Moutinho 2008). For example, for each unit rise in *attachment*, protection reduces by an average of 0.09 (9%) whilst each unit rise in *confidence in HIV knowledge* leads to an increase of an average of 0.03 (3%) in protection. However, protection decreases by an average of 0.11 (11%) for each unit rise in *coping*. *** indicate the most significant followed by ** whilst * indicate the least predictor of protection. These are further explained by the effect plots below. In the diagnostics (Fig. 9), the cut-off line occurs at 4/(448-4) = 0.010 and about 19 cases are seen that may significantly alter the model fit but does not give cause for concern because 5% above the line was expected.

In the effect display (Fig. 10), the vertical axis is labelled *protection (with condoms)*, the response variable and the horizontal axis shows individual explanatory variable, the predictor. Protection (condom use) was best predicted by two religious factors, attachment and coping, and confidence in HIV knowledge.

The relationship shows, as attachment and coping increase, protection decreases; the relationship is inversely related. Protection however increases with increasing confidence in HIV knowledge, the highest predictor. Protection is negatively related to religiosity therefore highly religious people are not likely to use condom. Addai (1999) found religion to be a significant predictor of contraceptive use. Some religious groups view any discussions about condoms as implying a support of pre-marital and extramarital sex; it is likely that they may not talk about condoms in their discussions about AIDS (Takyi 2003).

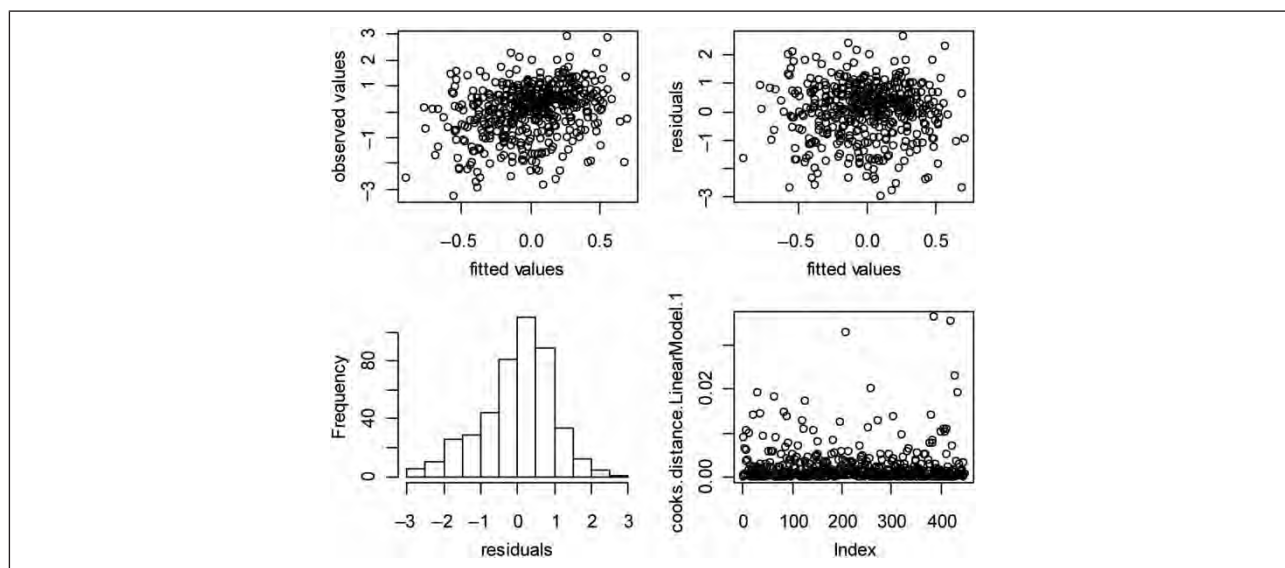


Fig. 9. Diagnostic graphs: protection model.

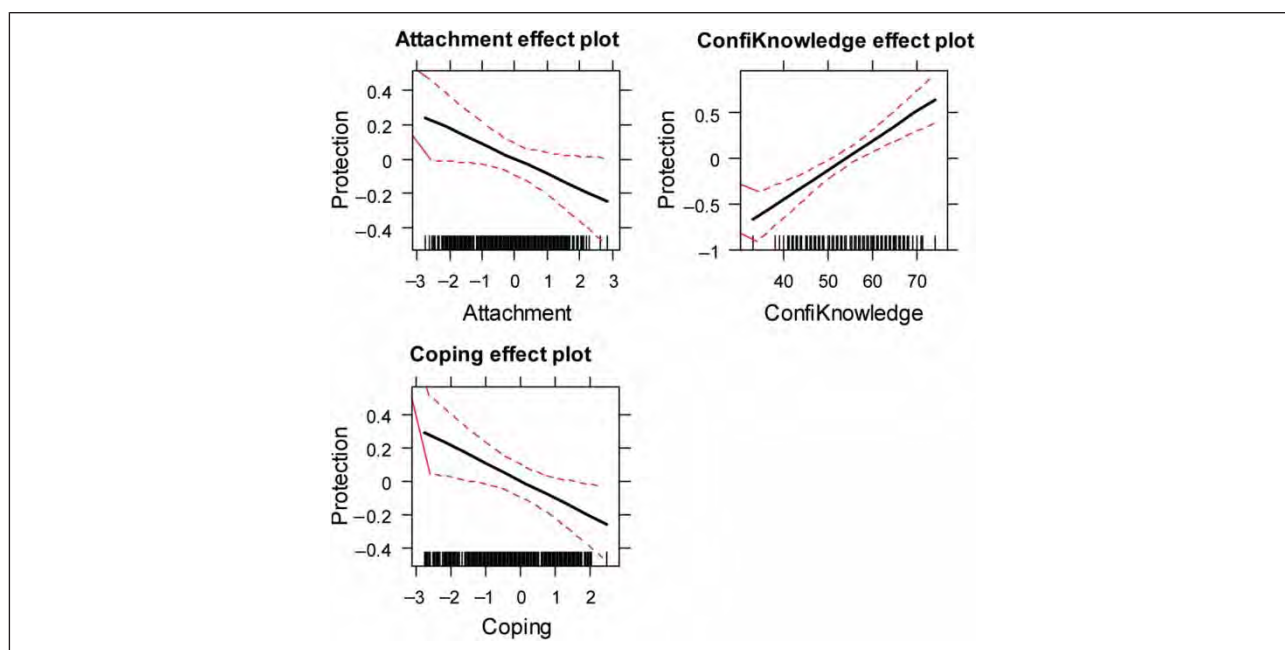


Fig. 10. Effect plots of predictors of protection.

Conclusion

The findings support the beneficial effects of school-based interventions with improved environment. Major gaps in HIV/AIDS knowledge support the view that knowledge levels are not yet universal; a comprehensive and systematic approach is important to ensure that people are continuously educated and updated; also to address signs suggesting stigmatisation or discrimination of infected people. Consistent with prior studies (Odimegwu 2005; Regnerus *et al.* 2003), findings in this study indicate that religiosity may represent an important protective factor, supporting the assumption that adolescents who strongly identify with religious teachings and traditions are less likely to engage in HIV risk-related behaviours. A flipside to the protective effect of religion

supports other findings that religious individuals who are sexually active are less likely to report 'safe sex' practices like condom use (Bearman & Brückner 2001).

As a multi-dimensional construct, certain dimensions of religiosity were more prominent and influential than others. *Attachment* (to God) was the only religiosity factor found to have relationship with all the attitudinal factors; a dimension known to have been generally ignored in empirical research on religiosity. Attachment (to God), noted as the highest form of religiosity, is also an intrinsic religiosity, where the individual has a daily spiritual experience and personal relationship with God (Fetzer Institute 1999). Whilst attachment is part of all the models, its contribution is

positive towards *teen abstinence* as the major predictor and *tolerance* (to infected people) but negative towards *protection* (by condom). Those with high *attachment* are less likely to use condoms once they do initiate sex. The major predictor of tolerance and protection was *confidence in HIV knowledge*. Pupils with higher confidence in their HIV knowledge, are more likely to tolerate people who have HIV/AIDS and also more likely to use condoms in sexual activities.

The preference for private (personal) religiosity as against public (organisational) mode; intrinsic instead of extrinsic religiosity seems to be the most telling finding to emerge from this study, therefore suggesting that religious-based adolescent interventions should focus on intrinsic religiosity. These preferences also suggest a higher sense of value and moral-based motivations are related to drawing strength and stability from the highest form of religiosity (in themselves), where the adolescent has a personal relationship with God. Related to this, are the findings of Leonard and Scott-Jones (2010) study among high school students, in the USA, that the frequency of religiosity ratings, increased from the external and public to the internal and private components.

The findings suggest a relationship between theories of attitudes, beliefs and behaviour. Taken together, a role for *religiosity* is suggested with the potential to promote positive attitudes and behaviour in health-based problems, including HIV. However it cannot be guaranteed as a 'magic wand' to solve all related problems. The evidence does not support the prospect of attaining abstinence for all. Whilst all respondents may be religious, levels of religiosity vary. Some religious people may abstain but not all religious people will. It is also not certain what pupils do or will do in spite of their convictions, especially when they progress to boarding schools after JHS, away from scrutiny of parents or religious groups. The complexity of adolescent sexual behaviour raises a major concern; any personal and cultural inhibitions, therefore need to be reconsidered.

Whilst upholding attitudes which support abstaining, a lot more needs to be done to strengthen alternative approaches to ensure protection for all. Potential conflict between abstinence and condoms as methods of preventing HIV transmission needs addressing.

Among the limitations of this study includes the use of a cross-sectional research design, capturing only respondents' views at one moment which may not allow for complete understanding of effects of time in adolescent development on religiosity and attitudes. Also, there can be no claims for generalisation of conclusions. The effects of tribal differences and Christian denomination were not considered due to their multiplicity, thus limiting our understanding of the complexity of the relationships.

Implications for practitioners

The evidence from this study suggests that religiosity is an important constituent in the life of the Ghanaian adolescent which could generate positive effects on their attitudes to HIV: an implication for policy, theory and methodology. Policy makers could consider religion (spirituality) as part of health promotion

intervention design, especially the current HIV/AIDS prevention activities and other behaviour-based problems. Developing and implementing effective HIV education strategy is a challenge which policy makers constantly face. What is culturally acceptable to a community is vital to any successful implementation. Since the results suggest that religiosity has some influence in attitudes and consequently lifestyle, identifying its effects among target audiences could serve a useful purpose. Incorporating reasons adolescents give for not engaging in sexual intercourse and in other behaviour-based health problems could provide an important direction and heighten effectiveness in interventions. It may also be beneficial to redefine and prop up the role of religious leaders and institutions in prevention programmes to offer them a well-informed 'voice' to reach their members. Finally, equipping Teachers continuously is crucial due to their role in school-based education. This may help bring about improved knowledge base and understanding of students.

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