IOSR Journal of Pharmacy (IOSRPHR)
ISSN: 2250-3013, Vol. 2, Issue 4 (July2012), PP 58-65
www.iosrphr.org

HIV prevention behavior scale: testing for factorial invariance across lower class and upper class historically black college students

Nicole Lucas[1*], Maurice Y. Mongkuo[2], Angela Taylor[3], Jilly Ngwainmbi[4]
[1]*Department of Sociology, Fayetteville State University, North Carolina, U.S.A*
[2]*Department of Government & History, Fayetteville State University, North Carolina, U.S.A.*
[3]*Department of Criminal Justice, Fayetteville State University, North Carolina, U.S.A.*
[4]*Department of Sociology, Fayetteville State University, North Carolina, U.S.A*.

***Abstract*—This study examined the factorial invariance psychometric measurement and structure of the HIV prevention model (HPM) scale across lower class (freshmen and sophomores) and upper (seniors, juniors, and graduate students) class students attending a Historically Black College and University (HBCU). The HPM scale was developed and validated using exploratory and confirmatory factor analyses by Mongkuo et al. (2012a). The validation process relied on the Information-Motivation-Behavioral Skill model (Fisher, Fisher, Harman, 2003) to identify the four factors or dimensions of HIV prevention behavior with sound psychometric properties: HIV prevention knowledge, HIV prevention education motivation, HIV prevention personal motivation, and HIV prevention behavioral skills. The data for the study was derived from a survey using a convenience sample of students at an HBCU. The aim of this study is to determine the external validity of the HPM scale for use in assessing HIV prevention programs at HBCUs. The HPM invariance was tested by estimating the chi-square goodness-of-fit statistic, comparative fit index (CFI), and Tucker-Lewis fit index (TLI). The analyses found that the HPM scale's factorial measurement and structure were invariant across lower class and upper class HBCU students, thus, confirming the external validity of the scale.**

***Keywords*— Factorial equivalence, HIV prevention measurement, confirmatory factor analysis, cross-group invariance, Historically Black Colleges and Universities, AMOS.**

I. INTRODUCTION

In the United States, the continued rise in HIV infection among college students attending historically black colleges and universities (HBCU) has become a major public health concern. Research data indicate that while HIV infection seems to have stabilized or slightly decreased among college students in general, the trend among African American college students continues to rise (Hightow et al., 2005; CDC 2011). Specifically research indicates that the incidence and spread of HIV/AIDS and other sexually transmitted diseases among heterosexual college students attending HBCUs in the United States continues to rise at an alarming rate. This is despite increased investment in HIV prevention programs aimed at reducing engagement in risky sexual behavior among students on college campuses (CDC, 2004a, 2004b, 2004c, 2006, 2008, 2008a; Lewis et al., 2000; Yee, 2004; Hightow et al., 2005; Leone et al., 2004). Research suggests that HIV prevention programs are more likely to succeed when they are based on empirical evidence and theory (Choi & Coates, 1994; Kelly, 2002; Leviton, 1989). The Information-Motivation-Behavioral Skills (IMB) theoretical model is useful in both explaining HIV prevention and other health-promoting behaviors, and providing a useful framework for developing HIV prevention programs. (Fisher & Fisher, 1992, 2000; Fisher el al., 2003; Misovich et al., 2003). In particular, the IMB model states that HIV prevention information and motivation work through prevention behavioral skills to influence risk reduction behaviors, such as safe sex practice (Fisher & Fisher, 1992). The model considers information and motivation to be independent constructs that may relate to the practice of behavioral skills relevant to risk behavior change. In effect, the model proposes that to practice safe sex, it is necessary for an individual to possess both the information or knowledge about how to prevent HIV infection, and the motivation to prevent HIV infection.

Using the IMB as a theoretical framework, researchers have developed and used several instruments to measure HIV prevention behavior for samples of the general population determined to be at-risk of HIV infection (Misovich et al., 2003; Fisher et al, 1994; Fisher et al., 1999, Bryan et al., 2002; Mongkuo et al., 2010a). These instruments have generally been effective in assessing HIV prevention programs (Glasford, 2008; Misovich et al., 2003; Botvin et al., 1989; and Foote et al., 1985). Researchers have drawn on various

behavioral models to predict preventive behavior among college students with the goal of designing effective HIV/AIDS education and prevention programs. Unlike the theory of reasoned action (Ajzen & Fishbein, 1980) and the theory of planned behavior (Ajzen & Fishbein, 2005), the IMB model has been validated extensively and provides a more comprehensive model for identifying socio-cognitive predictors of health behavior outcomes (such as HIV prevention) (Carey et al., 1997; Fisher et al., 1996; Fisher & Fisher, 1992, 2000, 1993; Fisher et al., 2003; Cargill et al., 2006). In addition, the IMB model has been applicable to behaviors outside the HIV domain, including voting behavior (Glasford, 2008), breast self-examination behavior among women (Misovich et al., 2003), adolescence smoking behavior (Botvin el al., 1989) and oral rehydration behavior in developing countries (Foote et al., 1985). However, few studies have sought to test the applicability of the IMB model for understanding HIV risk behavior among students' behavior attending HBCUs.

To address this void, this study uses SEM to develop and test the psychometric properties of newly developed HPM scale that is based on the IMB model (Mongkuo et al., 2012a). Subsequently the scale was used to assess the influence of HIV prevention motivation and HIV prevention knowledge in explaining HIV preventive behavioral skills among students attending an HBCU (Mongkuo et al., 2012b). The goal of this research was to identify specific factors that contribute to improving HIV preventive behavior among the students, which could lead to designing effective HIV prevention program at HBCUs. In applying the IMB model, the researchers hypothesized that an HBCU college student's level of HIV prevention information or knowledge and HIV prevention motivation are fundamental determinants of their level of HIV prevention behavioral skills which, in turn, leads to HIV prevention behavior. To the extent that at-risk HBCU college students are well informed and motivated to practice HIV risk prevention and possess the skills required to effectively prevent HIV infection, they will be more likely to engage in HIV prevention behavior. Conversely, to the extent that these students are poorly informed about HIV risk prevention, unmotivated to engage in HIV risk prevention, and lack the behavioral skills required to effectively prevent HIV infection, they will be less likely to engage in HIV prevention behavior.

Exploratory factor analysis (EFA) identified four dimensions or subscales of HIV prevention behavior with acceptable internal consistency (i.e. Cronbach's alpha higher than .60) composed of 21 items scored on a 5-point Likert scale range from 1= strong agree to 5 strongly disagree. The measurement instrument was then subjected to confirmatory factor analysis (CFA) using AMOS 17.0 (Arbuckle, 2007). The first factor, named "Prevention Education Motivation" had three items and Crobach's alpha of 0.90. Factor 2, called "Prevention Knowledge" had four items and Cronbach's alpha of 0.677. Factor 3, named "Prevention Personal Motivation" had two items with Cronbach's alpha of 0.52. The factor loadings for each of the latent constructs ranged from reasonable (0.30) to substantive (0.90) and statistically significant. Within factors, most subtests items had fairly equivalent loadings on the latent construct they should measure.

Overall, the fit statistics revealed that the estimated model reproduces the sample covariance matrix reasonably well. Furthermore, the researchers found evidence of construct validity in terms of convergent and discriminant validity. The HPM scale behaved as expected in terms of unidimensionality of the four measures of the IMB model and the way the constructs relate conceptually to measures of HIV prevention behavior found in previous studies (Fisher and Fisher, 2002; Fisher and Fisher, 2000; Fisher et al., 2003; Bryan et al., 2002; Carey et al., 1997; Abraham and Sheehan, 1994; Glasford, 2008; Misovich et al., 2003; Botvin et al., 1989; Foote et al., 1985; Avant et al, 2000, Osborne and Egede, 2010; Misovich et al., 2003). This initial validation of the HPM is important for three reasons. First, the HPM scale could be used to conduct a more thorough assessment of HIV prevention programs at HBCUs. Second, the HPM could be used to conduct future research to increase our understanding of HIV prevention behaviors at HBCUs. Third, the validated HPM scale provides a guide to design research-driven HIV prevention programs at HBCU institutions, as well as monitor and evaluate new HIV prevention programs at historically black college campuses.

However, the researchers acknowledged two limitations of the study. The first limitation is that the study did not examine the psychometric structure of social prevention motivation, which is a key dimension of the motivation construct of the IMB model. Instead, this construct was replaced with education prevention motivation primarily because a goal of the study was to develop a valid HIV prevention measurement instrument, which can be used to assess education prevention programs on HBCU campuses. However, the researchers proposed that future studies should extend the validation process to include social prevention motivation. The second limitation pertinent to the present study is that, while the study found a good fit for the psychometric properties of the HIV prevention behavior measurement model, it did not cross-validate the results using data from a different sample. Hence, the external validity of the measurement instrument is questionable. To establish external validity of the HPM instrument as suggested by Cheung & Renvolt (2002), the researchers proposed that future studies should extend the CFA to test for multi-group metric factorial and structural invariance across HBCU samples.

The purpose of this study is to address the second limitation by testing the factorial structure and invariance or equivalence of the HPM scores across the distinct groups: lower class levels (freshmen,

sophomore) vs upper class levels (Junior and Senior). College student prevention behavior reveals considerable interest in academic class differences related to both risky behavior and health prevention practice. Implicit in such comparisons is the assumption that the measuring instrument is factorially invariant across lower class and upper class students. More specifically, equivalence is assumed for: (a) the number of underlying prevention behavior factors across academic class; (b) the pattern of factor loadings (i.e. items load on the same factor across academic class); and (c) the theoretical structure of prevention behavior (that is, the pattern and magnitude of relations among the underlying factor is the same across academic class).

To the extent that an assessment instrument is not factorially equivalent across groups, the credibility of the HPM scale for use in designing effective prevention programs is rendered dubious. Logically, therefore, the next step in the validation process is to determine the extent to which the factorial structure of the HPM is invariant across HBCU academic class. The present study addressed this issue by testing the equivalence of the measurement and structural components of HPM model across two academic classes (upper and lower). More specifically, the study tested the following three hypotheses: (1) the items comprising the HPM scale operate equivalently across lower class and upper class HBCU students (configural model); and (2) the factorial loadings of the HPM scale are equivalent across lower class and upper class HBCU students (measurement model equivalence); (3) the factorial structure of the HPM instrument is replicated across lower class and upper class HBCU students (structural model equivalence).

II. METHODS

Research Design

This study employed a cross-sectional quasi-experimental one-shot case study design (Isaac and Michael, 1997). The design involved using a self-administered survey to obtain the perception of HBCU students about the requisite information and motivation required to enact HIV risk prevention behavioral skills and HIV preventive behavior. This design is generally considered to be most useful in exploring researchable problems or developing ideas for action research (Isaac and Michael, 1997). Also, this design is considered to be appropriate when exploring individuals' perception of relatively new or less understood phenomenon, such as HIV prevention behavior among students attending HBCUs. A schematic representation of the design is displayed in Figure 1.

Figure 1. Quasi-experimental One-shot Case Study Design.

Treatment	**Post test**
X	O_2

where X is an HBCU student's level of HIV prevention information or knowledge and prevention motivation (education and personal). O_2 is a student level of HIV prevention behavioral skills.

Participants and Procedure

The HBCU selected for this study has a population of 6,217 college students enrolled. A breakdown of the population by race/ethnicity shows that approximately 70% is African American, 17% Caucasian and 4% Hispanic, 1% Native American and 4% other racial/ethnic groups. The age distribution of the student population ranges of 17 to 25 years old (55%), 26 to 40 years (31%), and above 40 (14%). Most of the students are females (68%) while males were 32%. The distribution of the population by academic class shows: Freshmen (19%), sophomore (15%), junior (18%), senior (32%), and graduate (11%). Most of the students attending the university are enrolled as full-time students (66%), while 34% are part-time.

Participants in the study include a purposive, convenient sample of students attending HBCU. After receiving Institutional Review Board's (IRB) approval, various professors were contacted and asked for permission to conduct the survey during a portion of their class time. Once the permission was granted; we met with the students during the class period and explained the purpose of the study to them. They were also informed that their participation was strictly voluntary and they may either opt not to participate in the study and leave, or not provide a response to any of statements. In addition, the students were informed that no incentive will be provided for their participation in the study. The students who agreed to participate in the survey were provided with a consent form for them to read, sign with date. The consent form explained to the students that their participation was voluntary and would not affect their grade and their identity will be kept strictly confidential and their names would not appear in any report. We adhered to all American Psychological Association (APA) research guidelines. The survey was anonymous in that no identifying information was connected to individuals, or included in the data set. Participants completed the survey during class time and returned them before leaving the class. A total of 371 students agreed to participate in the survey.

A breakdown of the 371 study participants by race/ethnicity shows that approximately 77% is African American, 11% Caucasian and 3% Hispanic, .8% Native American and 6% other racial/ethnic groups. The age

distribution of the participant population ranges of 18 to 25 years old (77%), 26 to 34 years (11%), 33 to 44 (8%), 45 to 54 (3%), 55 and above (.5%). The distribution of the participants by academic class shows: Freshmen (24%), sophomore (17%), junior (22%), senior (35%), and graduate (.5%). Most of the participants attending the university are enrolled as full-time students (97%), while 2% are part-time.

Measures

The HIV Prevention Measure (HPM) survey instrument developed and validated by researchers at Fayetteville State University in North Carolina was used to collect the data for this study (Mongkuo et al., 2012). The survey instrument includes items measuring the three components of the IMB model –HIV prevention information, motivation, and behavioral skills.

Information. HIV prevention knowledge was measured by four items scored on a 5-point Likert scale ranging from 1=strongly agree to 5=strongly disagree: (a) A person can get HIV from tears or saliva, (b) A person can be infected with the AIDS virus from someone's, (c) Sharing cooking utensil with a person who has AIDS is not safe, (d) A person can get the AIDS virus by using a public toilet. The four item were used as indicators of the IMB's latent information variable (see Table 1), which loading significantly on all four measures (p = .001).

Motivation. Two types of HIV prevention motivation were assessed: education and personal. HIV prevention education motivation was measured by three items scored on a 5-point Likert scale ranging from 1=strongly agree to 5=strongly disagree: (a) HIV education in middle school is a waste of time, (b) HIV education in high school is a waste of time, (c) HIV education in college is a waste of time. The three items were used as indicators of the IMB's latent education motivation variable (see Table 1), which loaded significantly on all three measures (p = .001).

HIV prevention personal motivation was operationalized using three items: (a) During sex, I would be insulted if my partner insisted we use condoms, (b) I intent to talk about HIV prevention with a mate only after sex, (c) I dislike the idea of limiting sex to just one partner. The three items were used as indicators of the IMB's latent personal motivation variable (see Table 1), which loading significantly on all three measures (p = .001).

Behavioral skills. HIV prevention behavioral skills were measured by two items scored on a 5-point Likert scale ranging from 1 = Strongly disagree to 5 = Strongly agree: (a) I would openly promote others to get tested for HIV, and (b) If I was HIV positive, I would tell my mate. The two items were used as indicators of the IMB's latent behavioral skills variable (see Table 1), which loading significantly on the two measures (p = .001).

Statistical Analysis

The statistical test for factorial and structural invariance or equivalence encompassed a series of hierarchical analyses using AMOS 17.0 (Arbuckle, 2007). Following Joreskog (1971) guidelines, the test began with the determination of the HPM baseline model (with no between-group constraints) for each group of students separately. This model, commonly referred to as the configural model, incorporated the baseline models for lower class and upper class students. This model represents the one that best fits the data from the perspectives of both parsimony and substantive meaningfulness. That is the model represents one that fits the data and where minimal parameters specification is optimal (Byrnes, 2010). Next, tests for equivalence for parameters were conducted across the two groups of students at each of several increasingly stringent levels, beginning with the measurement model, and then the structural model. The factor loadings for each observed measure were tested for equivalence across the two groups of students. Once it was known which measures were group-equivalent, these parameters were constrained equal while subsequent tests of the structural parameters were conducted. Thus, the process of determining nonequivalence of measurement and structural parameters across the two groups of students involved the testing of a series of increasingly restrictive hypotheses.

The 21-item HPM developed by Mongkuo et al (2012) provided the basis for the hypothesized model used to determine the baseline model for each academic level as presented in Figure 1.

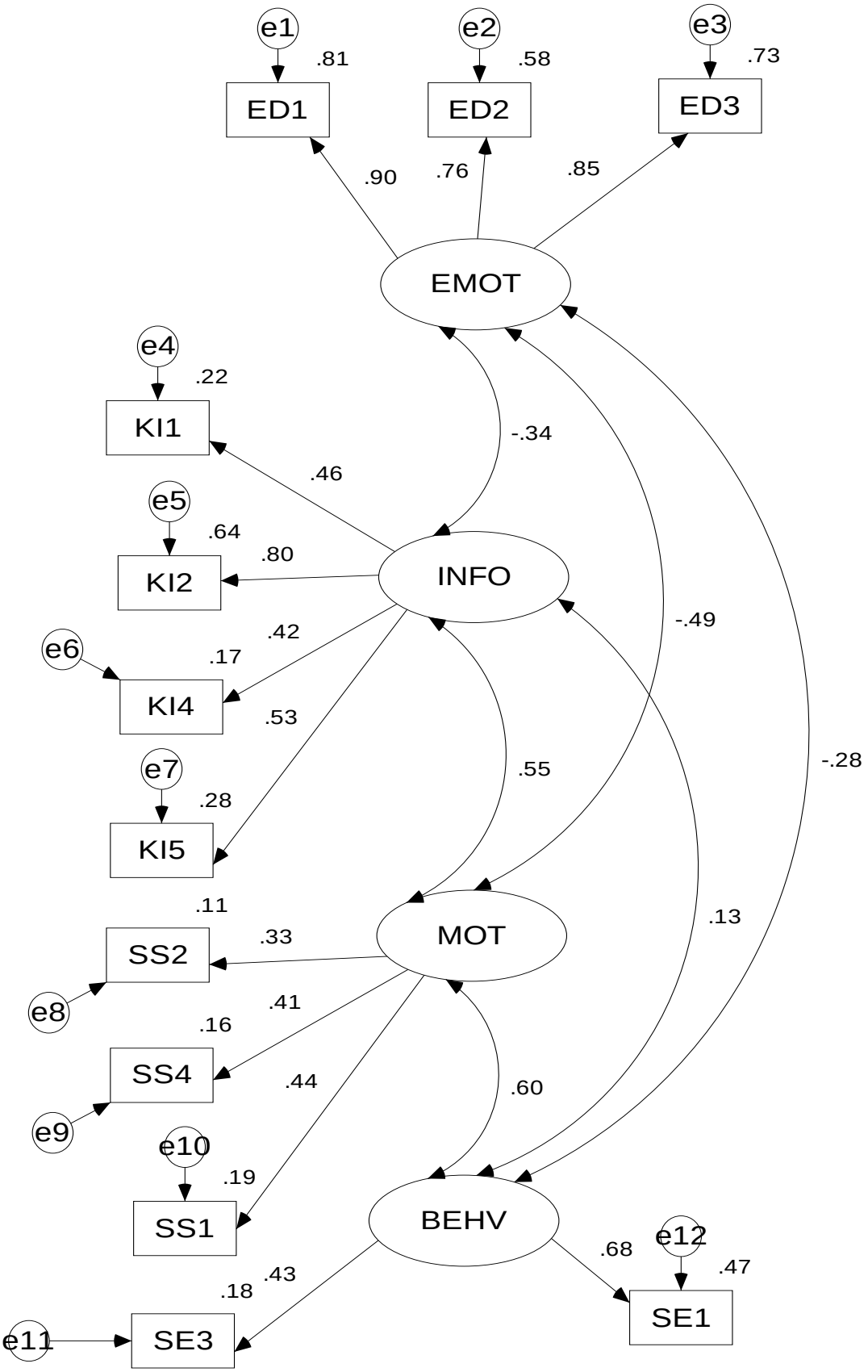

Figure 1. Hypothesized multigroup baseline model of HPM structure

If the model fit the data well for both groups of students, it was maintained as the hypothesized model in the test for equivalence across the two groups of students. If the model exhibited a poor fit to the data for lower class

and upper class students, it will be modified accordingly and become the hypothesized multigroup model under test. Because the estimation of the baseline model involves no between-group constraints, the data was analyzed separately for each group. However, in testing for invariance, equality constraints were imposed on particular parameters and, thus allowing for the data for the two groups to analyzed simultaneously to obtain efficient estimates (Bentler, 2005, Joreskog & Sorbom, 1996).

A number of indices were used to evaluate the goodness of fit of the four-factor orthogonal HPM configural model. The models absolute fit was assessed using chi-square (χ^2) statistics, with low χ^2 considered good fit (Hair et al., 2006). Incremental fit was evaluated using the Root Mean Square Errors of Approximation (RMSEAs) with a value less than 0.06 indicating a relatively good fit, along with Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) with values of .95 or greater considered desirable (Hu & Bentler, 1999; Hair et al., 2006, Blunch, 2010; Brown, 2006). Assessing invariance involved comparing the goodness-of-Fit for the configural model to the constrained measurement and structural model, with evidence of noninvariance claimed if the χ^2 difference ($\Delta\chi^2$) value is statistically significant (Byrnes, 20102; Joreskog, 9171) and/or the CFI difference (ΔCFI) is less than .01 (Cheung & Renvolt, 2002; Byrnes, 2010).

III. RESULTS

Table 1 displays the goodness-of-fit test results for the HPM multi-group invariance. The results related to first multi-group model testing for the configural invariance reveal the χ^2 value to be 113.716 with 96 degrees of freedom. The CFI and RMSEA values are .982 and .022, respectively. From this information, we conclude that the hypothesized multi-group configural model of the HPM structure is well fitting across lower class and upper class HBCU students. The results goodness-of–fit statistics for the measurement model shows the fit to be fairly consistent with the configural model (CFI = .982; RMSEA = .022). The test for factor loadings invariance reveals a non-significant χ^2 difference between the configural model and the measurement model ($\Delta\chi^2$ (8) = 6.948, $p < .01$), and a CFI difference of -.001. Thus, these results provide evidence of factor invariance between lower class and upper class HBCU students for the measurement model of HMP scale. The results of the test for structural invariance shows the factor convariance to be equivalent across lower class and upper class HBCU students ($\Delta\chi^2$ (18) = 19.000, $p < .01$), ΔCFI = .001).

Table 1. Goodness-of-Fit statistics test for HIV Prevention Measure scale multi-group invariance

Model Description	Comparative Model	χ^2	df$\Delta\chi^2$	Δdf	Stat. Sig.	CFI	ΔCFI
Phase I*: Baseline model fit for each academic class student*							
Lower Class Students	-	65.389	55	-	-	.159	.979	-
Upper Class Students	-	64.923	56	-	-	.194	.976	-
Phase II: *Factorial invariance across student academic class groups*							
1. Configural Model: No constraint imposed	-	113.716	96	-	-	-	.982	-
2. Measurement model: Model A: Factor Loading constrained Equal	2A versus 1	120.664	104	6.948	8	.542 (NS)	.982	.004
3. Structural Model: Model B with convariances among EMOT, PMOT, INFO & BEHV constrained Equal	3B versus 1	132.716	114	19.000	18	.392 (NS)	.981	.005

Notes: $\Delta\chi^2$ = difference in χ^2 between constrained and unconstrained model; Δdf = Difference in degree of freedom between constrained and unconstrained model; ΔCFI = Difference in Comparative Fit Index between unconstrained and constrained model; NS = Not significant at probability <.01.

Root Mean Square Error Approximation (RMSEA)

Lower class baseline model: .035
Upper class baseline model: .027
Model 1 (Configural): .022
Model 2 (Measurement): .024
Model 3 (Structural): .023

IV. CONCLUSION

This study was aimed at testing the factorial invariance of the HIV prevention measurement scale developed and validated by Mongkuo et al. (2012b) for use in assessing HIV prevention behavior among students at Historically Black Colleges and Universities. The goal was to determine the external validity of the scale. Researchers have argued that for any measurement instrument to be externally valid, it must be factorially and structurally equivalent across various groups or populations of interest (Joreskog, 1971, 1992; Joreskog & Sorbom, 1993; Byrnes, 2010). Specifically, the study tested three research hypotheses. First, the configural structure of the HPM scale is equivalent across lower class and upper class HBCU students. Second, the factorial measurement of the HPM scale is invariant across lower class and upper class HBCU students. Third, the structural convariances of the HPM scale is invariant across lower class and upper class HBCU students.

The results of the tests showed that the HPM scale exhibited strong and well-fitted configural, measurement, and structural invariance across the two groups of students. Thus, the external validity across groups as hypothesized is supported. This study affirms that the HPM scale provides sound psychometric properties that can be relied upon to assess and design research-driven HIV prevention behavior interventions to reduce the incidence of HIV infection at HBCUs. However, this study is a cross sectional study does not provide information on the stability of the relationship between the factors and their corresponding measurement variables over time. To fully establish factorial invariance of the HPM scale, it is necessary to validate the instrument using a longitudinal study design to ensure valid within-group changes and reliable change process of the instrument over time (Nguyen, Kitner-Triolo, Evans, & Zonderman, 2004).In addition, to further establish support of the external validity for the HPM scale, it should be tested at other HBCUs.

REFERENCES

[1]. Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.
[2]. Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), The handbook of attitudes (pp. 173–221). Mahwah, NJ: Lawrence Erlbaum.
[3]. Arbuckle, James L (2007). Amos 17.0 User's Guide. Crawford, FL: Amos Development Corporation.
[4]. Bentler, P.M. (2005) Structural Equation Program Manual. Encino, CA: Multivariate Software.
[5]. Blunch, N. J. (2010). Introduction to Structural Equation Modeling Using SPSS and AMOS. Los Thousand Oaks, CA: Sage Publications.
[6]. Botvin, G.J., Dusenbury, L., Baker, E., James-Ortiz, S., & Kemer, J. (1989). A skill training approach to smoking prevention among Hispanics youth. Journal of Behavioral Medicine, 12:279296.
[7]. Bryan A.D., Fisher J.D. & Fisher WA (2002). Test of mediating role of preparatory safer sexual behavior in the context of the theory of planned behavior, Health Psychology, 21:71-80.
[8]. Brown TA (2006). Confirmatory Factor Analysis for Applied Research. New York, NY: Guilford Press.
[9]. Byrnes, Barbara M (2010) Structural Equation Modeling with AMOS: Basic Concepts, Application, and Programming. 2nd Edition. New York, NY: Routledge Taylor & Francis Group.
[10]. Carey, M.P., Morrison-Beedy, D, & Blair T. (1997). The HIV-Knowledge Questionnaire: Development and evaluation of a reliable, valid, and practical self-administered questionnaire. AIDS & Behavior, Volume 1, Number 1, 61-74.
[11]. Center for disease Control & Prevention. (2011). HIV among African Americans: Fast Facts. Retrieved January 21, 2012 from http://www.cdc.gov.
[12]. Center for Disease Control & Prevention. (2004a). Health disparities experienced by racial/ethnic minority populations. Mobility & Mortality Weekly Report, 53(33), 755.
[13]. Center for Disease Control & Prevention. (2004b) HIV/AIDS Surveillance Report: Cases of HIV infection and AIDS in the United States, 2003, Atlanta: Author.
[14]. Center for Disease Control & Prevention. (2004c) HIV/AIDS and college students: a CDC pathfinder, 1995, Atlanta: Author.
[15]. Center for Disease Control & Prevention. (2006) HIV/AIDS Surveillance Report.
[16]. Center for Disease Control & Prevention. (2008). Estimate of New HIV infections in the United States. Retrieved August 29, 2008 from http//cdc.gov.
[17]. Center for Disease Control & Prevention (2008a), HIV Surveillance Report, 2008, vol.18, Atlanta: Author.
[18]. Cheung, G.W. & Renvold, R.B. (2002) Evaluating good-of-fit indexes for testing measurement invariance. Structural Equation Modeling: A Multidisciplinary Journal, 9, 233-355.
[19]. Choi K.H. Coates T.J. (1994). Prevention and HIV infection. AIDS 8: 1371-1389.
[20]. Fisher JD & Fisher WA (1992) Changing AIDS Risk Behavior, Psychological Bulletin, 111:455-474.
[21]. Fisher JD & Fisher WA (2000). Theoretical approaches to individual level change in HIV risk behavior. In Peterson JH, Diclemente RJ (eds). Handbook of HIV Prevention. New York: Klumer Academic/Plenum, 3-55.
[22]. Fisher WA, Fisher JD, Harman J. The Information-Motivation-Behavioral Skills Model: A general social psychological approach to understanding and promoting health behavior. In Suls J, & Wallston K (eds), (2003). Social Psychological Foundations of Health and Illness. Malden, MA: Blackwell, pp. 3-55.
[23]. Foote, D., Martorell, R., McDivitt, J.A., Snyder, L., Spain, P.L., Stone, S. (1985). Mass Media and Health Practice Evaluation in the Gambia: A Report of the Major Findings. Menlo Park, CA: Applied Communication Technologies.
[24]. Glasford, DE (2008). Predicting voting behavior of young adults: The importance of information, motivation and behavioral skills, Journal of applied Social Psychology, volume 38, Number 11: 2648-2672.
[25]. Hair, J.F, Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L. (2006). Multivariate Data Analysis. Upper Saddle River, NJ: Pearson/Prentice Hall.

[26]. Hightow L., MacDonald P.D., Pilcher C.D., Kaplan A.H., Foust E., Nyuyen T.Q., & Leone, P.A. (2005). The Unexpected Movement of the HIV Epidemic in the southeastern United States: Transmission among College Students. Journal of Acquired Immune Deficiency Syndrome, 38, 531-537.
[27]. Hu L. & Bentler P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6:1-55.
[28]. Isaac, Stephen & Michael, William B. 1997, Handbook in Research and Evaluation, (3rd Ed.) California: EdITS Publishers 71-72.
[29]. Joreskog, KG (1971) Simultaneous factor analysis in several populations. Psychometrika, 36, 409-426.
[30]. Joreskog, KG & Sorbom D. (1996) LISREL 8: User's Reference Guide. Chicago: Scientific Software International.
[31]. Kelly JA (2002). "Innovation in the application of social cognitive principles to develop prevention interventions to reduce unsafe sexual behaviors among gays and bisexual men." In Chesney MA, Antoni MH (eds). Innovative Approaches to Health Psychology: Prevention and Treatment Lessons from AIDS. Washington, DC: American Psychological Association, pp. 71-96.
[32]. Leone, P., Hightow, L., Foust, E., Owen-O'Dowd, J., Phillip, S., Gray, P., Jones, B., Fitzpatrick, L., Millett, G., Jones., Stall, R., Holmberg, S., Greenberg, A., Ahdieh- Grant, L., & Eure, C. (2004). HIV transmission among black college students and non-student men who have sex with men—North Carolina, 2003. Morbidity and Mortality Weekly Report, 53(32), 731-734.
[33]. Lewis J.E. & Malow, R.M. (1997). HIV/AIDS risk in heterosexual college students. Journal of American College Health, 45, 147-159.
[34]. Misovich SJ, Martinez T, Fisher JD, Bryan A, Catapuno N (2003) Predicting breast self examination: A test of the information-motivation-behavioral skills model. Journal of Applied social Psychology, 33:775-790.
[35]. Mongkuo MY, Thomas R., Lucas N, Taylor A. (2012a) Development and validation of HIV Prevention scale for historically black colleges. Journal of AIDS and HIV Research, vol. 4(5): 152-159.
[36]. Mongkuo MY, Lucas N., Taylor, A. (2012b) The effects of motivation and knowledge on HIV prevention behavior. Greener Journal of Medical Sciences, vol. 1(1): 001-007.
[37]. Nguyen, H. T., Kitner-Triolo, M., Evans, M. K., & Zonderman, A. B. (2004). Factorial invariance of the CES-D in low socioeconomic status African Americans compared with a nationality representative sample. Psychiatry Research, 126, 177-187.