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Psychosocial Burdens Negatively Impact HIV Antiretroviral Adherence in Gay, Bisexual, and other MSM Ages 50 and Older

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Abstract

We sought to characterize HIV antiretroviral therapy (ART) adherence and psychosocial correlates of adherence in a sample of gay, bisexual, and other non-gay or –bisexual identified MSM ages 50 and over. As part of a cross-sectional study we recruited a community-based sample of 199 men and assessed adherence to current ART medications along four domains: 1) missing doses in the past 4 days, 2) taking doses on the specified schedule in the past 4 days, 3) following instructions about how to take the medications (e.g. to take medications with food), and 4) missing doses in the last weekend. A total adherence score was also computed. Bivariable analyses indicated negative associations between depression, sexual compulsivity, and HIV-related stigma with each of the individual adherence variables and the composite adherence score, while an older age was found to be protective. In multivariable analyses, controlling for age and educational attainment, a higher likelihood of missing doses and failing to follow instructions were related to higher levels of HIV-related stigma, while dosing off-schedule was associated with higher levels of sexual compulsivity. These results indicate that psychosocial burdens undermine the adherence behaviors of older HIV-positive sexual minority men. Programming and services to address this compromising health behavior must embrace a holistic approach to health as informed by syndemics theory, while attending to the developmental and age-specific needs of older men.

Keywords

HIV; adherence; aging; gay and bisexual; HIV-stigma; depression; sexual compulsivity

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Introduction

Since the advent of effective antiretroviral therapy (ART) dramatic changes have occurred in the HIV/AIDS epidemic in the United States (U.S.). The implementation of ART has transformed the HIV/AIDS epidemic by improving the clinical course of the disease and reducing the associated morbidity and mortality (Bhaskaran et al., 2008; Palella et al., 2006; Paterson et al., 2000).

By 2015, it is estimated that 50% of the adults living with HIV in the U.S. will be ages 50 and older (United States Senate Special Committee on Aging, 2005). In HIV epicenters such as New York City, those ages 50 and older comprised 44% of the population living with HIV in 2011 (New York City Department of Mental Health and Hygiene, 2013). This aging population will contend with not only the psychosocial and medical changes associated with aging, but also the added burden of HIV (GMHC, 2010; Power, Bell, & Freemantle, 2010; Zanjani, Saboe, & Oslin, 2007). Moreover, this population is diverse consisting of both long term survivors and those who have seroconverted at later stages of their lives (Centers for Disease Control & Prevention, CDC, 2013; Halkitis, 2012)

To achieve the maximum benefits of ART, strict adherence to the medication regimen is required (Bae, Guyer, Grimm, & Altice, 2011; Paterson et al., 2000; Perno et al., 2002). Suboptimal adherence (less than 90 to 95% of prescribed doses) may fail to achieve viral suppression, and has been associated with adverse clinical outcomes, including drug resistance, viral replication, and faster disease progression (Bangsberg et al., 2000; Gifford et al., 2000; Liu et al., 2001; Wainberg & Friedland, 1998). In the United States, of the 1.1 million people estimated to be living with HIV, only 25% achieve viral suppression (CDC, 2012), a figure that is only slightly higher (27%) among men who have sex with men (MSM). For those ages 50 and over, the figures are more promising but still not ideal: 36% of 55–64 year-olds achieve HIV viral suppression, while only 27% of those 65 and older manage to reach this goal. To date we know little about the adherence behaviors of older seropositive individuals, many of whom are MSM.

Over the last two decades, several key psychosocial burdens including depression, post traumatic stress disorder (PTSD), body change distress, and HIV-related stigma, have been found to negatively impact the disease course of people living with HIV, including poor levels of ART adherence. Both depression and PTSD are related to suboptimal adherence (Boarts, Sledjeski, Bogart, & Delahanty, 2006; Cohen, Alfonso, Hoffman, Milau, & Carrera, 2001). In a meta-analysis across 95 independent samples, depression was negatively associated with adherence (Gonzalez, Batchelder, Psaros, & Safren, 2011).

Furthermore, some antiretroviral side effects such as lipodystrophy and lipoatrophy are highly stigmatizing and often have an adverse psychological and social functioning effect (Reynolds et al., 2006). The associated body change distress has also been associated with poor adherence (Ammassari et al., 2002; Kemper, Diamond, & Wagner, 2005; Peterson, Martins, & Cofrancesco, 2008).

Additionally, research has shown that perceptions of HIV-related stigma negatively impact adherence (Rao, Kekwaletswe, Hosek, Martinez, & Rodriguez, 2007; Rintamaki, Davis,

Skripkauskas Bennett, & Wolf, 2006; Whetten, Reif, Whetten, & Murphy-McMillan, 2008; Vanable, Carey, Blair, & Littlewood, 2006). For example, missing important dosing times may occur if an individual feels at risk of damaging a social relationship or ‘outing’ himself due to stigma (Ware, Wyatt, & Tugenberg, 2007).

Finally, behavioral research also indicates that older HIV-positive MSM continue to engage in unprotected sexual behaviors (Jacobs et al, 2010; Pappas & Halkitis, 2011). These behaviors may, in part, be directed by sexual compulsivity. While, the relationship between sexual compulsivity symptoms and antiretroviral adherence has been understudied, sexual compulsivity among HIV-positive individuals has been found to be positively correlated with substance abuse (Benotsch, Kalichman, & Pinkerton, 2001) and negatively correlated to sexual self-management (Benotsch, Kalichman, & Kelly, 1999), both of which may negatively impact adherence to antiretroviral medications (Hinkin et al., 2004; Spire et al., 2002; Malow et al., 2013; Brion, Leary, & Drabkin, 2012).

Few behavioral studies examine HIV antiretroviral adherence in aging HIV-positive population. The complications of aging and the associated psychosocial, behavioral, and medical manifestations of this developmental life period may reveal a different set of challenges with regard to ART adherence (Halkitis, 2013b). Thus, the overriding goals of our analysis are to (1) examine adherence behaviors in a sample of HIV-positive gay, bisexual, and other non-gay or -bisexual identified MSM ages 50 and over and (2) determine key psychosocial factors associated with antiretroviral adherence in this population. This knowledge is critical for the development of health programs tailored to increase antiretroviral adherence and overall health among HIV-positive sexual minority men ages 50 and older.

Methods

Study Design and Sample Characteristics

Data for the present analysis were drawn from Project Gold, a cross sectional study of aging HIV-positive MSM in New York City. The conceptual framework of the study was informed by syndemics theory, which posits that multiple epidemics work synergistically compromising the health profile of this population and that these health burdens are predisposed by psychosocial conditions including discrimination and homophobia (Halkitis, Wolitksi, & Millet, 2013; Stall, Friedman, and Catania, 2008). Evidence of the reinforcing nature of drug use, mental health, and same-sex unprotected sexual behaviors as driven by psychosocial burdens (supporting the applicability of syndemics theory) in this sample have been provided elsewhere (Halkitis et al., 2013).

Participants were recruited using active and passive methods in 2010-11. The majority of the sample was recruited through active methods; 30% from community based agencies, 22% from internet-based recruitment, and 12% from distribution of palm cards and other advertisements. A more detailed description of the methods of the study, including the recruitment strategy, has been published elsewhere (Halkitis et al., 2013).

To be eligible, prospective participants had to be 50 years or older, HIV-positive (independently of whether participant met criteria for AIDS diagnosis), born biologically male, identify as male, and have had sex with a man in the past 6 months. A total of 509 participants were screened for eligibility to participate in the study, 200 were found eligible. Reasons for ineligibility included being younger than 50 in age and race/ethnicity (given that we were oversampling for men of color and other quotas had been filled).

All participants provided consent before data were collected and they received \$50 upon completion of the assessment. The data of one participant was expunged because he did not have sex with men, despite his screening information. Of the 199 who constitute the study sample, 93.8% ($n = 187$) have ever taken HIV medications. Of these 187, 96.3% ($n = 180$) were taking medications at the time of the assessment. Thus, the analytic sample for the ensuing analysis consisted of 180. There were no key differences in terms of age and years living with HIV between participants currently taking medications and those who were not taking medications at the time of the assessment.

Measures

Sociodemographic Characteristics and Clinical Markers—Self-reported data were collected for age, years living with HIV, race/ethnicity, educational attainment which we dichotomized for analytic purposes, and perceived socioeconomic status. In addition, participants self-reported their most recent CD4 cells count, HIV viral load, and whether they ever had history of any opportunistic infection.

Antiretroviral Adherence—The AIDS Clinical Trials Group (ACTG) Adherence Questionnaire was used to capture information on HIV medication adherence (Reynolds et al., 2007). Participants responded to four questions (yes/no) related with non-compliance with antiretrovirals regimen: 1) missing doses in the past 4 days, 2) taking doses outside specified schedule in the past 4 days, 3) failing to follow instructions about how to take the medications (i.e., to take medications with food, on an empty stomach, or with plenty of fluids) in the past four days, and 4) missing doses in the most recent past weekend. Each question uses a 5-point Likert scale, ranging from 0 (never) to 5 (all of the time). Dichotomous variables for each of the 4 adherence behaviors were created, such that “1” indicated the suboptimal adherence behavior. In addition, an overall adherence score, which ranges from 0 (adhere to the 4 adherence behaviors) to 4 (adhere to none of the 4 behaviors), was created.

Depression—The 21-items Beck Depression Inventory-II (BDI-II) (Beck, Steer, Ball, & Ranieri, 1996) was utilized to measure depressive symptomatology. The α for our sample was 0.90.

Post-Traumatic Stress Disorder—The Trauma Awareness and Treatment Center (TATC) PTSD Scale, a 10-item survey of symptoms (e.g. hyper-vigilance, flashbacks, avoidance) that utilizes a 5-point Likert scale and which is informed by the PCL-C (Weathers, Litz, Herman, Huska, & Keane, 1993; Weathers & Ford, 1996), was utilized to assess PTSD symptoms. In our sample $\alpha = 0.99$.

HIV-Related Stigma—The HIV Stigma Scale measures perceptions of stigma among people living with HIV (Berger, Ferrans, & Lashley, 2001). We used 15 items that utilize a 4-point Likert scale. In our sample $\alpha = 0.92$.

HIV-Related Body Change Distress—To evaluate the degree to which participants experience distress regarding changes in their bodies due to HIV and/or the side effects of antiretrovirals (e.g. lipodystrophy) we used the Assessment of Body Change Distress (ABCD) (Nokes et al., 2007; Reynolds, Neidig, Wu, Gifford, & Holmes, 2006). Twenty 5-point Likert items captured information on feelings of distress regarding these body changes. In our sample, $\alpha = 0.99$.

Sexual Compulsivity—The Compulsive Sexual Behavior Inventory (CSBI) was used to evaluate the degree to which recurring sexual urges, arousing fantasies and behaviors interfere with one's life (Miner, Coleman, Center, Ross, & Rosser, 2007). The 22 5-point Likert scale items record the frequency of common sexually compulsive behaviors. In our sample $\alpha = 0.88$.

Data Analysis

We undertook a descriptive analysis to characterize the sample as well as each of the psychosocial states and the four dichotomous adherence variables. We examined the bivariable associations between the factors and each dichotomous adherence variable using Wilcoxon-Mann-Whitney tests. Then, binary logistic regression models were examined to determine the extent to which the psychosocial variables explained the likelihood of each of the 4 dichotomous adherence variables, controlling for age and educational level. Psychosocial variables with a significance level ≤ 0.10 in the bivariate analyses were included in the regression model as per Hosmer and Lemshow (2000). Thereafter, a total adherence rank score was computed by summing the four dichotomous adherence variables. Bivariable associations between the psychosocial factors and the total adherence rank score were tested using Spearman rank correlations.

Results

Sample Characteristics

Table 1 summarizes the sociodemographic characteristics and clinical markers of the overall study sample ($N = 199$) and the analytic sample ($n = 180$). The analytic sample was constituted of those who reported being on ART. No significant differences were noted between the analytic and overall study sample. The mean age of the analytic sample was 55.4 years ($SD = 4.6$) and the participants had been living with HIV for an average of 18.4 years ($SD = 6.1$) at the time of the assessment. The sample consisted of predominantly racial/ethnic minority men (76.1%, $n = 153$). The majority of the participants (93%) in this sample identified as gay or bisexual, with the remainder as heterosexual identified MSM. Although several participants met criteria for AIDS, these participants did not reported differential levels of ART adherence to those without an AIDS diagnosis.

Adherence Behaviors

The majority of the 180 men on ART (57.2%, $n = 109$) reported suboptimal adherence to at least one of the behaviors. Specifically, 20.0% ($n = 36$) of the participants missed doses in the 4 days previous to the assessment, 48.3% ($n = 87$) failed to take their medications on schedule, 24.1% ($n=40$) failed to follow instructions, and 18.3% ($n = 33$) missed doses in the past weekend. On average, the participants reported suboptimal adherence on 1.04 (SD = 1.13, Md = 1, Range = 0–4) of the four adherence variables.

Psychosocial Correlates of Adherence Variables

Table 2 summarizes the bivariate associations between the psychosocial factors with the four dichotomized adherence variables. Higher levels of HIV-related stigma were observed among participants who missed doses in the 4 days prior to assessment as compared to those who did not miss doses in the past 4 days ($z = -2.52$, $p = 0.01$). Failing to take antiretrovirals on schedule in the prior 4 days was associated with depression ($z = -1.97$, $p = 0.05$), HIV-related stigma ($z = -2.45$, $p = 0.01$), and sexual compulsivity ($z = -3.43$, $p < 0.001$). These three psychosocial factors were also related to failing to follow instructions about how to take the antiretrovirals ($z = -1.79$, $p = 0.07$; $z = -3.41$, $p < 0.001$; $z = -2.541$, $p = 0.01$, respectively). Finally, the relationship between sexual compulsivity and missing doses in the past weekend approached significance ($z = -1.813$, $p = 0.070$).

Binary Logistic Regression Models of Adherence Behaviors

Based on the bivariable analyses of the four adherence variables with psychosocial states, only associated correlates (i.e., $p \leq .10$) were included in each of the associated logistic regression models. In each of the model, we controlled for age and level of education. The results of these analyses are shown in Table 3 and include both crude and adjusted odds ratios for each of the four analyses.

The model for adherence in the last 4 days approached significance (LR $\chi^2(3) = 6.72$, $p = 0.08$), with HIV-related stigma positively associated with the adherence behavior, after controlling for age and educational attainment (aOR = 1.04, 95% CI = 1.00, 1.09). With regard to adhering to schedule, significance for the model was achieved (LR $\chi^2(5) = 21.25$, $p < 0.001$). After controlling for age and education, higher levels of sexual compulsivity was associated with failing to take antiretrovirals on schedule (aOR = 1.04, 95% CI = 1.01, 1.07).

With regard to following instructions, the model also achieved significance (LR $\chi^2(6) = 21.26$, $p = 0.001$). After controlling for age and educational attainment, HIV-related stigma increased this likelihood of failing to follow instructions for dosing (aOR = 1.06, 95% CI = 1.00, 1.11). The model for adherence in the last weekend approached significance (LR $\chi^2(3) = 6.16$, $p = 0.10$), with sexual compulsivity related to missing doses (aOR = 10.4, 95% CI = 1.00, 1.07).

Psychosocial Correlates of Adherence Score

We computed an overall adherence score across the four variables. Forty two percent of the sample reported adhering across the four behaviors. The remaining participants reported

poorer adherence: 27.7% (n = 46) did not adhere to one behavior, 15.1% (n = 25) did not adhere to two behaviors, 12.1% (n = 20) did not adhere to three behaviors, and 2.41% (n = 4) did not adhere to any of the four behaviors.

The bivariable associations between the psychosocial factors and the adherence score were tested using non-parametric correlations. Depression ($r_s = 0.17$, $p = 0.03$), HIV related stigma ($r_s = 0.24$, $p = 0.002$), and sexual compulsivity ($r_s = 0.27$, $p = 0.001$) were associated with higher levels of poor antiretroviral adherence.

Discussion

Our analyses of HIV antiretroviral adherence behaviors among gay, bisexual, and other MSM ages 50 and older revealed several psychosocial factors which are associated with suboptimal adherence. Depression, HIV-related stigma, and sexual compulsivity were consistently associated with diminished adherence behaviors, while older age was protective. These findings add to the growing body of literature of the aging HIV-positive population which is an epidemiological phenomenon in the United States and worldwide (UNAIDS, 2013). While scientists continue to grapple with the biomedical complications of aging and HIV, it is important to note that the disease is more than a purely biomedical one but also a health state that embodies psychological and social challenges during aging and across the lifespan (Halkitis, 2013a). Thus, while attending to the treatments that are allowing the population to age with the disease, it is equally important to attend to the factors that may undermine the effectiveness of such treatments so to fully develop a holistic approach to care of aging HIV-positive individuals.

From the onset of the epidemic, stigma has negatively impacted and often compromised the health of those living with HIV. Several studies have described the association of stigma with poor medication adherence among individuals living with HIV (Whetten et al., 2008; Rao et al., 2007; Rintamaki et al., 2006; Vanable et al., 2006). In our study stigma was associated with missing doses in the last four days and failing to follow instructions about how to take medications during the same period among aging MSM. These findings align with other studies suggesting that HIV-related stigma influences adherence behaviors and, consequently, may impact treatment efficacy and health outcomes (Rintamaki et al., 2006; Vanable et al., 2006).

In addition, depression has been consistently associated with poorer health outcomes in HIV-positive individuals (Sherr, Clucas, Harding, Sibley, & Catalan, 2011) including suboptimal antiretroviral adherence (Gonzalez et al., 2011; Springer, Dushaj, & Azar, 2012). Our findings suggest that depression is associated with difficulties taking HIV medications on schedule and adhering to medication instructions, although depression is not significant in the multivariable models.

Furthermore, sexual compulsivity was associated with poor antiretroviral adherence overall. Participants with more sexual compulsive behaviors and thoughts were more likely to miss doses on the previous weekend and to fail adhering to the schedule of their medications in the last four days. Our findings add to the extant literature on sexual compulsivity by

establishing an association with antiretroviral adherence among an older population of gay, bisexual, and other MSM living with HIV.

Limitations

Our findings must be viewed within the context of the limitations of our study. The current study relied on self-reports of both adherence and psychosocial factors. Therefore, our methodology may have resulted in underreporting. The cross-sectional design of the study also limits our ability to draw causal conclusions and provides no evidence concerning the history of adherence behaviors and psychosocial states of the participants. Although we drew our sample from the community and our findings are robust, the sample size reduces our ability of establishing generalizations. In addition, we utilized valid and reliable psychometric scales to assess the psychosocial factors, not a clinical diagnostic procedure. These scales are not diagnostic instruments and should not be used as such.

Our study as exploratory in nature and is noted as an initial attempt to further understand the adherence challenges of older adults with HIV.. It is likely that several generations of gay men and will age with this disease. Thus comprehensive cohort investigations are needed not only to fully understand the challenges of adherence but all of the biopsychosocial implications of aging with HIV in this first AIDS generation and in the ones to follow.

Conclusions

Our findings provide further evidence of the toll of psychosocial burdens on the health of gay, bisexual, and other MSM. These burdens, including but not limited to depression, HIV-related stigma, and sexual compulsivity, compromise the health of these men, which in our investigation is adherence behavior. In recent years, the compromised health of sexual minority individuals has been abundantly documented (Institute of Medicine, 2011) and understood in terms of a theory of syndemics which posit that these burdens exacerbate the multiple overlapping health burdens evidenced in the population (Halkitis, 2010; Halkitis et al., 2012). The compromised adherence of these older men, coupled with their ongoing sexual activity (Halkitis et al., 2013), and exacerbated by the psychosocial burdens they face, require that we attend to the interplay of these multiple health problems. More importantly we must attend to the psychosocial and social factors which produce the conditions that exacerbate these health epidemics.

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Table 1

Participant Characteristics, Project Gold

	Total Sample N = 199 No. (%)	Analytic Sample N = 180 No. (%)
Sociodemographic Characteristics		
Age (mean, standard deviation)	55.5 (4.5)	55.4 (4.6)
Year living with HIV (mean, standard deviation)	18.1 (6.3)	18.4 (6.1)
Race/Ethnicity		
Black	95 (47.7)	84 (46.7)
White	46 (23.1)	43 (23.9)
Latino	29 (14.6)	28 (15.6)
Mixed race other	29 (14.6)	25 (13.9)
Education		
Less than Bachelor's degree	131 (65.83)	121 (67.22)
Bachelor's degree or higher	68 (34.17)	59 (32.78)
Perceived socioeconomic status		
Lower	153 (76.9)	138 (76.7)
Middle	39 (19.6)	38 (21.1)
Upper	7 (3.5)	4 (2.2)
Clinical Markers		
Opportunistic infections		
No	75 (37.7)	63 (35.0)
Yes	124 (62.3)	117 (65.0)
Viral load count		
Undetectable	149 (74.9)	141 (78.3)
Under 500	15 (7.5)	14 (7.8)
500–5,000	18 (9.0)	12 (6.7)
Over 5,000	13 (6.5)	10 (5.6)
CD4 cell count		
500 or higher	96 (48.2)	89 (49.4)
200–499	75 (37.7)	68 (37.8)
Lower than 200	28 (14.1)	23 (12.8)

Table 2

Adherence Variables in Relation to Psychosocial Factors

Psychosocial Factors	Analytic Sample	Adherence														
		Last 4 days				Schedule				Instructions				Last weekend		
		Adherent	Non-Adherent	<i>p</i>		Adherent	Non-Adherent	Median (Range)	<i>p</i>	Adherent	Non-adherent	Median (Range)	<i>p</i>	Adherent	Non-adherent	Median (Range)
	<i>N</i> = 180	<i>N</i> = 144	<i>N</i> = 36		<i>N</i> = 93	<i>N</i> = 87			<i>N</i> = 126	<i>N</i> = 40			<i>N</i> = 147	<i>N</i> = 33		
Depression	6 (0, 37)	6 (0, 34)	7 (0, 37)	0.11	5 (0, 34)	7 (0, 37)	0.05		6 (0, 34)	8 (0, 34)	0.07		6 (0, 34)	6 (0, 37)	0.53	
PTSD	4 (0, 39)	4 (0, 39)	3 (0, 30)	0.87	3 (0, 31)	5 (0, 39)	0.41		3 (0, 31)	5 (0, 21)	0.60		4 (0, 31)	4 (0, 39)	0.22	
HIV-related stigma	33 (15, 49)	32 (15, 49)	37.5 (15, 48)	0.01	32 (15, 48)	34 (15, 49)	0.01		32 (15, 48)	38 (17, 49)	<0.001		33 (15, 49)	35 (15, 48)	0.32	
Body change distress	14 (0, 80)	12 (0, 80)	17 (0, 42)	0.14	12 (1, 49)	15 (0, 80)	0.15		12 (0, 61)	16.5 (3, 40)	0.06		13 (0, 61)	19 (0, 80)	0.46	
Sexual compulsivity	41 (22, 70)	39.5 (22, 70)	43 (23, 67)	0.12	37 (22, 57)	43 (22, 70)	<0.001		39 (22, 70)	44 (22, 70)	0.01		40 (22, 70)	42 (22, 70)	0.07	

PTSD: Post-Traumatic Stress Disorder

Table 3
Binary Logistic Regressions Models of Psychosocial Correlates on ART Adherence

Psychosocial Factors	Adherence											
	Last 4 days		Schedule		Instructions		Last weekend					
	cOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)				
Age	0.93* (0.85, 1.01)	0.93** (0.87, 1.00)	0.93** (0.87, 1.00)	0.95 (0.88, 1.02)	0.90** (0.82, .098)	0.90 (0.82, 1.00)	0.94 (0.85, 1.03)	0.94 (0.86, 1.04)				
Education [†]	0.88 (0.40, 1.94)	1.01 (0.45, 2.29)	0.57* (0.30, 1.07)	0.62 (0.32, 1.22)	0.43* (0.18, 1.02)	0.54 (0.22, 1.34)	0.87 (0.38, 1.97)	1.03 (0.44, 2.41)				
Depression	--	--	1.04** (1.01, 1.08)	1.03 (0.99, 1.07)	1.04** (1.00, 1.09)	1.03 (0.98, 1.09)	--	--				
HIV-related stigma	1.05** (1.00, 1.10)	1.04* (1.00, 1.09)	1.04** (1.01, 1.08)	1.01 (0.98, 1.06)	1.08*** (1.03, 1.13)	1.06* (1.00, 1.11)	--	--				
Body change distress	--	--	--	--	1.02 (0.99, 1.05)	1.00 (0.96, 1.03)	--	--				
Sexual compulsivity	--	--	1.05*** (1.02, 1.09)	1.04** (1.01, 1.07)	1.05*** (1.01, 1.08)	1.02 (0.98, 1.06)	1.04** (1.00, 1.08)	1.04** (1.00, 1.07)				
Model Fit	LR $\chi^2(3) = 6.72^*$		LR $\chi^2(5) = 21.25^{*****}$		LR $\chi^2(6) = 21.26^{*****}$		LR $\chi^2(3) = 6.16^*$					

[†] Bachelor's degree or higher compared to less than Bachelor's degree; cOR: crude odd ratio; aOR: adjusted odd ratio; CI: confidence interval;

* p 0.1;

** p 0.05;

*** p 0.01;

**** p 0.001