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Correlates of Adherence to Antiretroviral Therapy Among HIV-Positive Young Men Who Have Sex with Men

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ABSTRACT Adherence to antiretroviral therapy (ART) is important in HIV management. The objective of this study was to analyze the risk factors for non-adherence to ART in HIV-positive young men who have sex with men (YMSM). Data pertaining to possible risk factors for non-adherence was collected from ATN086-106, a study protocol within the Adolescent Trials Network of HIV/AIDS Interventions (ATN). Variables that were significantly associated with non-adherence to ART in bivariate analyses were entered into multivariate logistic regression models to identify correlates of non-adherence to ART. The results indicate that YMSM who used marijuana and methamphetamine and missed medical appointments were less likely to adhere to ART. These findings suggest that healthcare professionals should pay close attention to YMSM who are on ART and have a history of marijuana and/or methamphetamine use. Additionally, medical professionals should keep track of those who miss 2 or more appointments within a year. Further research should examine why certain drug use and missed appointments are correlated to poor adherence.

INTRODUCTION

Young men who have sex with men (YMSM) are currently overrepresented in the HIV epidemic in the U.S. (CDC, 2016). YMSM are men under the age of 25. In 2016, men who had sex with men (MSM) accounted for 67% of the new HIV diagnoses and of those, Black/African American and Hispanics/Latinos YMSM accounted for 79% of those diagnoses (CDC, 2016).

Studies have found that antiretroviral therapy (ART) can effectively treat HIV by suppressing the viral load in those living with HIV, and persons with suppressed viral load are at significantly less risk of transmitting the virus to others (Das et al., 2010). In order to be effective, adherence level must be between 90% and 95% (Reisner et al., 2009). However, this can be

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difficult to obtain due to various obstacles that YMSM face. Compared to older MSM, young people living with HIV, particularly Black YMSM, still experience significant disparities on the HIV care continuum, including lower retention in care, lower adherence to treatment, and lower viral suppression (Zanoni & Mayer, 2014). By determining the risk factors for non-adherence, better treatment methods can be developed in order to increase adherence to ART. Therefore it is important that those with HIV are able to adhere to ART in order to address the HIV epidemic in YMSM.

Demographic factors such as race and ethnicity, education, and environment may be correlated to poor adherence. Previous research has found that Black and Hispanic men were less likely to adhere to ART than White men (Oh et al., 2009). In addition, one study found that HIV-positive youth who were able to read at a higher reading level were more likely to adhere to HIV medication than youth who read at a lower grade level (Navarra et al., 2014). This suggests that education level may be correlated to adherence. Also, a previous study had determined that housing instability is correlated with poor adherence among HIV-positive adolescents (Martinez et al., 2000). A person's environment can make it difficult to adhere to their medication especially among YMSM who may need greater support.

Young people face specific challenges when it comes to HIV management. Some of these challenges are related to the care coordination. Previous studies suggest that the number of dosages and complicated ART regime may play a role in why young people struggle to adhere to their medication (Belzer et al., 1999; Murphy et al., 2001). The ART regime can be particularly difficult for those in unstable housing environments and employment. Furthermore, missing medical appointments may lead to poor adherence. Previous studies have evaluated the effects of missing appointments on people with HIV. Mugavero et al. (2009) found that missed appointments were correlated with younger age and worse ART adherence.

Other challenges that YMSM may face in adhering to their medication may be related to attitudes in regard to the HIV treatment. Self-efficacy may play a role when it comes to YMSM adhering to their medication. Among HIV-positive adolescents, those with low self-efficacy and poor outcome expectancy were less likely to adhere to their medication (Rudy et al., 2009). Furthermore, a previous study of youth who were HIV-positive has shown that negative perception of being on medication as well as negative self-image is correlated with poor adherence to ART (Veinot et al., 2006). At a young age, social aspects may put additional stress on YMSM to adhere to their medication. Previous studies have found that HIV stigma and social barriers are correlated with poor adherence among young people with HIV (Rao et al. 2007). Therefore, social support in taking HIV medication can act as a protective measure against the stigma and negative self-image.

Psychosocial and behavioral characteristics may also be a risk factor for poor adherence. Multiple studies have found that psychological distress and depression in young people was correlated with poor ART adherence (Hosek, Harper & Domanico, 2001; Murphy et al., 2001; Naar-King et al., 2006). Alcohol and illicit substance use has been found to be highly prevalent among youth with HIV and significantly correlated with poor adherence to ART (Hosek, Harper, & Domanico, 2005; Murphy et al., 2005). Furthermore, early onset of marijuana use has also been associated with non-adherence to HIV medication (Hosek et al., 2001). These findings suggest that substance use at a young age is a barrier to medication adherence.

There are many factors that may attribute to why YMSM are over represented in the HIV epidemic. One of those reasons may be due to lower viral suppression rates among YMSM who are living with HIV as a result of poor ART adherence. YMSM may have difficulty adhering to ART because of specific barriers that they face. Currently there is existing literature on the correlates of adherence among youth with HIV and among MSM with HIV but there is not a lot of literature on correlates of adherence among YMSM with HIV. Using some of the variables

that have already been explored and found to be associated with poor adherence among youth and adults with HIV, we attempt to discover whether the risk factors for poor adherence among YMSM are similar or different from other HIV-positive groups. An individual's background can predispose them to difficulties when it comes to adhering to their medication. This study aimed to determine the risk factors that are associated with poor adherence to ART among YMSM.

METHODS

Study Procedures

Data for this study was derived from ATN086-106, a study protocol within the Adolescent Trials Network for HIV/AIDS Interventions (ATN). A total of 2,225 adolescents and young adults ages 12-24 linked to care at 15 geographically diverse adolescent medicine clinics within the ATN were recruited to participate in a cross-sectional survey. The participants completed an audio-computer assisted self-interview (ACASI). Of the 2,225 adolescents that participated in the survey, 991 were YMSM. Data for our study included the YMSM who were on ART (N=518). The institutional review boards at all 15 study sites and DePaul University approved the study protocol.

Measures

As the data examined are secondary data, we did not create any new measures for this study. The data collected for this study included demographics, psychosocial and behavioral characteristics, social support, and retention in care. Demographics included age, race/ethnicity, education, employment, and housing. The education variable was narrowed down to whether they received post high school education. The employment variable was measured by whether they were currently employed at the time of the survey. Housing was measured by whether the participant had unstable housing. Psychosocial and behavioral characteristics included mental health and substance use. Mental health was measured using the BSI-global severity index grand total score which measures overall psychological distress level. This score may range from 0 (not at all) to

4 (extremely). Substance use included marijuana, alcohol, opioids, cocaine, and methamphetamine and varied in the frequency of use. Substance use (e.g., alcohol, marijuana, cocaine, and methamphetamine) frequency was assessed using the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) and utilized the following categories: any use over the past 90 days, any use over the past month, and daily use (WHO, 2002). Social support was measured by whether the participant indicated that there were people in their life that were supportive of taking ART. This was measured on a 5 point scale, 1=strongly disagree and 5=strongly agree. Retention in care was defined as whether the participant missed at least 2 health care appointments in the past 12 months. Participants self-reported the number of missed medical appointments over the past 12 months. We created a dichotomous variable into missing one or fewer appointments and missing two or more appointments as applied in previous studies of persons living with HIV (Berg, et al, 2005; Mugavero, et al., 2009). Adherence to ART was measured by the participant reporting taking their medication at least 90% of the time. Participants reported number of ART doses they were prescribed to take and the number of doses missed over the past 7 days, and ART adherence was then measured as taking <90% of prescribed doses over the past 7 days in accordance with current practice for assessment of self-reported ART adherence (Simoni et al., 2006).

Analysis

The data was analyzed using the statistical program SPSS. This data analysis is drawn from a sub-sample of 518 YMSM in the study who were on ART. Bivariate chi-square analyses were conducted on the dichotomous variables: adherence, race and ethnicity, education, employment, housing, substance use, and missed appointments. Bivariate Pearson correlation analyses were conducted on the continuous variables: age, social support, and mental health. Variables that were significantly associated with non-adherence to ART in bivariate analyses were entered into multivariate logistic regression models to identify correlates of non-adherence to ART.

RESULTS

The results of the bivariate analyses and the adherent and non-adherent participant characteristics regarding demographics, mental and behavioral characteristics, education, employment, housing, social support and retention in care are presented in Table 1. Of the 518 participants, 198 were non-adherent. The mean age of the non-adherent participants was 21.64 years old (SD=2.01) and the mean age of

the adherent participants was 21.54 years old (SD=1.91). Of the non-adherent participants, 7.6% were Black or African American, 11.6% were White, 21.2% were Hispanic/Latino, and 21.2% were multiracial. Of the adherent participants, 63.2% were Black or African American, 14.6% were White, 18.5% were Hispanic/Latino, and 21.2% were multiracial. Of the non-adherent participants, 44.9% of the

Variable	Adherent 90% Adherence = 1		Non-Adherent 90% Adherence = 0		Bivariate Analysis	
	M	SD	M	SD	r	p
Age	21.54	1.91	21.64	2.01	-0.010	N/S
Social Support						
People in my life are supportive of taking ART (5-point scale, 1=strongly disagree...5=strongly agree)	4.45	0.99	4.29	1.20	0.086	<0.01
Mental Health						
BSI-global severity index	0.98	0.81	1.07	0.80	-0.081	N/S
	<i>n</i>	%	<i>n</i>	%	χ^2	p
Race/Ethnicity						
African American or Black	208	63.2	15	7.6	0.24	N/S
Hispanic/Latino	77	23.4	42	21.2	7.72	N/S
Non-Hispanic White	48	14.6	23	11.6	0.62	N/S
Multiracial	61	18.5	42	21.2	0.95	N/S
Education						
Post high school education	158	48.0	89	44.9	0.58	N/S
Employment						
Currently employed	164	49.8	88	44.4	1.79	N/S
Housing						
Unstable Housing	14	4.3	15	7.6	1.62	N/S
Substance Use						
Any alcohol, past 90 days	273	83.0	181	91.4	6.71	<0.01
Any marijuana, past 90 days	173	52.6	141	71.2	18.50	<0.05
Any opioids, past 90 days	10	3.0	3	1.5	0.78	N/S
Any cocaine, past 90 days	30	9.1	31	15.7	5.36	<0.05
Any methamphetamine, past 90 days	33	10.0	47	23.7	14.48	<0.05
Daily alcohol use	15	4.6	12	6.1	0.14	N/S
Daily marijuana use	67	20.4	60	30.3	6.53	N/S
Monthly cocaine use	7	2.1	9	4.5	2.58	N/S
Monthly methamphetamine use	6	2.1	14	7.1	9.62	<0.05
Missed appointments						
At least 2 in past 12 months	90	27.4	95	48.0	16.93	<0.05

Table 1. Adherent and Non-Adherent Participant Characteristics and Bivariate Analysis results (N=518)

Parameter	B	S.E.	Wald	Df	Sig	O.R.	95% C.I.	
							upper	lower
Marijuana use, past 90 days	-0.615	0.209	8.658	1	0.003	0.541	0.359	0.0814
Methamphetamine use, past 90 days	-0.700	0.264	7.869	1	0.005	0.476	0.800	0.284
Missed at least 2 appointments in the past 12 months	-0.666	0.201	10.955	1	0.001	0.514	0.762	0.364
Constant	1.273	0.174	53.533	1	0.000	3.571		

Table 2. Final Multivariate Model of ART Adherence

participants had received post high school education, and of the adherent participants, 48.0% had received a post high school education. 44.4% of the non-adherent participants and 49.8% of the adherent participants were employed at the time of the survey. A Pearson correlation coefficient was computed to determine which variables were significantly correlated with adherence. Social support was found to be significantly positively associated with adherence to ART ($r=0.09$; $P<0.01$). In the bivariate chi-square analysis alcohol use in the past 90 days was significantly associated with adherence to ART ($\chi^2=6.71$; <0.01). Any marijuana use in the past 90 days was also significantly associated with adherence ($\chi^2=18.51$; $p<0.05$). Any cocaine use in the past 90 days was significantly associated with adherence ($\chi^2=5.36$; $P<0.05$). Any methamphetamine use in the past 90 days ($\chi^2=14.48$; $P<0.05$) and monthly methamphetamine use ($\chi^2=16.93$; $P<0.05$) were both significantly associated with adherence.

Variables that were significant in the bivariate analyses were entered into a multivariate logistic regression analysis. Table 2 depicts the multivariate regression model for adherence to ART. Participants who indicated marijuana use in the past 90 days had 1.85 times higher likelihood of non-adherence (OR= 0.541; CI 0.0814-0.359). Odds of non-adherence were 2.1 times higher for a participant who indicated methamphetamine use in the past 90 days (OR= 0.476; CI 0.284-0.800). Furthermore, participants who missed 2 or more appointments in the past 12 months had

1.95 times higher odds of non-adherence (OR= 0.514; CI 0.0364-0.762).

DISCUSSION

YMSM who used marijuana and methamphetamine were significantly less likely to adhere to ART. The relationship between substance use and adherence may be due to the effects that marijuana and methamphetamine have on its users. Marijuana use can cause mental impairment and make its users forgetful. Therefore marijuana functions as a barrier to taking daily medication because users may be forgetful of taking their doses. Methamphetamine also functions as a barrier to adherence because it causes its users mental and physical impairments that interfere with their ability to take medication. For example, methamphetamine may cause users to lose track of time or lose their medication. Some YMSM may use marijuana or methamphetamine as a way to cope with stress. These findings support previous studies that have found alcohol and substance use to be correlated to poor adherence to ART (Murphy et al., 2005; Hosek, Harper, & Domanico, 2005). Previous studies suggest that depression in youth may be a risk factor for substance use and therefore youth should be screened and treated for depression (Murphy et al., 2005). Our study did not find mental distress to be a significant risk factor for poor adherence, but we did find substance use to be correlated. This subject of depression and substance use could be further explored in order to determine how to address the issue of substance use among YMSM. Furthermore, substance use may represent additional risk

behaviors, such as decreased health-seeking behaviors (Hosek, Harper, & Domanico, 2005). Exploring other drug-related behaviors can provide more insight as to why substance use is correlated with poor adherence. Further research on substance use is needed to understand why substance use among YMSM affects their adherence to ART.

Another finding in this study was that YMSM who miss medical appointments are less likely to adhere to ART. Missing appointments may be an indicator of attitudes towards the HIV management and ART regime. Those who miss appointments may not completely comprehend the importance of their healthcare regime. Missing appointments may also be an indicator of other barriers. As adolescents and young adults, they depend on others to get to their appointments. This indicates that they may not be fully responsible enough to take on a complicated ART regime without assistance from others. These findings support previous research that found missed appointments to be an indicator of poor adherence (Mugavero et al. 2009).

Previous studies posit that missed appointments are not the cause of poor adherence but identify patients whose health behaviors predispose them to non-adherence. Examining health behaviors in YMSM may provide further insight as to why they have poor adherence rates. Further research should look into the reasoning behind why some YMSM are more likely to miss medical appointments and how this affects their ability to adhere to ART medication.

The findings in this study imply that more can be done in order to assist YMSM in adhering to

medication. Healthcare professionals should pay close attention to YMSM who are on ART and have a history of marijuana and/or methamphetamine use. Furthermore, healthcare professionals should keep track of those who miss 2 or more appointments within a year. By recognizing the risk factors for poor adherence, medical professionals can intervene early and address the issues.

Limitations in this study were the limited sample size and the self-reported aspects of the data. This study included a sample size of 518 individuals. In future studies, recruiting more participants could provide clearer results. Furthermore, this study only included HIV-positive YMSM that were a part of the ATN, which could result in sample bias. Those that were able to be a part of the ATN may be more disposed to certain behaviors that influenced the results of this study. Furthermore, the survey was taken at one point in time and was self-reported by participants so it is possible that participants reported their adherence and behavioral characteristics incorrectly.

This study examined the risk factors for non-adherence to ART among YMSM. The data analysis found significant correlations between poor adherence, marijuana use, methamphetamine use, and missed appointments. Because this was a cross-sectional study, the results are relational and do not prove causation. More studies should be done on YMSM, substance use, and retention in care in order to determine why these risk factors are correlated with poor adherence and how to best address these issues.

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