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Can you hear me now?:

Limited use of technology among an urban HIV-infected cohort

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Abstract

Recent studies support technology-based behavioral interventions for individuals with HIV. This study focused on the use of cell phone and internet technologies among a cohort of 515 HIV-infected individuals. Socio-demographic and clinic data were collected among individuals presenting at an urban Midwestern university HIV clinic in 2007. Regular internet usage occurred more often with males, Caucasians, those who were employed, had higher salaries, and were more educated. Higher levels of education and salary >$10,000 predicted regular usage when controlling for race, employment, and gender. Cell phone ownership was associated with being Caucasian, employed, more educated, and salary > $10,000. Employment was the only predictor of owning a cell phone when controlling for income, race, and education. Individuals who were <40 years of age, employed, and more educated were more likely to know how to text message. Employment and post-high school education predicted knowledge of text messaging, when controlling for age. Disparities among internet, cell phone, and text messaging usage exist among HIV-infected individuals.

Keywords

HIV/AIDS; technology-based interventions; cell phones; internet usage; HIV-infected; socioeconomic barriers

Introduction

For the past decade, HIV incidence in the U.S. has remained stable. The CDC recently revised estimates for HIV incidence in this country and now indicates that ~56,000 individuals were infected in 2007 (CDC, 2008). This ongoing incidence combined with a significant decline in mortality, has led to the current estimated prevalence of 1.2 million persons living with HIV/AIDS in the U.S. There is an urgent need to reduce HIV incidence and to improve the health status of individuals living with HIV/AIDS. Given the advancements in the care and treatment of HIV, secondary prevention efforts and quality of life improvements have been incorporated into standard clinical care (CDC, 2003; Janssen et al., 2001). Well-established primary care guidelines for HIV prioritize key areas for prevention, including behavioral assessments improving adherence to care and treatment efforts; serostatus disclosure; and enhancing patient understanding of safer sex techniques (CDC, 2003; Jemmott, Jemmott, & O'Leary, 2007; Nilsson-Schonnesson, 2002).

Other fields have successfully implemented technology-based behavioral interventions. For instance, internet-based interventions increased levels of physical activity and weight loss

(Tate, Wing, & Winett, 2001; Vandelanotte, Spathonis, Eakin, & Owen, 2007); successful smoking cessation intervention messages have been sent via text messages (Rodgers et al., 2005); clinic visit reminders can be delivered via text messages and cell phone calls (Leong et al., 2006); and text messaging has been shown to enhance medication adherence for chronic diseases, including psychiatric disorders (McDonald, Garg, & Haynes, 2002). These advances in intervention design have also been explored in the field of HIV. Some examples include internet-delivered and telephone-based mental health care for HIV-infected individuals in rural areas (Heckman & Carlson, 2007; M. L. Ybarra & Eaton, 2005), telephone-based medication adherence messages (Puccio, 2006; Vidrinea, 2006), partner notification via text messaging among STD clinics (Levine, McCright, Dobkin, Woodruff, & Klausner, 2008), and smoking cessation messages delivered through cell phones (Vidrinea, 2006). In a recent meta-analysis, Ybarra and Bull (2007) found that much effort has been placed on developing technology-based interventions for HIV-infected populations to offer new avenues of message delivery, yet large-scale effectiveness of these programs have yet to be reported (Ybarra & Bull, 2007).

Not only do these efforts have the potential to enhance health-promoting behaviors among HIV-infected populations by reaching individuals where they actively live, but also the interventions may be more effective and cost-efficient than traditional efforts. Many of the studies conducted in the U.S. have focused on populations that are avid internet consumers, specifically young adults, and most often, young men who have sex with men (MSM) (Ybarra & Bull, 2007). Examining the availability and accessibility of these technologies among more diverse HIV-infected populations in the U.S. would be beneficial to the developing field of HIV intervention design. The goal of this study was to increase the understanding of access to and use of currently available technologies among an urban cohort of HIV-infected patients.

Methods

This cross-sectional study was conducted between June and September 2007 as part of standard of care behavioral assessment among HIV-infected patients in an urban, Midwestern university HIV clinic. All patients were asked to participate in this assessment prior to their clinic visit. Interviews were conducted while patients were waiting to be seen by their health care providers. All HIV-infected patients who presented in the clinic during that time frame were eligible. This study was approved by Washington University School of Medicine Human Research Protection Office.

Demographic characteristics (race, age, employment, education, income, and gender), self-reported medication adherence (4 day recall and visual analogue scale), internet usage (daily, 2–3 times per week, weekly, 2–3 times per month, and never), owning a cellular phone (yes/no), and knowledge of text messaging (yes/no) were collected in the assessment. The validated 4-day AIDS Clinical Trial Group (ACTG) measure of self-reported medication adherence was used (Chesney et al., 2000). The Patient Health Questionnaire (PHQ-9) was also completed during these interviews, which screens depressive symptomatology and calculates symptom counts that signify major depressive disorder and other depressive disorders (Kroenke, Spitzer, & Williams, 2001).

Medical measures including current CD4 cell count, plasma HIV RNA level, and use of antiretroviral therapies were collected at time of the visit. Virologic suppression was defined as having an HIV RNA level of < 400 copies/ml.

Statistical Analyses

Descriptive and bivariate analyses were conducted to illustrate and assess differences among the sample. Logistic regression analyses were conducted to determine factors that serve as predictors to technology use (internet, cell phones, and text messages). Internet use was dichotomized to (1) daily to weekly use or (2) two to three times per month to never. Education levels were categorically defined (less than high school degree; high school degree; some college, vocational, or associate's degree; and college or graduate degree). Race was categorized into African American, Caucasian, or other based on self reporting. Employment status was categorized into unemployed, employed (part- or full-time), or receiving disability benefits. Depression severity was dichotomized to those who expressed major depressive disorder symptoms and those who did not. Age was categorized for regression analyses (18–25, 26–39, 40–55, >55 years). Medication adherence was dichotomized above and below 95% adherent. HIV RNA level was transformed into $\log_{10}$ for normality. All tests were 2-tailed and $p< 0.05$ was considered significant. Data analyses were performed using SPSS software (version 15.0).

Results

A total of 515 individuals completed the assessments between June and September 2007. The majority of the sample was male (n = 349; 68%) and African American (n = 305; 60%). Half of the sample reported having a high school education or less (n = 258) and 42% (n = 212) of the sample completed a college or graduate degree. A large proportion of the sample reported an annual salary of < $10,000 (n = 239; 46.6%), while 16% (n = 76) reported a 12 month salary of > $30,000. One-fifth of the patients reported being unemployed (n = 111), 40% (n = 209) were employed either part- (n = 52; 9.9%) or full-time (n = 158; 30.7%), and 32% (n = 164) reported receiving disability benefits. About 12% of the sample reported being currently married (n = 62), while 62% of the sample reported never being married (n = 320). About 40% (n = 201) of the sample reported currently having a sexual partner and 90% (n = 165) of those, reported one sexual partner in the past 30 days.

The median CD4 cell count of the sample was 440.0 cells/mm^3 (IQR 268.75–635.25). Almost three-quarters (n = 373) of the sample was receiving antiretroviral medication (ARV) and 65% of the sample had a HIV RNA viral load of < 400 copies/ml, signifying viral suppression. Almost half of the sample (n = 248) had ≥ 95% self-reported medication adherence, when measuring the 4-day recall. About 40% of the sample endorsed criteria for major depressive disorder, as measured by the PHQ-9 and about 15% (n = 145) endorsed having suicidal thoughts at least once within the past 2 weeks.

Daily internet usage was reported among 31% (n = 160) of the sample, while 44% (n = 228) reported never using the internet. The majority of the sample reported having a cellular telephone (60%; n = 310), with 68% (n = 210) of cell phone owners reporting knowing how to text message. Combined, 38% (n = 194) of the sample reported owning a cell phone and using the internet at least weekly, and 9% (n = 46) reported neither owning a cell phone nor any internet use.

Regular internet usage occurred more often with male (74% vs. 21%; $p = 0.003$), Caucasian (63% vs. 34%; $p < 0.001$), more educated (67% vs. 29%, $p < 0.001$), higher salaried (63% vs. 26%; $p < 0.001$), and employed (62% vs.38%; $p < 0.001$) individuals. Logistic regression analyses found that highest levels of education attainment ($p < 0.001$) and an annual income over $10,000 ($p < 0.001$) predicted regular internet usage when controlling for race, employment, and gender.

Cell phone usage was assessed; individuals who were Caucasian (76% vs. 51%; $p < 0.001$), making > $10,000 annually (72% vs. 46%; $p < 0.001$), employed (77% vs. 47%; $p < 0.001$), and had completed post-high school education (70% vs. 53%, $p < 0.001$) were more likely to report having cell phones. Additionally, of patients on antiretroviral medications, those reporting to be > 95% adherent were more likely to own a cell phone (65% vs. 53%; $p < 0.001$). Logistic regression analyses found being employed as the only predictor of owning a cellular phone ($p < 0.001$) when controlling for income, education, and self-reported medication adherence.

When assessing knowledge of text messaging, univariate analyses were conducted only among patients who reported having cellular phones (n = 260). Patients < 40 years of age (85% vs. 54%; $p < 0.001$), who were more educated (74% vs. 64%; $p < 0.05$), and employed (78% vs. 50%; $p < 0.001$) knew how to utilize text messaging technology on their cellular phones. Logistic regression analyses found employment ($p < 0.001$) and more than a high school education ($p < 0.02$) predicted knowledge of text messaging, when controlling for age.

Discussion

During a three-month period, behavioral assessments were conducted among individuals with HIV presenting at an outpatient clinic. The demographics of the cohort reflect the national HIV epidemic, in that the majority of the sample was low-income, male, and African American. The majority of the sample was on antiretroviral therapy with excellent viral suppression. The study was conducted to assess the usage of newer and prevalent technologies in this urban, Midwestern U.S., university HIV clinic sample. Use of technology (internet, cell phones, and text messaging) was most often associated with employment, higher education, male gender, higher income, and Caucasian race.

Delivering behavioral interventions through new, prevalent technologies creates an opportunity to reach more individuals and collect data that enhance understanding of behavioral determinants in a cost-effective and -efficient manner. Previous research has found that among HIV-infected populations the internet is a useful health resource among those who have been living with HIV for extended period of time (Kalichman, Benotsch, Weinhardt, Austin, & Luke, 2002), for research purposes (Pequegnat et al., 2007; Rhodes, Bowie, & Hergenrather, 2003), and among populations who are already heavy consumers of these common technologies (MSM, young adults) (McFarlane, Kachur, Klausner, Roland, & Cohen, 2005; Mustanski, 2001). These technologies have also shown promise in some developing countries (Curioso, Blas, Nodell, Alva, & Kurth, 2007; Curioso & Kurth, 2007; Kaplan, 2006).

Overall, our clinic cohort reported low rates of daily internet usage. These findings mimic those of a study conducted among newly HIV-infected low-income individuals, which found that education and income impacted internet access, and only one-third of their sample had internet access at home and 3% at work (Mayben & Giordano, 2007). While the internet has become readily available throughout most of the U.S. with an estimated 78% of the general population using frequently (USC Annenberg School, 2007), populations that seldom, if ever, access it. Internet-delivered interventions require a commitment to improve access related resources for those persons who report little or no access to the internet. Similar to the Diffusion of Innovation model, “late adopters” or minimal consumers of the internet (i.e. those who access the internet less than 2–3 times a week), may be more apt to increase internet usage with their participation in an internet-based intervention. However in the current study, participants reported not using the internet, even with access at public libraries and similar locations.

The USC Annenberg report (2007) estimated that 50% of the U.S. population owns cellular phones. Over 60% of our cohort does not have them. Furthermore, consistent cell phone ownership may be an additional barrier, which our study did not assess. Providing cell phones during a study period offers the opportunity to overcome this barrier, yet becomes increasingly difficult to routinely adopt these interventions due to associated costs. Interestingly, of those who owned cell phones, almost 70% reported knowledge of text messaging, which is an important finding for developing interventions. Text messaging is a viable message delivery option for health care providers and intervention developers (Leong et al., 2006; Levine et al., 2008; McDonald et al., 2002; Rodgers et al., 2005). These promising interventions offer little for ongoing standard of care, if resources are not available to provide ongoing technology access.

The role of these technologies and their effect on HIV-related outcomes, including medication adherence is one that deserves further attention. The high rates of depressive symptoms and suicidal ideation was not significantly associated with technology use. In our study, race, gender, education attainment, and employment status were related to consumption of these technologies in this urban, Midwestern HIV clinic. This study also directly highlights individuals who reported to be ≥ 95% adherent more often owned cell phones, which suggests that there are multiple socioeconomic factors that influence medication adherence.

Study limitations and strengths

This study had the opportunity to screen all HIV-infected patients who presented for care during a three-month period. Screening patients to assess their behavioral risk factors has been encouraged in HIV primary care to help reveal patient intervention needs. The cross-sectional nature of this study does not allow for assessment of the temporal relationships of the associations. Further, due to the self-reported nature of the study, there is potential for an inherent reporting bias. The rates of technology usage in this sample was lower than national averages; this may be due to the lower socioeconomic status of our sample than the national average. Alternatively, the nature of this Midwestern U.S. sample offers limited insight to the broader HIV-infected populations. Furthermore, the technology use items were current usage measures and did not measure cell phone ownership over a specific time, and these measures have potential to fluctuate over time. Finally, we did not collect sexual orientation data. Given that previous research has illustrated higher use of technology among MSM than other populations, future research should include information related to sexual orientation.

Conclusions

This study revealed low rates of internet, cell phone, and text messaging technology usage among patients with HIV. While technology-based behavioral interventions are successful among heavy technology consumers and in many developing countries, challenges remain among resource-poor populations.

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References

CDC. Incorporating HIV prevention into the medical care of persons living with HIV: Recommendations of CDC, the Health Resources and Services Administration, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Morbidity and Mortality Weekly Report. 2003; 52 (RR-12).

CDC. A Glance at the HIV/AIDS epidemic. 2008. Retrieved July 8, 2008, from http://www.cdc.gov/hiv/topics/surveillance/resources/factsheets/incidence.htm

Chesney MA, Ickovics JR, Chambers DB, Gifford AL, Neidig J, Zwick DBB. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG Adherence Instruments. AIDS Care. 2000; 12:255–266. [PubMed: 10928201]

Curioso WH, Blas MM, Nodell B, Alva IE, Kurth AE. Opportunities for providing web-based interventions to prevent sexually transmitted infections in Peru. PLos Medicine. 2007; 4(2):e11. [PubMed: 17326701]

Curioso WH, Kurth AE. Access, use and perceptions regarding Internet, cell phones and PDAs as a means for health promotion for people living with HIV in Peru. BMC Med Inform Decis Mak. 2007; 7(24)

Heckman T, Carlson B. A randomized clinical trial of two telephone-delivered, mental health interventions for HIV-infected persons in rural areas of the United States. AIDS and Behavior. 2007; 11(1):5–14. [PubMed: 16705479]

Janssen RS, Holtgrave DR, Valdiserri RO, Shepherd M, Gayle HD, De Cock KM. The serostatus approach to fighting the HIV epidemic: Prevention strategies for infected individuals. American Journal of Public Health. 2001; 91(7):1019–1024. [PubMed: 11441723]

Jemmott LS, Jemmott JB III, O'Leary A. Effects on sexual risk behavior and STD rate of brief HIV/STD prevention interventions for African American women in primary care settings. American Journal of Public Health. 2007; 97(6):1034–1040. [PubMed: 17463391]

Kalichman SC, Benotsch EG, Weinhardt LS, Austin J, Luke W. Internet use among people living with HIV/AIDS: Association of health information, health behaviors, and health status. AIDS Education and Prevention. 2002; 14(1):51–61. [PubMed: 11900110]

Kaplan W. Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries? Globalization and Health. 2006; 2(1):9. [PubMed: 16719925]

Kroenke K, Spitzer R, Williams J. The PHQ-9: Validity of a brief depression severity measure. Journal of General Internal Medicine. 2001; 16(9):606–613. [PubMed: 11556941]

Leong KC, Chen WS, Leong KW, Mastura I, Mimi O, Sheikh MA, et al. The use of text messaging to improve attendance in primary care: a randomized controlled trial. Family Practice. 2006; 23(6):699–705. [PubMed: 16916871]

Levine D, McCright J, Dobkin L, Woodruff AJ, Klausner JD. SEXINFO: A sexual health text messaging service for San Francisco youth. American Journal of Public Health. 2008; 98(3):393–395. [PubMed: 18235068]

Mayben JK, Giordano TP. Internet use among low-income persons recently diagnosed with HIV infection. AIDS Care. 2007; 19(9):1182–1187. [PubMed: 18058404]

McDonald HP, Garg AX, Haynes RB. Interventions to enhance patient adherence to medication prescriptions: Scientific review. JAMA. 2002; 288(22):2868–2879. [PubMed: 12472329]

McFarlane M, Kachur R, Klausner JD, Roland E, Cohen M. Internet-based health promotion and disease control in the 8 cities: Successes, barriers, and future plans. Sexually Transmitted Diseases. 2005; 32(10):S60–S64. [PubMed: 16205295]

Mustanski BS. Getting wired: Exploiting the Internet for the collection of valid sexuality data. Journal of Sex Research. 2001; 38(4):292–301.

Nilsson-Schonnesson L. Psychological and existential issues and quality of life in people living with HIV infection. AIDS Care. 2002; 14(3):399–404. [PubMed: 12042085]

Pequegnat W, Rosser B, Bowen A, Bull S, DiClemente R, Bockting W, et al. Conducting internet-based HIV/STD prevention survey research: Considerations in design and evaluation. AIDS and Behavior. 2007; 11(4):505–521. [PubMed: 17053853]

Puccio J, Belzer M, Olson J, Martinez M, Salata C, Tucker D, Tanaka D. The use of cell phone reminder calls for assisting HIV-infected adolescents and young adults to adhere to Highly Active Antiretroviral Therapy: A pilot study. AIDS Patient Care and STDs. 2006; 20(6):438–444. [PubMed: 16789857]

Rhodes SD, Bowie DA, Hergenrather KC. Collecting behavioural data using the world wide web: considerations for researchers. J Epidemiol Community Health. 2003; 57(1):68–73. [PubMed: 12490652]

Rodgers A, Corbett T, Bramley D, Riddell T, Wills M, Lin RB, et al. Do u smoke after txt? Results of a randomised trial of smoking cessation using mobile phone text messaging. Tobacco Control. 2005; 14(4):255–261. [PubMed: 16046689]

Tate DF, Wing RR, Winett RA. Using internet technology to deliver a behavioral weight loss program. JAMA. 2001; 285(9):1172–1177. [PubMed: 11231746]

USC Annenberg School. The 2007 Digital Future Report. Los Angeles, CA: 2007.

Vandelanotte C, Spathonis KM, Eakin EG, Owen N. Website-delivered physical activity interventions: A review of the literature. American Journal of Preventive Medicine. 2007; 33(1):54–64. [PubMed: 17572313]

Vidrinea D, Arduinob RC, Lazevc AB, Gritz ER. A randomized trial of a proactive cellular telephone intervention for smokers living with HIV/AIDS. AIDS. 2006; 20:253–260. [PubMed: 16511419]

Ybarra M, Bull S. Current trends in internet-and cell phone-based HIV prevention and intervention programs. Current HIV/AIDS Reports. 2007; 4(4):201–207. [PubMed: 18366952]

Ybarra ML, Eaton WW. Internet-Based Mental Health Interventions. Mental Health Services Research. 2005; 7(2):75–87. [PubMed: 15974154]

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Table 1

Demographic Characteristics of the Cohort by Gender

	Male (n = 349)		Female (n = 166)		
Race	**n**	**%**	**n**	**%**	**p**
African American	190	54.4	115	59.2	0.001
Caucasian	134	38.4	29	17.5	
Other	25	7.2	22	13.3	
Education level (n = 503)					
Less than high school degree	64	18.9	53	32.3	0.001
High school degree/GED	89	26.3	52	31.7	
Some college/vocational schooling	22	6.5	11	6.7	
Bachelor or graduate degree	164	48.4	48	29.3	
Employment status (n = 514)					
Unemployed	68	19.5	43	26.1	0.163
Full-time	115	33.0	43	26.1	
Part-time	30	8.6	21	12.7	
Disability benefits	20	5.7	10	6.1	
Other (retired, student, work rehabilitation)	116	33.2	48	29.1	
Income (n = 471)					
< 10k	147	45.2	92	59.0	0.008
10–20k	70	21.5	40	25.6	
20–30k	32	9.8	11	7.1	
30–40k	20	6.2	8	5.1	
40–50k	19	5.8	1	0.6	
50–60k	12	3.7	1	0.6	
60–70k	7	2.2	1	0.6	
70–80k	2	0.6	1	0.6	
80–90k	2	0.6	0	0.0	
100k+	4	1.2	1	0.6	
Refused	10	3.1	0		
Housing					
Own house or apartment	242	69.5	131	78.9	0.112

	Male (n = 349)		Female (n = 166)		
Race	**n**	**%**	**n**	**%**	**p**
Someone else's house or apartment	85	24.4	30	18.1	
Shelter/rooming	21	6.0	5	3.0	
Consider self homeless	29	29.6	10	27.8	0.509
One current sexual partner (n = 504)	92	83.6	73	98.6	0.05
Marital status (n = 511)					
Married	32	9.2	30	18.2	0.001
Divorced	52	15.0	27	16.4	
Separated	12	3.5	15	9.1	
Never married	241	69.7	79	47.9	
Widow/Widower	9	2.6	14	8.5	
Major depressive symptoms	135	39.6	68	42.0	0.339

Table 2

Technology usage among sample

	n	%
Cell phone ownership	310	60.2
Text messaging knowledge	210	40.8
Internet usage		
Daily	160	31.1
2–3×/week	48	9.3
Weekly	18	3.5
2–3×/month	26	5.0
Monthly	35	6.8
Never	228	44.3

Table 3

HIV-Related medical characteristics

Median CD4 cell count	440	IQR: 268.75–635.25
Currently on HAART	373	73.0
< 400 copies/ml (of those on HAART)	326	87.4
Log_{10} VL	2.66	1.22

Table 4

Differences in internet usage by gender, education, employment and race

	Daily		2–3×/week		Weekly		2–3×/month		Monthly		Never		
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**p**
Male	126	36.1	34	9.7	8	2.3	18	5.2	21	6	142	40.7	0.003
Employment status													
Unemployed	44	20.9	5	2.3	5	2.3	0	0	5	2.3	150	72.1	0.001 **
Employed	99	47.4	22	10.5	9	4.3	15	7.2	16	7.7	48	23	
Disability	35	21.3	13	7.9	3	1.8	7	4.3	8	4.9	98	59.8	
Education level													
<High school diploma	6	5.1	5	4.3	3	2.6	4	3.4	11	9.4	88	75.2	0.001 **
High school diploma	26	18.4	11	7.8	4	2.8	5	3.5	9	6.4	86	61	
Some college	11	33.3	7	21.2	3	9.1	3	9.1	1	3	8	24.2	
Bachelor or graduate degree	109	51.4	24	11.3	8	3.8	14	6.6	12	5.7	45	21.2	
Race													
African American	60	19.7	31	10.5	11	3.6	13	4.3	28	8.9	162	53.1	0.001
Caucasian	81	50.3	13	8.1	7	4.3	12	7.5	7	4.3	41	25.5	
Other	19	40.4	2	4.3	0	0	1	2.1	1	2.1	24	51.1	

** Logistic regression analyses revealed significance at $p < 0.001$

Table 5

Differences in cell phone and text message usage by education, employment and race

Cell phone ownership	n	%	p	Text Message	n	%	p
Education level				Education level			
<High school diploma	53	45.3	0.001	Less than high school	28	52.8	0.019**
High school diploma	77	54.6		High school diploma	49	63.6	
Some college/vocational school	25	75.8		Some college/vocational school	19	76	
Bachelor or graduate degree	146	68.9		Bachelor or graduate degree	109	74.7	
Employment level				Employment level			
Unemployed	88	41.9	0.001**	Unemployed	10	52.6	0.001**
Employed	161	77		Employed	126	78.3	
Disability benefits	80	48.8		Disability benefits	39	48.8	
Race				Race			
African American	82	51.1	0.001	African American	90	73.1	0.054
Caucasian	123	76.4		Caucasian	79	64.2	
Other	31	66		Other	17	53.1	
>95% medication adherence	161	65	0.03	>95% medication adherence	105	74	0.562

** Logistic regression analyses revealed significance at $p < 0.001$