Published in final edited form as:

AIDS Behav. 2011 October ; 15(7): 1475–1482. doi:10.1007/s10461-010-9667-2.

Work-Related Barriers and Facilitators to Antiretroviral Therapy Adherence in Persons Living with HIV Infection

Gilberto Torres-Madriz¹, Debra Lerner², Robin Ruthazer², William H. Rogers², and Ira B. Wilson²

¹The Department of Geographic Medicine and Infectious Diseases, Tufts Medical Center, Boston, MA

²The Institute for Clinical Research and Health Policy Studies, Tufts Medical Center, Boston, MA

Abstract

Little is known about how the structure of work affects adherence to HIV antiretroviral therapy. We surveyed participants in an adherence intervention study to learn more about job characteristics, including measures of psychological demand and control, and job accommodations. Adherence was assessed using the Medication Event Monitoring System (MEMS). Of 156 trial subjects, 69 were employed, and these 69 made 229 study visits. Psychological demands and control were unrelated to adherence, but the presence of workplace accommodations was significantly associated with adherence ($p < 0.05$). In multivariable models adjusting for clustering, those who reported having received an accommodation were 12% more adherent than those who did not receive an accommodation. Adherence was unrelated to experiencing side effects affecting work performance. Having the ability to institute job accommodations was more important to adherence than the psychosocial structure of the work. These potential benefits of requesting modifications need to be weighed against the possible risks of workplace disclosure.

Keywords

Patient compliance; HIV infection; employment; Anti-HIV Agents/therapeutic use

INTRODUCTION

Since the introduction of highly active antiretroviral therapy (ART) there has been a dramatic decline in the rates of HIV associated mortality and morbidity in the United States [1, 2]. As a result of treatment improvements, HIV has become a chronic disease rather than a fatal condition leading to rapid deterioration and death. The success of ART is largely dependent on being able to maintain strict adherence to treatment. Suboptimal adherence is associated with treatment failure and emergence of HIV antiretroviral (ARV) medication resistance [3, 4]. Transmission of resistant virus to others has been reported [5], however the role of adherence to ART on this transmission has not been proven.

As a result of ART's impact on symptoms and survival, many employed persons with HIV infection are able to continue working, and among patients who were too sick to work, health and functioning may improve to levels that allow them to return to work [6, 7]. Investigators from the HIV Cost and Services Utilization Study found that the likelihood of

remaining employed increased from 57 % to 94 % within 6 months when HIV infected workers received ART [8]. However, while reducing the adverse impact of HIV on ability to work is an important accomplishment, it raises new issues about the potential role of work stressors on HIV infected employees. Specifically, employment could add additional physical and psychological stress to the complex health situation of patients living with HIV. Thus, an understanding of these stressors and their impact is important for clinicians and policy makers.

We were interested in three specific aspects of how working might affect ART adherence. First, a large body of research has established associations between exposure to psychosocial stressors in the work place and increased rates of cardiovascular diseases, musculoskeletal diseases, reproductive disorders, depression, functional deficits and other health problems [9–13]. However, we could find no published papers that look at their impact on persons with HIV, and none of these previous studies focused on medication adherence. Second, because of the stigma often attached to HIV, workers with HIV may confront discrimination in the workplace. There are few data on work-related discrimination related to HIV status, rates at which employers grant persons with work-related accommodations when asked, or how such accommodations affect adherence. Third, we could find no literature describing the rates at which working persons taking ART experienced ART-related side effects that adversely affected work performance, and whether this might reduce ART adherence.

We therefore tested the following hypotheses, that: 1) having a job with high psychological demands and/or low control would negatively impact adherence, 2) workplace accommodations would positively impact ART adherence, and 3) perceived ART side effects judged to affect work-performance would impair adherence. We tested these hypotheses by analyzing several waves of employment-related data from a Massachusetts adherence intervention trial.

METHODS

Subjects

We used data from a randomized, crossover trial testing a physician-focused intervention to improve adherence to HIV ART [14, 15]. The trial enrolled subjects from five patient care settings in the greater Boston area, including two academic centers, a community health center, a general medicine practice based in an academic medical center and a private infectious diseases practice. Patients were eligible if they spoke English, had a detectable HIV RNA viral load at their most recent clinical visit, were taking ART and were willing to use an electronic pill bottle cap for one of the antiretroviral medications. Patients without a telephone, non-English speakers, those with a history of HIV dementia and pill box users were excluded. All participants signed written informed consent, and the study was approved by the local Institutional Review Boards and Ethics Committees of all participating sites.

The protocol included an initial enrollment visit followed by five follow-up study visits at two to three month intervals (Figure 1). At each of the five follow up visits, participants completed a survey that asked about a variety of behaviors and activities related to medical care, health status, ART adherence and employment, and adherence data were downloaded from the Medication Event Monitoring System (MEMS) caps. Of the 282 persons referred to study coordinators, 220 (70%) agreed to discuss participation with study enrollment coordinators, of those, 197 (90%) agreed to participate, and of those 156 (76 %) made it to the baseline visit where they were randomized. Of the 156 patients participating in the trial, 69 (44 %) reported being employed, either part time or full time, at one or more study visits. These 69 patients, and the 229 visits they made, composed the analytic sample.

Variables

Adherence—We used Medication Event Monitoring Systems (MEMS) caps to monitor one of the ARV medications. MEMS caps have a pressure-activated microprocessor that records the date and time of each bottle opening and closing. We monitored only one ARV of the 3–4 that most patients were on. A protease inhibitor (PI) was the preferred monitored drug, followed by non-nucleoside reverse transcriptase inhibitor (NNRTI) and lastly nucleoside reverse transcriptase inhibitor (NRTI). A patient's dose was defined as being adherent if the bottle was opened one or more times within three hours of the scheduled dose time as reported by the patient. When a dose was taken outside of the three hour interval it did not reset the interval for the next dose. The adherence summary measure we use in analyses is the percentage of the doses taken correctly during a given interval of 30 days prior to each study visit.

Questionnaire Variables—Patient characteristics were assessed by self-report at the time of the baseline visit and included: age, gender, sexual orientation, marital status, living situation, household income, immigration status, race, ethnicity, level of education, attitude towards HIV infection and ART, substance abuse history and employment. At each follow-up study visit the following items were assessed: self-reported ART adherence, employment, health status, attitude toward ART, alcohol and substance abuse in the last six months (alcohol, cocaine, amphetamine, or narcotics). Reasons for unemployment were asked for those who were not working. Health status was assessed using the Medical Outcomes Study SF-12, a validated, short, generic survey instrument that produces physical and mental summary scores that range from zero to 100. The scale scores are constructed from a nationally representative sample such that the mean is 50 and the standard deviation is 10, where higher scores indicate better health [16].

Employed patients completed a specific section of the survey to explore work in more detail. We asked about type of work performed, weekly working hours, autonomy or flexibility in the workplace, number of jobs, working location, income and benefits by self report. We asked whether participants had disclosed their HIV status to their employer or co-workers, if they had experienced discrimination at the workplace. Regarding accommodations, we inquired whether they had received, from their employer, any of nine different possible accommodations including help from somebody to get work done, working fewer hours, having more frequent rest periods, receiving special transportation or special equipment, changing to an easier job, receiving training for a different job, and changing of the work area or work location. Because the rates of occurrence for individual accommodations were low, we created a dichotomous variable (any accommodations vs. none). Three variables assessed whether side effects that participants attributed to their ART affected work-performance: we asked whether ART side effects affecting work-performance caused them to skip doses, take doses at the wrong time, or miss work altogether. Because these were also uncommon, a dichotomous variable was created (any vs. none).

We used items and scales adapted from Karasek and Theorell to assess psychosocial work stress in three dimensions: psychosocial demands, decision latitude or control, and workplace support. Psychosocial demands measure quantity and pacing of the work, time pressure and the requirement for intense concentration. Job decision latitude or control has two components: workers' freedom to decide about their work content and flow, and worker's opportunity for creativity. Five items measured psychological demands, four items measured control, and two items measured workplace support. We classified subjects according to scores (0–100) in two scales, psychosocial demands and control, where 0 means low control or low demand and 100 means high control or high demand. Following usual classification practices, the median score of control and the median score of

psychological demands for all working study visits were used to define the split points for creating the four job strain categories (Figure 2): active (high demand/high control); high strain (high demand/low control); low strain (low demand/high control); and passive (low demand/low control) [17]. We also tested a dichotomous variable that compared high strain with the other three categories pooled, and a continuous form of the demand and control variables with an interaction term (Figure 2).

Laboratory variables—HIV RNA level and CD4 counts were obtained from medical records at each study visit.

Analyses

Descriptive statistics—To describe the sociodemographic characteristics of our sample and the characteristics of their jobs, we used the patient as the unit of analysis (69 patients). For the job characteristics we used the first visit at which they reported being employed either part or full time. We created descriptive statistics using means, standard deviation, medians and the inter-quartile range (IQR) for the continuous variables, and frequencies and percentages for the categorical variables.

Bivariate relationships—For all other analyses we used the visit as the unit of analysis (N=229). There were 24 patients with five visits (35%), 10 patients with four visits (15%), thirteen patients with three visits (19%) and 22 patients with two visits or less (31%). We conducted bivariate analyses of the relationships of job characteristics, HIV disclosure at work, accommodations, job strain, and side effects affecting work performance to ART adherence. To accomplish this we constructed simple and multiple linear regression models with adherence, ranging from 0 to 100 percent, as the dependent variable, and the employment related variables as the independent variables. These analyses took advantage of the longitudinal nature of our data, recognizing that both adherence and work conditions may change with time. We performed intra-class correlation at patient level of the adherence measures at each visit, and adjusted for repeated measures per patient using mixed models.

The relationship between disclosure and accommodations and between job strain and accommodations was examined using logistic regression, again adjusting for repeated measures but using generalized linear models because the dependent variables in this case were categorical variables.

Multivariable models—To identify possible confounders of the relationship between work variables and ART adherence, we conducted bivariate regression analyses of the relationships between demographic variables (age, sex, race, education, sexual orientation, alcohol history, depression, current drug use, HIV risk factors, physical and mental health) and both the employment and adherence variables. Only variables with that were associated with both job strain and adherence at $p \leq 0.20$ were considered possible confounders and were thus candidates for inclusion in the multivariable regression model.

The base multivariable regression model of adherence included job strain, race, drug use, and side effects that patients attributed to ART. The latter three variables were included because they are often confounders in models of ART adherence [18]. We tested two forms of the job strain variable. In one, psychosocial demand and control were considered as separate continuous variables; in the other job strain was dichotomized, as previously described. Next potential confounders were added to the base model. We then performed a manual backward elimination, taking sequentially out of the model the variable with the highest p-value, until all the potential confounders left in the model were significant at $p < 0.05$. Treatment arm was not associated with adherence in bivariate analyses but we

nonetheless tested it in the final model. Because it was neither significant itself nor a confounder of the relationship between work variables and adherence, it was not included in the final models we present.

RESULTS

Patient and job characteristics

Sixty-nine participants were employed at one or more visits. The mean age was 42 years, 17 % were female, 45 % were non-White, 49 % had some education beyond high school, 60% were men that had sex with men (MSM), and 59 % of the patients were single. Approximately one-fourth (26 %) reported cocaine or heroin use in the prior six months and 17 % reported intravenous drug use as the HIV risk factor. The median CD4 cell count was 274 cell/mm³ and the median HIV viral load was 2,819 copies/ml.

Jobs characteristics at the first working visit are shown in Table 1. Fifty-eight percent of the participants had a full-time job (defined as more than 35 hours per week), 74 % had a permanent job and 10 % were self-employed. Thirty-six percent worked in an office and 22 % were in retail or restaurant work. Forty percent reported not having health insurance through their jobs, 63 % did not get paid sick leave, 58 % had no retirement benefits and 67 % had no disability insurance.

Median psychological demand and job control scores for all visits were 46 and 58, respectively (Figure 2). Based on the definition of job strain, which classified high and low demands and control based on respective sample median scores, approximately 20 % of the workers had high strain jobs at their first working visit (Table 1).

Sixty-six percent had not disclosed their HIV status to their employer, and 52 % had not disclosed to any co-worker (Table 1). Only 10 % reported experiencing discrimination in the work place. More than two-thirds were not allowed to go to medical appointments during working hours without losing pay. Twenty percent reported receiving an accommodation of some kind.

The types of accommodations reported are shown in Table 2. The most frequent accommodation reported was getting more breaks and rest periods (61 %), followed by arranging for a shorter working day (46 %) and working from a different location (41%).

ART adherence

The mean (median) 30-day, pre-visit adherence was 81(93)%, 76(87)%, 76(89)%, 75(90)% and 74(85)% at visits 1, 2, 3, 4, and 5, respectively (data not shown in a Table). As can be seen by the differences between the means and medians, adherence was skewed upward.

Bivariate relationships

In simple linear regression tests, type of job, characteristics of health benefits, disclosure to employer and disclosure to co-workers were not associated with ART adherence ($p > 0.05$ in each test, Table 3). Contrary to our hypothesis, job strain was not associated with adherence ($T = -1.11$, $p = 0.26$). This was true regardless of the variable definition used, including job strain categories, high strain versus non-high strain, and the continuous forms of the variables and their interaction (data not shown). Reports of perceived ART side effects affecting work performance did show a trend ($T = -1.66$, $p = 0.09$) toward being associated with worse adherence. The presence of workplace accommodations was significantly associated with better adherence (parameter estimate 9%, 95% CI 1–17 %, $T = 21.17$, $p = 0.03$).

Relationships among employment variables

Patients who disclosed their HIV status to their supervisor were more likely to report they had accommodations in place (OR 6.15, 95% CI 2.23-16.92, $Z=3.52$, $p<0.01$) when compared to those who did not disclose. However no data about denied accommodation requests were available. Those who disclosed their infection status to their supervisor did not report more discrimination or unfair treatment in the workplace because of their HIV infection than those who did not disclose it. Neither the likelihood of reporting unfair treatment at the workplace (OR 2.04, 95% CI 0.63-6.55, $Z=1.19$, $p=0.23$), nor the likelihood of a promotion were related to HIV status disclosure (OR 1.0, 95 % CI 0.42-2.45, $Z=0.01$, $p=0.99$).

There was no association between job strain and workplace accommodations ($p>0.05$), and between job strain and HIV status disclosure ($p>0.05$). Workers with accommodations scored lower on the physical and mental components of the SF-12 when compared to those without accommodations, 45 and 52, respectively for the physical component ($F=36.44$, $p<0.0001$), and 40 and 48, respectively for the mental component ($F=16.84$, $p<0.001$).

Multivariate analysis of factors related to ART adherence

After adjusting for race, drug use, job strain, side effects affecting work performance and physical and mental health, patients who had any accommodations had a 12% higher mean adherence than those without any such accommodations (95% CI 3–20%, $T=2.79$, $p=0.006$, Table 4). Regarding job strain, neither the continuous forms of psychosocial demand and control as separate variables, nor the dichotomous form of strain was statistically significant, and the dichotomous form is shown in the Table. To examine the sensitivity of the model to the inclusion of physical and mental health, we dropped these variables, but found that accommodations were still significantly associated with adherence. The intra-class correlation at patient level for the adherence outcome variable was 0.72, so we expect that only 28 % of the total variance is not explained by clustering of the data. Therefore a mixed model that accounts for the repeated measures was necessary for these analyses.

DISCUSSION

Our study showed four main findings. First, none of the psychosocial work variables that we assessed were associated with ART adherence. Second, accommodations made at the work were significantly associated with higher rates of adherence to ART. Third, patients who disclosed their HIV status were more likely to report accommodations. Finally, having side effects affecting work performance was not significantly associated with ART adherence.

Historically, studies of job strain have focused on the inverse relationship of job strain to health status. While poor medication adherence could be a mediator of those poor health outcomes, we are not aware of previous work that has examined this hypothesis. While our sample was relatively small and our analysis somewhat underpowered, we suspect that our findings will likely replicate. Although both variables control and demand were not static and showed some variation over time, we did not see a clinically important trend in the hypothesized direction that would warrant further studies with larger samples.

Only a third of the participants in our study disclosed their HIV status to their employer, which may explain the low level of accommodations reported. Nonetheless, the accommodations that were reported had a positive impact on patients' adherence, even after adjusting for health status (using the SF-12) and other socio-demographic factors. Furthermore, although in the whole cohort healthier people had higher adherence, those with accommodations had lower scores in the physical component and mental component of the SF-12, but higher adherence, than those without accommodations, even after controlling for

health status. One possible interpretation of this is that workplace accommodations can improve the adherence of sicker people.

Understanding cause and effect related to accommodations is challenging. The presence of accommodations indicates not only employer involvement but also suggests that the employee has a relatively high level of awareness of the disease, and also a willingness to address the issue with an employer. While it is possible that the modifications reported contributed to better adherence, it is also possible that requesting accommodations and taking medications are two sides of a personal self-care orientation, manifestations of health related self-efficacy or some other personal attribute. These considerations notwithstanding, the validity of the association between accommodations is supported by the fact that a statistically significant relationship with ART adherence even though rates of accommodations were low, the fact that this finding remained strong after adjustment for relevant confounders, and the observation that our findings were robust to differences in model specification.

We were interested that very few of the participants in our study reported discrimination or any other negative consequences at their jobs as a result of the disclosure of their HIV infection. One interpretation of this observation is that disclosure is relatively “safe,” at least in Massachusetts. Another is that patients chose to disclose when they have good reason to believe that their employer will be sympathetic, and when know that they need a particular accommodation. It is possible that attitudes towards persons with HIV are different from what they were at the beginning of the ART era [19, 20], but disclosure remains a difficult and potentially risky step.

Relatively few people reported ART-related side effects reducing their work performance, perhaps because of the better tolerability of current ART regimens. Of the three side effect items that made up the aggregate variable, those who reported missing days or time at work and those who reported that they intentionally skipped or mistimed their ARV dose to avoid side effects had the lowest rates of ART adherence. In the multivariable model, the effect size we observed was six percentage points, with a wide 95 % confidence interval, which includes a potentially clinically significant adherence effect. We believe that a larger, better powered, study to better understand this effect would be justified.

There are several study limitations. First, because the data come from a randomized trial, they may not be generalizable to those who did not qualify for study entry, in particular those with non-detectable viral loads. Second, the findings are likely very sensitive to the types of jobs that our patients happened to have, and samples that captures a wider variety of types of work might yield different findings. Third, as previously noted, this study was relatively small, and may have been underpowered to detect some clinically important effects. Fourth, a study done in urban care settings in Massachusetts may not be generalizable to other states and regions, or to rural care settings. Fifth, the job strain measure hasn’t been validated in this type of sample and perhaps it is not picking up environmental attributes of the job as much as personal attributes. Finally, we did not analyze physical demands, which may be relevant to adherence among certain subgroups of workers.

In conclusion, we would encourage physicians to inquire about work, work conditions, and disclosure at work as part of adherence discussions. The specific accommodations captured in this study, and possibly others we have not measured, may have a positive impact on patient ART adherence. While this may involve disclosure about HIV status, in some situations the potential negative consequences of such disclosure may be minimal.

Acknowledgments

This work was supported by grants from the National Institute on Drug Abuse (R01DA015679), the National Institute of Mental Health (R21MH073420), the Lifespan/Tufts/Brown Centers for AIDS Research (P30AI042853), and the National Center for Research Resources (K24 RR020300). GTM was supported by Ruth L. Kirschstein National Research Service Awards (5 T32 AI007438-15 and 5 T32 AI0055412-03) and the Tufts CTSA (UL1 RR025752). We would also like to recognize the invaluable contributions made by Emily Howe to this project

REFERENCES

1. Hogg RS, Heath KV, Yip B, Craib KJP, O'Shaughnessy MV, Schechter MT, et al. Improved Survival Among HIV-Infected Individuals Following Initiation of Antiretroviral Therapy. *JAMA*. 1998 Feb 11; 279(s6):450–460. 1998. [PubMed: 9466638]
2. Palella FJ, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining Morbidity and Mortality among Patients with Advanced Human Immunodeficiency Virus Infection. *N Engl J Med*. 1998 Mar 26; 338(s13):853–860. 1998. [PubMed: 9516219]
3. Bangsberg, DRab; Hecht, FMb; Charlebois, EDa; Zolopa, ARf; Holodniy, Mfg; Sheiner, Lc, et al. Adherence to protease inhibitors, HIV-1 viral load, and development of drug resistance in an indigent population. *AIDS*. 2000 Mar 10; 14(s4):357–366. 2000. [PubMed: 10770537]
4. Roge BT, Barfod TS, Kirk O, Katzenstein TL, Obel N, Nielsen H, et al. Resistance profiles and adherence at primary virological failure in three different highly active antiretroviral therapy regimens: analysis of failure rates in a randomized study. *HIV Medicine*. 2004; 5(5):344–351. [PubMed: 15369509]
5. Hecht FM, Grant RM, Petropoulos CJ, Dillon B, Chesney MA, Tian H, et al. Sexual transmission of an HIV-1 variant resistant to multiple reverse-transcriptase and protease inhibitors.[see comment]. *New England Journal of Medicine*. 1998 Jul 30; 339(s5):307–311. [PubMed: 9682043]
6. Bettinger M. Regaining lost abilities: the prospect of returning to work. *Focus*. 1997 Jul; 12(8):1–4. [PubMed: 11364545]
7. Ezzy D, De Visser R, Grubb I, McConachy D. Employment, accommodation, finances and combination therapy: the social consequences of living with HIV/AIDS in Australia. *AIDS Care*. 1998 Jun 10; 2(Suppl):S189–S199. [PubMed: 9743740]
8. Goldman DP, Bao Y. Effective HIV treatment and the employment of HIV(+) adults. *Health Serv Res*. 2004 Dec; 39(6 Pt 1):1691–1712. [PubMed: 15533182]
9. Theorell T, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. *Journal of Occupational Health Psychology*. 1996 Jan; Vol 1(1):9–26. 1996. [PubMed: 9547038]
10. Rugulies R, Krause N. Job strain, iso-strain, and the incidence of low back and neck injuries. A 7.5-year prospective study of San Francisco transit operators. *Social Science & Medicine*. 2005 Jul; 61(s1):27–39. [PubMed: 15847959]
11. Amick BC 3rd, Kawachi I, Coakley EH, Lerner D, Levine S, Colditz GA. Relationship of job strain and iso-strain to health status in a cohort of women in the United States. *Scandinavian Journal of Work, Environment & Health*. 1998 Feb; 24(1):54–61.
12. Sanne B, Mykletun A, Dahl AA, Moen BE, Tell GS. Testing the Job Demand-Control-Support model with anxiety and depression as outcomes: the Hordaland Health Study. *Occupational Medicine (Oxford)*. 2005 Sep; 55(6):463–473.
13. Karasek R, Baker D, Marxer F, Ahlbom A, Theorell T. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. *Am J Public Health*. 1981 Jul 1; 71(7):694–705. [PubMed: 7246835]
14. Lu M, Safren S, Skolnik P, Rogers W, Coady W, Hardy H, et al. Optimal Recall Period and Response Task for Self-Reported HIV Medication Adherence. *AIDS and behavior*. 2007
15. Vranceanu AM, Safren SA, Lu M, Coady WM, Skolnik PR, Rogers WH, et al. The relationship of post-traumatic stress disorder and depression to antiretroviral medication adherence in persons with HIV. *AIDS Patient Care & Stds*. 2008 Apr; 22(4):313–321. [PubMed: 18338960]

16. Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996 Mar; 34(3):220–333. [PubMed: 8628042]
17. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): An Instrument for Internationally Comparative Assessments of Psychosocial Job Characteristics. *Journal of Occupational Health Psychology*. 1998 Oct; 3(4):322–355. [PubMed: 9805280]
18. Tucker JS, Burnam MA, Sherbourne CD, Kung F-Y, Gifford AL. Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with human immunodeficiency virus infection. *American Journal of Medicine*. 2003 May; 114(7):573–580. [PubMed: 12753881]
19. Fesko, SL. Accommodation and discrimination: workplace experiences of individuals who are HIV+ and individuals with cancer. Boston College; 1998. p. 233Ph.D
20. Timmons JC, Fesko SL. The impact, meaning, and challenges of work: perspectives of individuals with HIV/AIDS. *Health Soc Work*. 2004 May; 29(2):137–144. [PubMed: 15156846]

Figure 1.
Study design

Psychosocial Demands (median=46)

Figure 2. Job strain frequency distribution according to Karasek and Theorell's model. N= 229 visits per 69 participants.

Table 1

Employment related characteristics at the time of their first working visit (N=69) .

Job Characteristic	N (%)
Job appointment	
Full time	38 (58)
Part time	28 (42)
Permanent	48 (74)
Temporary	17 (26)
Self-employed	7 (10)
Type of work	
Administration, accounting, management	5 (7)
Sales	7 (10)
Service	12 (18)
Waiter, cook	7 (10)
Health services	8 (12)
Driver	5 (7)
Maintenance, construction	10 (14)
Technicians	7 (10)
Other	8 (12)
Location	
Office	23 (36)
Retail or Restaurant	14 (22)
Factory	4 (6)
Vehicle	5 (8)
Other	18(28)
Health benefits	
Medical Insurance	39 (60)
Sick Leave	23 (37)
Retirement	27 (42)
Disability	21 (33)
Disclosed to employer	22 (34)
Disclosed to co-workers	31 (48)
Reported discrimination at the work place	7 (10)
Allowed to go appointments	44 (69)
Any accommodations made	13 (20)
Lose pay for going to medical appointments	22 (34)
Job strain	
High strain	13 (20)
Non-high strain	52 (80)

Table 2

Type of workplace accommodations reported by 13 workers at 41 of 229 study visits. [†]

Accommodations	N	%
Allowed to take more breaks and resting periods	25	61
Getting a shorter workday	19	46
Allowed to work at a different location	17	41
Changing work tasks to ease job	15	37
Someone assigned to help	11	27
Training for a different job	9	22
Changing the work-area layout	8	20
Getting special equipment for the job	7	17
Getting special transportation	2	5

[†]Workers can get more than one accommodation.

Table 3Relation of the employment related variables and adherence to ART for all working visits (N=229)[†]

Job characteristic		Parameter Estimate [‡]		
		N visits, (%)	(95% CI)	T
Job appointment				
Full time		146 (66)	−0.01 (−0.07, 0.07)	− 0.03
Part-time		76 (34)	−	
Permanent		174 (79)	−0.01 (−0.09, 0.08)	− 0.09
Temporary		45 (21)	−	
Hired		191 (88)	0.03(−0.06, 0.12)	0.64
Self-employed		26 (12)	−	
Health Benefits				
Medical insurance	Yes	142 (65)	0.06 (−0.01, 0.13)	1.58
	No	78 (35)	−	
Sick Leave	Yes	104 (48)	0.04 (−0.04, 0.11)	0.90
	No	111 (52)	−	
Retirement	Yes	103 (47)	0.05 (−0.02, 0.12)	1.33
	No	115 (53)	−	
Disability	Yes	89 (40)	0.01 (−0.09, 0.10)	0.87
	No	129 (61)	−	
Disclose to employer	Yes	82 (37)	0.02 (−0.06, 0.10)	0.53
	No	137 (63)	−	
Disclose to Co-worker	Yes	116 (53)	0.05 (−0.03, 0.12)	1.22
	No	104 (47)	−	
Accommodations	Yes	41 (19)	0.09 (0.01, 0.17)	2.17 *
	No	177 (81)	−	
Allowed to go to appointments	Yes	152 (69)	0.01 (−0.05, 0.07)	0.35
	No	68 (31)	−	
Lose payment for medical appointments	Yes	97 (44)	−0.01 (−0.08, 0.05)	− 0.45
	No	123 (56)	−	
High Strain	Yes	49 (22)	−0.04 (−0.10, 0.03)	− 1.11
	No	171 (78)	−	
Side effect affecting work performance	Yes	27 (13)	−0.06 (−0.14, 0.01)	− 1.66 †
	No	186 (87)	−	

[†] Analysis of all visits adjusted for repeating measures.[‡] The estimate x 100 is the number points on the 100 point adherence associated with having a “yes” for that variable (e.g. accommodations).[†] p<0.10

* p<0.05

Table 4

Multivariate analysis of work-related variables and ART adherence after adjusting for drug use, job strain, race, physical and mental health and repeated measures (N=229 visits).

Effect	Parameter Estimate [†] (95% CI)	T
Accommodations	0.12 (0.03, 0.20)	2.79 **
High Strain Job	−0.001 (−0.07, 0.07)	− 0.04
Side effects at work	−0.06 (−0.14, 0.02)	− 1.53
Physical Health [‡]	0.01 (0.001, 0.02)	2.20 *
Mental Health [‡]	0.01 (0.003, 0.01)	3.19 **
White	0.12 (−0.003, 0.23)	1.92 ⁺
Drug use	0.11 (−0.03, 0.25)	1.52

[†]The estimate x 100 is the number points on the 100 point adherence associated with having a accommodation, a high strain job, side effects at work, being white, our drug use. For physical and mental health, the estimate x 100 is the number of points on the adherence scale associated with a 1 point change in health (on a 100 point scale).

[‡]Physical and Mental Health are measured by SF-12

⁺p<0.10

*p<0.05

**p<0.01