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Reliability and Validity of a Single Item Rating Scale to Monitor Medication Adherence for People Living with HIV and Lower Health Literacy

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Abstract

BACKGROUND—Monitoring medication adherence in clinical and research settings may be especially challenging for people with lower literacy skills.

OBJECTIVE—The current study examined the measurement properties of a single item rating scale for assessing medication adherence in a sample of 468 people living with HIV and lower health literacy skills.

METHODS—Participants completed two versions (computerized and telephone interview) of a single item rating scale (SIRS) as well as unannounced monthly pill counts. We also collected measures of common correlates of adherence and obtained participants' HIV RNA viral load from medical records.

RESULTS—Results indicated that the SIRS is time stable over one month ($r = .46$ to $.52$). There was limited evidence for modality effects between the computerized and phone administered SIRS. Associations with unannounced pill counts demonstrated concurrent and predictive validity of the SIRS, and criterion-related validity by associations with viral load. However, the SIRS also demonstrated inflated adherence estimates relative to unannounced pill counts and these discrepancies were greatest for persons of lower income and who reported alcohol use.

CONCLUSIONS—A simple single item rating scale to monitor medication adherence may therefore be reliable and valid for use with people challenged by lower literacy skills in both clinical and research settings.

Keywords

HIV; Health literacy; Medication adherence

Patient self-report is often used for monitoring medication adherence in clinical and research settings. Most self-report adherence measures require patients to recall the number of medication doses taken in a specified time period, such as in the past three days or the past week.^{1,2} For example, the most commonly used measure of HIV medication adherence was

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developed by the AIDS Clinical Trials Group (ACTG) and asks patients to report how many doses they missed yesterday, followed by the day before yesterday and then the day before that.³ Retrospective recall of medication doses taken and doses missed, including the ACTG measure, tend to over-estimate adherence, possibly due to self-report biases such as perceived expectations, demand characteristics, and the inherent error that comes from asking a person to recall an event defined by forgetting. The validity of self-report may be further compromised when patients are challenged by cognitive limitations including limited literacy skills.^{4,5} For example, poor numeracy and reading literacy have been shown to account for observed gender and race differences in medication management skills and adherence.⁶ Thus, a measure of medication adherence with minimal cognitive demands may have considerable utility.

One self-report measure of medication adherence that has shown promise in monitoring antiretroviral therapy (ART) adherence for people living with HIV is a single-item rating scale that asks patients to estimate the percent of medications taken in a retrospective period, usually the previous month.^{7,8} In what has been called the Visual Analogue Scale (VAS) for ART adherence,⁸ patients are shown an extended line anchored by 0%, 50% and 100% and asked to indicate how much of their medication they have taken in a specified time period. The resulting value representing the percentage of medications taken has been found to significantly correlate with objective measures of adherence including electronic medication monitoring devices, unannounced pills counts, and clinical outcomes, namely suppression of HIV RNA viral load.⁹ Given these promising results and the reduced cognitive demands of a single item rating scale (SIRS), this measure may be of particular use with people with limited literacy skills.

The current study was undertaken to examine the measurement properties of a medication adherence SIRS for use with people living with HIV and lower-literacy skills. We administered two versions of the SIRS to a sample of men and women living with HIV and lower reading literacy scores; (a) computerized self-interview with visual continuum and anchors or (b) telephone interview administered with only verbal cues. Our intention was to test the psychometric performance of the SIRS for people with moderate and lower literacy skills.

Methods

Participants and Setting

This study was conducted in Atlanta, Georgia, a city with a growing HIV epidemic. Georgia has over 41,000 people living with HIV/AIDS and had over 2,000 new infections in 2010.¹⁰ Participants were recruited from the Atlanta-metro area AIDS services and community outreach as well as through word-of-mouth. Enrollment occurred between November 2008 and April 2011. These data were collected in a run-in study for an adherence trial for people with lower health literacy living with HIV.¹¹ The procedures were approved by the University Institutional Review Board and informed consent was obtained from all enrolled participants.

Measures

Literacy and Cognitive Tests

Reading and numerical literacy: Participants completed the Test of Functional Health Literacy in Adults (TOFHLA) at screening.¹² It is a 12-minute timed test and includes 50 multiple-choice items, in which participants select the correct word (out of four options) to complete sentences from standard medical instructions. Scores range from 0 to 50 and percentages were computed for the total score. Participants in this study scored 90% correct or below on the TOFHLA to be eligible for enrollment. Numeracy Scale was also administered which assesses numerical reasoning for medical instructions.¹³ Scores ranged from 0–7.

Neurocognitive screening—To assess gross neurocognitive functioning, the Draw a Clock Test was administered. Participants were asked draw a representation of a round-faced clock from memory that was scored using standard procedures.¹⁴ Scores ranged from 0–7, with higher scores indicating higher neurocognitive functioning.

Medication Adherence and Health Outcomes

Single Item Rating Scale (SIRS)—We administered a single item rating scale (SIRS) adapted from what has previously been called the Adherence Visual Analog Scale (VAS).⁸ We administered the SIRS in two formats: (a) computer assisted interviews with visual cues and (b) phone interviews that excluded visual cues. The instructions for the computerized adherence SIRS ask participants to “please indicate on the line below at the point showing your best guess about how much of your HIV medications you have taken in the past 30-days, or past month. 0% means you have taken none of your HIV medications, 50% means you have taken half of your HIV medications, 100% means you have taken every single dose of your HIV medications.” For computerized interview administration, participants viewed a continuum on a computer screen and used a mouse to click their response anywhere on the continuum.

One month after the initial assessment, participants received a telephone interview assessment during which time they were asked, “Thinking back over the past month, about what percent of your HIV medications would you say you have taken? 0% would mean you took none, 50% would mean you took half, and 100% would mean you took every single dose of each medication.” Participants verbally indicated the percentage of HIV medications that they believed they had taken without any visual cues. The phone interviews were repeated monthly for three months.

Unannounced pill counts—Pill counts represent an objective measure of medication adherence. Although clinic/office-based pill counts have known limitations that can over-estimate adherence, these problems are resolved by conducting home-based unannounced pill counts.^{9,15} Furthermore, telephone administered unannounced pill counts have been validated against home-based unannounced pill counts and are associated with clinical outcomes.^{16,17} In this study, unannounced pill counts represent an objective measure of medication adherence over the previous month. Following an in-office training session that covered all of the pill counting and phone assessment procedures, an assessor called

participants to conduct phone assessments, which included the unannounced pill count. Participants were provided with a project cell phone for assessments free of charge. The assessor asked the participant to count the pills in each medication bottle aloud twice. Using information from the medication bottles (i.e. prescription number, dispense date, dispense amount and dosage information), pillboxes, and other storage devices, adherence was calculated at the individual medication level as the ratio of the number of pills taken between phone assessments relative to the number of pills prescribed for that period of time.

HIV RNA viral load—Participants obtained their most recent HIV RNA viral load from their health care provider. Viral loads could not be dated older than three months. Participants who were unable to obtain their health care provider records (less than 5%) provided a blood specimen for viral load testing. We used 50 copies of HIV RNA to define undetectable viral load.

Predictors of Measurement Discrepancies—We examined participant characteristics that may explain observed discrepancies between adherence obtained from the SIRS and adherence observed in unannounced pill counts. Specifically, participants completed measures of demographic characteristics, health status, and psychosocial characteristics that previous research has shown associated with medication adherence.¹⁸

HIV-related symptoms: A 14-item scale assessed the number of HIV symptoms experienced by participants.¹⁹ Items consist of common symptoms associated with HIV such as fatigue, sore throat, and unintentional weight loss. We calculated a composite using the summation of all 14 items, $\alpha = 0.70$.

HIV-related shame: To assess levels of shame associated with having HIV, participants completed a ten-item measure.²⁰ Participants were asked about thoughts and feelings over the past three months, responses were *0 = not at all*, *1 = a little bit*, *2 = quite a bit* and *3 = very much*, $\alpha = 0.67$.

Depression symptoms: The Centers for Epidemiological Studies Depression scale (CESD) was used to assess emotional distress.²¹ Participants completed the full 20-item CESD, $\alpha = 0.87$. Items focused on how often a participant had specific thoughts, feelings and behaviors in the last seven days. Responses were *0 = 0 days*, *1 = 1–2 days*, *2 = 3–4 days*, *3 = 5–7 days*. For this scale, scores range from 0 to 60, with scores greater than 16 indicated possible depression.

Social support: Level of social support was assessed through a 14-item scale.²² Items measured tangible, emotional, and informational support. Responses were *1 = completely true*, *2 = mostly true*, *3 = mostly false* and *4 = completely false*. Possible scores ranged from 14–56, with higher scores indicating more social support, $\alpha = 0.80$.

Stress: To assess levels of stress, participants completed 17 items focusing on the past three months.²³ Participants indicated whether or not each specific event had occurred within the past three months.

Alcohol and other substance use: Composite scores ranged from 0 to 17, $\alpha = 0.74$. To assess level of alcohol use, participants completed the AUDIT-C, which has been found valid in various populations.²⁴ In our sample, it had acceptable internal consistency ($\alpha = 0.77$). We also assessed other drug use by asking participants if they had used marijuana, cocaine, amphetamine and other drugs in the previous month. Dichotomous responses were summed to create drug use index.

Statistical Analyses

We performed standard psychometric analyses for the entire sample as well as subsamples of participants divided into those who scored below an 85% on the TOFHLA reading literacy scale (lower health literacy) and those who scored greater than or equal to 85% but less than 90% (moderate health literacy). Pearson correlations were performed to test associations of continuous measures and we used z-scores to compare the Pearson correlation coefficients for literacy subgroups.²⁵ We also examined the relationships between SIRS and unannounced pill count adherence using four clinically meaningful categories: 100%-90%, 89%-80%, 79%-70%, 69% or below. For these analyses we calculated contingency table chi square tests and kappa coefficients with z-scores to compare kappa coefficients between literacy groups.

For descriptive analyses we report the means and standard deviations for each of the adherence measures at each time point for the entire sample as well as the literacy subgroups. In addition, we performed paired sample t-tests to compare the overall mean values of each of the adherence measures (i.e. computer and phone administered SIRS and unannounced pill counts). To assess test-retest reliability for the repeated measures of adherence (i.e. unannounced pill counts and phone SIRS), correlations were conducted between Time 1 and Time 2 as well as Time 2 and Time 3.

Analyses tested multiple indicators of validity. To examine concurrent validity for continuous values of medication adherence, we calculated Pearson correlations between the phone SIRS and concurrent unannounced pill counts at all three monthly time points. The mean adherence was also calculated across the time points. Correlations and kappa coefficients examined modality effects for the computer and phone administered SIRS, using both continuous and categorically defined adherence. To assess predictive validity, the computerized SIRS was correlated with unannounced pill count adherence obtained one month later. To test criterion-related validity we correlated adherence variables with the log value of HIV RNA.

Because our data included unannounced pill counts as an objective measure of adherence, we considered the absolute difference between the SIRS adherence values and unannounced pill counts as error in self-report. We then examined predictors of that error. Specifically, we performed linear regression analyses predicting the absolute value of the difference between phone SIRS and unannounced pill counts conducted in the same phone assessment, therefore assessing the same 30-day period. We tested demographic characteristics, health status, and psychosocial factors as the predictors of adherence discrepancy scores. We performed a series of bivariate regressions and factors that were found significant at the $p < 0.05$ level were entered into a multivariate regression model.

Results

Sample

Participants contacted our research site if they were interested in being in the current study. A total of 1,385 individuals contacted the research site. Of these individuals, 911 screened out on the entry criteria; 417 scored higher than 90% on the TOFHLA, 374 were not taking antiretroviral medications, 120 were not HIV positive. Six additional participants were excluded from the current analysis due to missing TOFHLA data. Thus, 468 participants are included in the current analysis and were divided into two groups. The lower health literacy group consisted of 267 individuals and the moderate health literacy group consisted of 201 participants.

Descriptive Analyses

Sixty-nine percent of participants were male (N=326). Ninety-three percent were African American (N=437), 4% were White (N=18), 1% were Latino (N=6) and 1% selected other as their ethnicity (N=7). Over a third of participants had not completed high school and 92% were on disability or unemployed. Participants who were enrolled in the study but who were unable to be contacted for their phone assessments were compared to those who could be reached. No differences were found on any demographic variables or psychosocial variables except for social support; participants who did not complete the phone assessments reported less social support than those that did complete the phone assessments, $t(267) = 2.76$, $p = 0.006$.

Table 1 presents the medication adherence estimates obtained from the unannounced pill counts, computerized SIRS and phone administered SIRS. For the total sample the phone SIRS averaged over the three-months (M=90.2, SD=15.1) yielded higher adherence estimates than the unannounced pill counts over three months (M=84.1, SD=17.8) and the computerized SIRS (M=87.0, SD=19.3). These patterns were unchanged for the lower literacy and moderate literacy subgroups. Paired t-tests for the total sample showed that the difference between unannounced pill counts and phone SIRS was significant, as was the difference between unannounced pill counts and computer delivered SIRS, and the difference between phone SIRS and computer SIRS (see Table 1). This pattern was similar for the lower literacy subgroup except that the difference between phone SIRS and computerized SIRS was not significant. The pattern for those with moderate literacy varied such that the difference between unannounced pill counts and phone SIRS was significant, as was the difference between phone SIRS and computerized SIRS. However, the difference between unannounced pill counts and computerized SIRS was not significant.

Reliability

Table 2 presents the test-retest reliability for the phone SIRS and the unannounced pill counts and Table 3 shows the inter-correlation matrix for all adherence measures at each time point within literacy subgroups. Results indicated acceptable test-retest reliability for subgroups as well as the entire sample. Results also showed that the test-retest coefficients for the moderate literacy subgroup were of significantly greater magnitude for the SIRS. The unannounced pill count reliability coefficients did not consistently differ.

Concurrent Validity

The correlations between phone SIRS and unannounced pill counts suggest concurrent validity, with the overall correlation between the SIRS and pill counts $r = .66$ for the entire sample. In addition, there was significant concordance among the clinically defined categories of adherence for the SIRS and pill counts with minimal differences between coefficients for the literacy subgroups (see Table 4, Panel 1).

Modality Effects

The same patterns of associations were observed for the continuous and categorical adherence values from the phone and computerized SIRS (see Table 4 Panel 2). There were no differences between the computer and phone administered SIRS coefficients for the literacy subgroups.

Predictive Validity

The computerized SIRS was administered one-month prior to the first unannounced pill counts, allowing for a test of predictive validity. The associations were significant for the continuous and categorically measured adherence for the total sample and subgroups (see Table 4 Panel 3).

Criterion-Related Validity

Table 5 shows the associations between the computerized and phone administered SIRS and unannounced pill counts with HIV RNA viral load. Results showed that all of these associations were significant, with the magnitudes of correlations not differing between the literacy subgroups.

Predictors of SIRS – Pill Count Discrepancies

Analyses examining predictors of absolute differences between adherence assessed by SIRS and unannounced pill count are shown in Table 6. The mean absolute value of the discrepancy was 9.96 (SD = 11.34). Results of regression analyses showed that lower income was a significant predictor of greater discrepancy between the SIRS and unannounced pill counts, as was lower social support, and greater alcohol use. The multivariate regression model found income and alcohol use remained significant predictors of greater discrepancies between SIRS and pill count adherence.

Discussion

The single item rating scale administered by computerized self-assessment or by telephone interview in this study was reliable and valid in this sample of people living with HIV and lower health literacy. This is among the first studies to evaluate the psychometric performance of this measure in people with demonstrated lower literacy skills. The scale demonstrated time stability with one-month test-retest correlations ranging between .40 and .62, representing comparable stability with unannounced pill counts. However, for all measures of adherence, persons of moderate literacy demonstrated greater time stability than those of lower literacy. In terms of validity, we found significant associations between both

the computerized and phone administered versions of the SIRS with unannounced pill counts. These associations were observed for both adherence treated as a continuous and categorical variable. The computer administered SIRS was also associated with the phone administration of the SIRS, suggesting minimal modality effects. There was also limited evidence for significant differences between validity indices for lower and moderate literacy subgroups. Significant associations between the computer and phone administrations of the SIRS and HIV RNA viral load demonstrated evidence for criterion-related validity. These correlations were of a similar magnitude as those observed for the relationship between unannounced pill count adherence and viral load in this study and previous research.²⁶ There were no significant differences in the magnitudes of validity coefficients between literacy subgroups.

Our findings mirror previous research on the SIRS in samples not characterized by lower literacy skills to suggest that asking patients to estimate the percent of medications they have taken in the previous month can be used to reliably estimate adherence. However, we also found important limitations of the SIRS. Similar to other self-report measures of adherence this simple single item rating scale over-estimated medication adherence relative to an objective measure. Specifically, in most cases the average rating scale adherence was as much as five adherence percentage points greater than adherence assessed by unannounced pill counts. Thus, the SIRS poses adherence inflating biases that are common to self-reported adherence measures.^{3,7,27} This bias may be truncated in future studies by normalizing non-adherence prior to participants responding to the SIRS. Discrepancy analyses indicate that errors in SIRS adherence relative to pill counts are associated with lower income and greater alcohol use. However, given the associations between the SIRS and pill counts and the lack of significant differences in criterion-related validity, we conclude that the inflated estimates of adherence from the SIRS are minimal and may not be clinically meaningful.

Our study has limitations that should be considered when evaluating these results. These data were collected as part of a run-in study for clinical research conducted in a city in the southeastern United States that may not be generalizable to other cities and regions. Generalizability was also limited by recruiting with outreach and referral procedures to clinics. Thus, our convenience sample cannot be considered representative of people living with HIV/AIDS receiving care. Although monthly assessments of medication adherence have not shown evidence of assessment reactivity, we cannot rule out the potential for monthly assessment calls prompting participant adherence on the pill count. Additionally, the participants were always asked the phone SIRS after the pill count and thus may have increased the participants' accuracy on the phone SIRS. The study is also limited by having only a single administration of the computerized SIRS to estimate reliability and validity. This limitation may be especially important in terms of time stability, which was only available for the phone administration of the SIRS. In addition, although HIV RNA viral load is the gold standard for determining criterion-related validity in HIV treatment, our study would have been strengthened with additional clinical health indicators. With these limitations in mind, our study provides support for using the SIRS for assessing and monitoring medication adherence in people with lower literacy skills.

Conclusions

The adherence rating scale tested in this study demonstrated similar results using visual cues in the computerized version and the phone interviews that were void of visual cues. Previous research has referred to this measure as a visual analogue scale. However, there is no true analogue presented in the measure. Rather, individuals are merely asked to indicate where on a rating continuum of percentages they estimate their recent medication adherence. Our findings go a step farther to show that the visual cues offered by a line representing a continuum of adherence is unnecessary for this scale. Simply explaining to patients that adherence is bound by not taking any medications (0%), taking half (50%), and taking every single dose (100%) may be sufficient to obtain reliable and valid estimates of adherence in subsequent interviews without visual cues. With the knowledge that self-reported adherence will tend to over-estimate doses taken and that adherence may be particularly inflated for patients of lower income and those who use alcohol, clinicians and researchers can quickly and easily estimate adherence from patients with lower health literacy skills using the SIRS. In addition, the lower cognitive demands of this measure relative to retrospective recall of doses missed as well as lower costs than any objective measure of adherence, make the use of single item rating scales particularly appealing for use in clinical and research settings.

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Table 1

Means and standard deviations of computerized and phone administered single item rating scale (SIRS) and unannounced pill count adherence.

	Total Sample n = 468		Lower Literacy n = 267		Moderate Literacy n = 201	
	M	SD	M	SD	M	SD
Phone - Administered SIRS						
Time 1	91.9	14.7	92.5	14.7	91.1	14.7
Time 2	90.2	18.1	91.1	16.7	88.8	20.0
Time 3	89.7	19.1	90.2	19.5	89.0	18.8
Time 1-3 Mean	90.2	15.1	90.8	14.6	89.3	15.7
Unannounced Pill Count						
Time 1	85.3	19.7	86.3	18.6	83.9	21.1
Time 2	83.9	22.3	84.4	21.7	83.0	23.0
Time 3	84.2	22.5	85.0	23.1	83.0	21.7
Time 1-3 Mean	84.1	17.8	85.0	16.8	82.6	19.2
Computerized SIRS	87.0	19.3	88.7	17.5	84.9	21.4
Paired T-tests						
	t(df)		t(df)		t(df)	
Mean Phone SIRS - Mean unannounced pill counts	9.3 ^{**} (438)		6.1 ^{**} (250)		7.7 ^{**} (184)	
Mean unannounced pill counts - Computerized SIRS	-3.1 ^{**} (436)		-3.1 ^{**} (248)		-1.2 (184)	
Mean Phone SIRS - Computerized SIRS	4.0 ^{**} (448)		1.9 ^{**} (253)		3.7 ^{**} (191)	

Note:

^{**}
p < .01

Table 2

Test-retest reliability coefficients for phone administered SIRS and unannounced pill count adherence.

	Total Sample n = 468	Lower Literacy n = 267	Moderate Literacy n = 201	z-score comparing correlations by literacy
	r	r	r	
Phone - Delivered SIRS				
Time1 – Time 2	0.522 **	0.418 **	0.627 **	–3.097 **
Time2 – Time 3	0.468 **	0.409 **	0.542 **	–1.836 *
Unannounced Pill Count (unannounced pill counts)				
Time1 – Time 2	0.495 **	0.436 **	0.564 **	–1.823 *
Time2 – Time 3	0.439 **	0.454 **	0.419 **	–0.907

Note:

UPC = unannounced pill count, SIRS = Single Item Rating Scale

*
p<0.05,

**
p<0.01

Table 3

Correlation matrix of adherence measures by literacy subgroups.

		Moderate Literacy						
		Phone SIRS 1	Phone SIRS 2	Phone SIRS 3	UPC 1	UPC 2	UPC 3	Computer SIRS
Lower Literacy	Phone SIRS 1	1	0.627**	0.540**	0.606**	0.539**	0.469**	-0.297**
	Phone SIRS 2	0.418**	1	0.542**	0.613**	0.686**	0.544**	-0.403**
	Phone SIRS 3	0.471**	0.409**	1	0.370**	0.452**	0.679**	-0.217**
	UPC 1	0.306**	0.295**	0.283**	1	0.564**	0.402**	-0.308**
	UPC 2	0.250**	0.614**	0.317**	0.426**	1	0.419**	-0.301**
	UPC 3	0.316**	0.280**	0.712**	0.403**	0.454**	1	-0.236**
	Computer SIRS	-0.209**	-0.203**	-0.297**	-0.235**	-0.366**	-0.358**	1

Note:

UPC = unannounced pill count, SIRS = Single Item Rating Scale,

** p < .01

Table 4

Concurrent validity (Panel 1), modality effects (Panel 2), and predictive validity (Panel 3)

	Total Sample n = 468		Lower Literacy n = 267		Moderate Literacy n = 201		Comparisons by literacy group	
	r		r		r		z-score comparing r's	
Continuous Phone SIRS & UPC								
Panel 1	Time 1	0.438**	0.306**		0.606**		-4.11**	
	Time 2	0.648**	0.614**		0.686**		-1.33	
	Time 3	0.700**	0.712**		0.679**		0.68	
	Mean UPC and SIRS	0.660**	0.534**		0.796**		-5.23**	
	Categorical UPC and Phone SIRS	X ²	K	X ²	K	X ²	K	z-score comparing kappas
Panel 2	Time 1	72.391**	0.215**	29.142**	0.179**	56.285**	0.270**	-1.020
	Time 2	107.799**	0.293**	43.574**	0.238**	77.683**	0.353**	-1.343
	Time 3	112.103**	0.250**	57.163**	0.227**	57.695**	0.281**	-0.614
Panel 2								
Phone SIRS & Computer SIRS	r	0.428**	0.399**		0.454**		-0.720	
	X ²	K	X ²	K	X ²	K	z-score comparing kappas	
Panel 3								
UPC & Computer SIRS	r	0.404**	0.353**		0.454**		-1.29	
	X ²	K	X ²	K	X ²	K	z-score comparing kappas	
Panel 3								
Categorical UPC & Computer SIRS	r	0.220**	0.218**		0.223**		-0.056	
	X ²	K	X ²	K	X ²	K	z-score comparing kappas	

Note:

UPC = unannounced pill count, SIRS = Single Item Rating Scale;

**
p < 0.01.

Table 5

Criterion-related validity coefficients for medication adherence measures and HIV RNA viral load.

	Total Sample n = 468	Lower Literacy n = 267	Moderate Literacy n = 201	z-score comparing correlations by literacy
	r	r	r	
Phone SIRS– Viral load	–0.250 **	–0.209 **	–0.297 **	1.00
Computer SIRS – Viral load	–0.366 **	–0.291 **	–0.444 **	1.89
Unannounced pill counts 1 – viral load	–0.269 **	–0.235 **	–0.308 **	0.84

Note:

UPC = unannounced pill count, SIRS = Single Item Rating Scale;

**
p < 0.01

Bivariate linear regressions on the absolute value of the discrepancy between phone SIRS and unannounced pill counts

Table 6

Variables	Multivariate Model				
	B	SE B	β	B	SE B
Gender	-0.812	1.169	-0.033		
Ethnicity	0.503	1.339	0.018		
Education	-.001	0.283	0.001		
Income	-1.778	0.83	-0.102 *	-1.87	0.825
Employment	-0.374	0.539	-0.033		
Reading literacy	-3.152	2.523	-0.060		
Numerical literacy	-0.392	0.290	-0.064		
Clock Test	0.427	0.416	0.49		
Years Since Testing Positive	-0.098	0.077	-0.065		
Shame	0.056	0.107	0.025		
Social Support	-0.155	0.072	-0.102 *	-0.132	0.072
Stress	0.141	0.140	0.050		
Depression	0.074	0.098	0.036		
Alcohol	0.616	0.0234	0.125 **	0.627	0.234
Substance Use	1.101	0.680	0.077		

Note:

*
p < .05,**
p < .01