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Exploring predictors of medication adherence among HIV positive women in North America

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Abstract

Objective—Women infected with HIV live with many factors that affect antiretroviral (ARV) medication adherence. Social Action Theory (SAT) explains how context, environment, and psychological factors influence behavior. How these factors are related to HIV adherence in women is unique. The purpose of this analysis was to explore the relationships among contextual, environmental, and regulatory factors with ARV medication adherence in order to assist care providers in improving care for women living with HIV.

Design—Convenience descriptive multicenter

Setting—Sixteen HIV clinics and service organizations in North America

Participants—This sample was drawn from a larger study of 2,182 persons living with HIV recruited from clinics and service from September 2009 to January, 2011. Our study included 383 North American women living with HIV who were taking ARV medications.

Methods—We assessed the relationship of contextual, environmental, and psychological factors specific to women living with HIV with adherence to ARV medication. Descriptive and multivariate statistics were used to examine the effects of these factors on self-reported ARV adherence.

Results—Age, depression symptoms, stigma, and engagement with health care provider, and four psychological factors were correlated with self-reported ARV medication adherence ($p = .01$). Regression analysis indicated that adherence self-efficacy and depression symptoms accounted for 19% for 3-day and 22% for 30-day self-reported medication adherence.

Conclusions—Adherence self-efficacy and depression symptoms predict ARV medication adherence in women and should be evaluated by nurses. Future research is needed to identify antecedents to and interventions that support adherence self-efficacy and decrease depression symptoms.

Keywords

HIV; women; Social Action Theory; adherence; antiretroviral

Caring for women living with HIV creates unique challenges related to the context of their lives, the environment created by the presence of HIV and their psychological state. Women account for almost half (47%) of people infected with HIV globally (United States Health and Human Services, 2012). They face a number of risk factors that affect their HIV treatment and care including HIV related stigma (Martinez et al., 2012), higher rates of

poverty than men (Kalichman & Grebler, 2010), lack of empowerment and social support (Meyer, Springer, & Altice, 2012), lack of access to women-specific HIV care (Carter et al, 2013), and the challenges women face in their role as caregivers (Webel & Higgins, 2012). To avoid morbidity and mortality from their HIV infection and maintain their health, women living with HIV need to follow a treatment plan that includes creating a supportive lifestyle and adhering to antiretroviral (ARV) therapy regimens. Factors that affect an HIV-positive woman's ability to follow a treatment regimen and behaviors that are protective of their well-being need to be examined. Social Action Theory (SAT), emphasizes such self-protective behaviors and relates them to contextual, environmental, and psychological regulatory factors. How elements of these factors specific to the lives of women living with HIV are related to adherence is important. This model may provide insights that can assist health care providers in improving care for women living with HIV (Traube, Holloway, & Smith, 2011).

Adherence to ARV medications is essential to suppressing HIV viral load and improving overall health (De Cock, Jaffe, & Curran, 2012). Adherence rates greater than ninety percent have been associated with overall improved health (Wang et al., 2009). Women living with HIV, however, have unique challenges related to adherence (Puskas et al., 2011). In the presence of universal access to ARV treatment, women are less likely than men to start treatment and those who do demonstrate lower adherence (Mocroft, Gill, Davidson & Phillips, 2000; Turner, Laine, Cosler, & Hauck, 2003). In a literature review of forty-four ARV medication adherence studies, women were found to have lower adherence than men in almost 70% of the reported findings related to gender (Puskas et al, 2011). The reasons for this are multi-factorial and are associated with the context, demographic variables, and the environment created by living with HIV (Lima et al., 2007; McDonnell-Holstad, Pace, De, & Ura, 2006; Ubbiali et al., 2008). Women's experiences with depression, stress, and stigma, as well as their family relationships and social roles that create competing demands on their time, influence their medication adherence (Sayles, Wong, Kinsler, Martins, & Cunningham, 2009; Sherr, Clucas, Harding, Sibley, & Catalan, 2011, Webel & Higgins, 2012). Depressive symptoms and their relationship with stigma in women are associated with impaired adherence to medications (Carr & Gramling, 2004; Mello, Segurado, Malbergier, 2010). The manner in which these factors relate to each other and affect medication adherence is not well understood.

How women manage their HIV is affected by their relationship with their healthcare provider and psychological regulatory factors that affect these relationships. Positive relationships with one's health care provider have been found to support better medication adherence (Johnson et al., 2006; Sandelowski, Voils, Chang, & Lee, 2009). Factors related to this relationship include self-efficacy and a person's mental health status, specifically how they feel about themselves (Voils, Barroso, Hasselblad, & Sandelowski, 2007). Sense of coherence and self compassion may play a role in improving self-efficacy, enhancing relationships and improving adherence. Sense of coherence reveals a person's overall wellbeing and capacity to cope and adapt to concrete and relationship-oriented problems and stressors (Griffiths, Ryan, & Foster, 2011). Research has demonstrated that persons living with HIV who rate their sense of coherence as low also report a lower quality of life compared to those who rate their sense of coherence as moderate or high (Langius-Eklöf,

Lidman, & Wredling, 2009). Self compassion may influence sense of coherence as it is the ability to be kind and understanding of one's own situation in times of pain or disappointment which improves one's capacity to cope and adapt to relationship-oriented stressors (Neff, Rude, & Kirkpatrick, 2007). Self compassion which recognizes one's shared humanity and feelings of self worth differs from self esteem (Neff & Vonk, 2009). Self esteem, viewed as having a healthy view of one-self externally, has been linked to happiness and optimism as well as depression and anxiety (Baumeister, Campbell, Krueger, & Vohs, 2003). Adherence self efficacy may be an endogenous variable that is influenced by sense of coherence, self compassion and self esteem. Clarifying the relationships among these concepts of self, the psychological regulatory factors in our model, may provide insights into the predictors of medication adherence among women living with HIV.

While researchers have examined many factors that affect medication adherence, there is no one factor or group of factors that has been identified that can be targeted to create interventions to improve medication adherence by women. To obtain a better understanding of the factors related to the context of women's lives, environmental factors created by living with HIV, and factors related to how they perceive themselves, a study was conducted to see how these factors affect medication adherence. The purpose of this analysis was to explore the relationships among the SAT domains of contextual, environmental, and regulatory factors with ARV medication adherence in order to assist care providers in improving care for women living with HIV.

Theoretical Framework

SAT (Ewart, 1991) was developed as a framework to address internal contextual factors, external environmental factors, and the psychological regulatory factors that affect both individual health and public health priorities. In SAT, the self care of the individual is positioned within the domain of psychological factors. SAT proposes that health protection behaviors such as medication adherence involve the interaction among the three domains such as response to internal affective states that influence self-regulatory processes, the self regulation capabilities of the individual and the larger environmental context (Ewart, 1991; Gore-Felton, 2005). The overarching goal in using SAT was to identify contextual (age, having children, income, education and ethnicity), environmental (depressive symptoms, stigma and healthcare provider engagement), and psychological regulatory factors (ARV adherence self-efficacy, self compassion, sense of coherence and self esteem) that promote and/or hinder healthy behaviors and habits and are specific to the lives of women (Ewart, 1991; Traube, et al., 2011). Each variable within each domain was chosen based on past research related to having an HIV diagnosis. Having children is known to affect adherence to ARVs (Merenstein, et al. 2008). Income and education increase risks for those infected with HIV (Center for Disease Control, 2012). Living with HIV creates an environment that increases depression and stigma (Carr & Gramling, 2004; Mello, Sequardo & Malbergier, 2010; Martinez et al., 2012) and requires a unique relationship with a health care provider (Johnson et al., 2006). Less is known about the psychological variables related to self regulation and HIV. How these variables in each domain, and together, predict adherence to ARV medications is not well understood.

Methods

Data for this study were collected as part of the International Nursing Network for HIV/AIDS Research, Study V: *Exploring the Role of Self-compassion, Self-efficacy and Self-esteem for HIV-positive Individuals Managing Their Disease* (N = 2182) (Corless et al., 2012; Nokes et al., 2012; Webel et al. 2012). In the larger study, there were 19 sites from five countries and Puerto Rico. For the current analysis, data were limited to women in North America who were taking ARV medications at the time of the survey (n = 383). We limited analysis to this geographical location due to the similarity in treatment regimens. Prior to recruitment at study sites, the protocols were reviewed and approved by the respective Protection of Human Subjects Committees. Data were collected between September, 2009 and January, 2011. Participants included adults (>18 years of age) who were HIV-infected. Potential participants were recruited from infectious disease clinics and AIDS service organizations. All participants gave informed consent before completing a pen and paper survey (Corless et al., 2012; Nokes et al., 2012; Webel et al. 2012). Participants at most sites in the United States completed the survey in English with those at two sites in Texas completing the survey in Spanish. All data were entered into an electronic database and were de-identified. The de-identified data were sent to the coordinating center, cleaned, entered into the master database, and stored until all sites completed data collection and entry.

Instruments

Basic demographic information was collected on all participants. Table 1 includes descriptive and reliability statistics for this sample of the following study measures.

Center for Epidemiology Depression Scale (CESD)—This 20 item instrument screens for the presence of depression symptoms in community populations (Radloff, 1977). Items are rated 0 = rarely or none of the time to 3 = most or all of the time. A higher score is indicative of more symptoms. The alpha reliability estimate was 0.90 in a sample of 727 AIDS patients (Holzemer et al., 1999).

Perceived Stigma Scale (PSS)—The PSS is a 40-item scale that measures perceived stigma by people with HIV (Berger, Ferrans, & Lashley, 2001). Each item is measured using a 4-point Likert type response ranging from strongly disagree = 0 to strongly agree = 3. A higher score is indicative of more perceived stigma.

Health Care Provider Engagement (HCPE)—The HCPE is a 13-item scale in which clients rate the nature of their interactions with their main health care provider on a four-point scale with 1=always true and 4=never. A low score indicates greater provider engagement. Initial Cronbach's alpha reliability estimate was 0.96 (Bakken et al., 2000).

Adherence self efficacy (ASE)—This 12-item scale measures patient confidence in carrying out important treatment associated behaviors related to perseverance and integration of treatment into one's life (Johnson, Neilands, Dilworth, Morin, Ramein & Chesney, 2007). Responses range from 1 (cannot do it) to 10 (certain can do it) with a higher score indicating more self efficacy. The ASES demonstrates robust internal consistency

(ρ s>.90) and 3-month (r s>.70) and 15-month (r s>.40) test-retest reliability (Johnson, Neilands, Dilworth, Morin, Ramein & Chesney, 2007).

Self-Compassion Scale (SCS)—This 12-item scale is adapted from Neff's 26-item self-compassion scale (Neff, 2003a). Participants are asked to rate how they deal with difficult situations on a 5 point Likert scale, where 1=almost never, 2= rarely, 3= sometimes, 4= frequently 5=almost always. After reversal of items for computing, a higher score indicates more self compassion. Scores are computed by calculating the mean of subscale item responses. The Cronbach's alpha for the original instrument total score is 0.90 (Neff, 2003a).

Self-Esteem Scale (SE)—The Rosenberg Self-Esteem Scale is a 10-item self-report measure of global self-esteem. It consists of 10 statements related to overall feelings of self-worth or self-acceptance. The items are answered on a four-point scale ranging where 1= strongly agree and 4 = strongly disagree. The Cronbach's alpha for early studies ranges from .77 to.88 (Rosenberg, 1989).

Sense of Coherence Scale (SOC)—This 13-item instrument consists of four meaningfulness, five comprehensibility, and four manageability items to measure sense of coherence (SOC). Participants respond using a 7-point scale with options ranging from very often to never. Higher scores indicate stronger SOC. The scale showed internal consistency with Cronbach's alphas ranging from 0.82 to 0.95 (Antonovsky, 1993; Kontinen, Haukkala, & Uutela, 2008).

Medication Adherence: 3 and 30-day visual analog scale—The visual analog scale is based on participants marking on a scale the percentage of time (0% to 100%) they were able to take their medications as prescribed over 3 and 30 days (Walsh, Mandalia, & Gazzard, 2002). These markings were then converted into a score for analysis ranging from 0 to 100. Adherence was categorized by yes 100% or no 0–99% due to the distribution of scores and previous research (Puskas, et al, 2011).

Analysis

The sample was assessed with descriptive statistics and *t* test with the outcome variable of self reported medication adherence (3-day, 30-day). The concepts related to Social Action Theory domains were context (personal characteristics); environment (health care provider engagement, depression symptoms, and stigma); and psychological regulatory (self compassion, self esteem, adherence self efficacy, and sense of coherence). Preliminary regression analysis of each domain was necessary to develop the final regression model of all significant factors (Voss, 2005). All variables were examined together in a correlation matrix to determine statistical significance, strength, and direction. Next, three individual regression models related to the factors of the theory were entered as blocks allowing us to examine them separately. After eliminating variables from each block that did not contribute to variance, the final regression model was examined.

Results

Sample

Of the 450 women who participated in the study from North America, 338 stated they were currently taking ARV medications. Table 2 describes the sample for this analysis. The mean age was 45 years (SD 9.1), 50% were African American with most participants having a high school education (39%) or less (37%). Slightly more than half ($n=200$) said their income was barely adequate and 84% ($n=283$) had children. Sixty-six percent ($n=224$) screened positive for symptoms of depression ($CESD > 16$). Ethnicity was the only statistically significant ($p = .038$) difference for 30-day medication adherence self-report. African American women reported lower 30-day medication adherence than women of other ethnicities.

Examination of the inter-correlation matrix revealed a relationship with medication adherence variables for each factor of the theory (Table 3). The contextual factor of being older was correlated with 3-day and 30-day medication adherence ($p = .05$) and having children was inversely correlated with 3-day medication adherence ($p = .05$). All three environmental factors related to living with HIV; engaging with health care provider ($p = .05$), having depression symptoms ($p = .01$) and perceived stigma ($p = .05$) were significantly related to 3-day and 30-day medication adherence. Lastly, all four psychological regulatory factors (adherence self-efficacy, self compassion, sense of coherence and self esteem) were significantly ($p = .01$) correlated with 3-day and 30-day adherence.

Table 4 represents results from the regression analysis for each factor of the theory. The contextual factors were age, education, having children, income and ethnicity. Age and having children were entered into the contextual model of adherence yet neither was significant in simultaneous regression analysis ($p < .05$).

The environmental factors consisted of perceived stigma, having depression symptoms, and health care provider engagement. The dependent variables of 3-day and 30-day medication adherence were regressed on all three independent variables and were significant. The models accounted for 5% and 7% of the variance respectively in medication adherence and the F values were significant ($F = 5.300, p < .001, F = 6.155, p < .001$). Examination of the standardized coefficients revealed that having depression symptoms was the only significant predictor of ARV adherence ($p = .000$) with a squared partial correlation of 3.2% for both results. Fewer depression symptoms predict higher self reported ARV adherence.

The psychological regulatory factors consisted of sense of coherence, self compassion, self esteem and adherence self-efficacy. These variables were all correlated with ARV medication adherence ($p < .01$). The dependent variables of 3-day and 30-day adherence were regressed on all four variables and were statistically significant. The models accounted for 19% and 22% of the variance respectively for 3-day and 30-day ARV medication adherence and the F-values were significant ($F = 14.685, p < .001, F = 17.89, p < .001$) for 3-day and 30-day medication adherence. Examination of the squared partial coefficients revealed that adherence self-efficacy was the only significant predictor ($p = .000$) with

squared partial correlations of 9% and 10% respectively for the two adherence measures. Having higher adherence self-efficacy predicts self-reported medication adherence.

The predictive variables of the three factors were examined together; adherence self-efficacy and having depression symptoms were predictive of self-reported medication adherence. The model for 3-day adherence accounted for 19% of the variance, ($F = 6, 332 = 37.08, p < .001$). Examination of squared part-coefficients revealed that 14% of 3-day medication adherence is uniquely explained by adherence self-efficacy and 1% by lower depressive symptoms. The model for 30-day adherence accounted for 22% of the variance, ($F = 6, 332 = 45.16, p < .001$). Examination of squared part-coefficient revealed that 15% of 30-day adherence is uniquely explained by adherence self-efficacy and 2% by lower symptoms of depression.

Discussion

Medication adherence for women living with HIV may be challenging given the circumstances of their lives and their feelings about themselves. Framing our analysis with SAT allowed for interpretation of these factors within three domains. Several variables were related to self-reported medication adherence. Specifically, the variables encompassing the environment and psychological regulatory factors were all correlated with medication adherence. Further analysis revealed that the psychological regulatory factor of adherence self-efficacy, the measure of confidence one has in carrying out health-related behaviors, and the presence of depression symptoms can predict ARV medication adherence. Promoting adherence as a way to persevere in obtaining one's treatment goals and integrating treatment into one's life can improve adherence (Johnson et al, 2007). Yet persevering may be affected by depression. Assessing depressive symptoms, the source of these feelings, and the consequences for neglecting one's self-care, needs to be an ongoing process of evaluation in the care of women living with HIV.

Having self efficacy is based on being self confident. Building self confidence in women and helping them understand that they can affect their health while living with HIV requires nurses to individually assess elements of sense of coherence, self compassion and self esteem with adherence self-efficacy. A focus is needed on those elements of believing in oneself that promote perseverance and integration of the medication regimen into activities of daily living. Nurses can do this by engaging patients in how they manage their daily routine, interactions with other people, and their feelings about their role in their family, place of work and community. The self protective behaviors promoted by Social Action Theory are supportive of building self confidence as a means to affect health outcomes (Traube, Holloway & Smith, 2011).

Although not all of the environmental and psychological regulatory factors were predictive of ARV medication adherence, they were all significantly correlated with each other. Adherence self efficacy may be supported by the other psychological regulatory factors which may be affected by the presence of stigma. Self esteem is often viewed as an antecedent to having motivation. The regulatory factors self compassion and self esteem have been found to be related to well being in motivating women to exercise (Magnus,

Kowalski, & McHugh, 2010). Focusing only on self esteem can be limiting. The self esteem process is based on one's evaluation of self worth in relation to others (Neff, 2003b). When living with HIV, self esteem is highly affected by internally perceived stigma. The role of perceived stigma in HIV is so powerful that it may inhibit the ability of a woman to see her value (Vyavaharkar, Moneyham, Murdaugh, & Tavakoli, 2012). Even if self esteem falters when one feels inadequate, self compassion can continue to be relevant (Neff and Vonk, 2009, p. 567). Sense of coherence as defined by Pham, Vinck, Kinkodi and Weinstein (2010), is "a reflection of an individual's overall well-being and ability to cope with stress" (p.313). Self compassion and sense of coherence may support altered self esteem. Corless et al (2012) found that sense of coherence was impacted by stressful life events and affected HIV medication adherence. The relationship between stigma, sense of coherence, self compassion and self esteem and self efficacy and how these factors are expressed in each woman may provide information to tailor interventions to improve adherence.

The presence of depression symptoms as supported in this model continues to predict decreased adherence in women living with HIV. Levels of depression and perceived self-efficacy have previously distinguished those with high and lower adherence (Catz, Kelly Bogert, Benotsh, & McAuliffe, 2000). Depression must be addressed to ensure that confidence in one's own value is not impaired. Depression was chosen a priori as an environmental factor because of its strong link to the situations created by living with HIV (loss of employment, poverty, HIV related stigma). These effects of depression on the lives of women with HIV make recognition and treatment of depression of the utmost importance (Gonzalez, Batchelder, Spsaros, & Safren, 2011; Cruess et al., 2012; Lennon, Huedo-Medina, Gerwien, & Johnson, 2012). Treating depression in ways that enhance a woman's belief in her own capacity may change the chronic nature of the diagnosis and improve adherence. The use of cognitive behavioral therapy (CBT) in minority women with AIDS has been found to reduce depression and anxiety and promote self efficacy and, coping, and improve quality of life (Weiss et al., 2011). When used with women living with HIV without an AIDS diagnosis, the effects were expanded to include enhanced ability to engage in behavior change and adopt healthier life style behaviors (Weiss et al, 2011). Nursing can play a vital role in supporting CBT treatment (Relf, Eisbach, Okine, & Ward, 2013). Integrating self-efficacy into new models of mental health care and as a specific treatment goal, may in turn mitigate depressive symptoms, allowing for better adherence.

Interventions that are tailored specifically to women may improve care. Access to HIV care has expanded yet women-specific HIV/AIDS services are complex and need to address a variety of factors such as safety, inclusion in planning, opportunities for self determination, the provision of social and support services, and several other issues related to women living with HIV (Carter et al, 2013). Services centered on communication, family, cultural sensitivity and coordination are best provided by nurses. Nurses are critical in creating an atmosphere of safety, respect and acceptance; each of which are necessary before any medical care can be actualized long term. These factors, when included as part of the treatment experience, may create better patient outcomes.

Limitations

This study had several limitations. There was wide variation in enrollment of women between sites. The overall non-random recruitment strategy may have introduced bias with self selection of participants; however the overall size of the North American sample increases the confidence in these findings. Self-report of adherence was heavily weighted to the positive with no actual biological data for confirmation. Self report as a single measure may not be the best measure of self-report medication adherence. Johnson and colleagues (2011) noted that report by a partner may be a better verbal measure of medication adherence. Finally, correlation does not imply causation so these findings need to be interpreted cautiously. Since each of these psychological factors was related, we need to evaluate further how they influence the action of adherence. In addition it may be important to assess how past experience with being adherent affects women's perceptions of adherence self efficacy.

Conclusions

SAT can be used to examine behaviors related to ARV medication adherence in North American women living with HIV. These findings are important to how nurses interact with women living with HIV and support them in their chronic illness treatment. Focusing on factors that increase adherence self-efficacy in treatment plans could improve long term adherence. The interrelationships between perceived stigmas, sense of coherence, self esteem, self compassion, and adherence self-efficacy demonstrates that these concepts, when promoted and supported, may improve adherence in HIV positive women. The presence of depression symptoms continues to be a barrier to treatment success in this vulnerable population. Consistently and continually assessing a woman's mental health status should include not only the presence of depression symptoms but also assessing a person's level of self worth. Focusing on improving a women's self perception and how it is affected by her environment and psychological state may over time improve adherence. The efficacy of nurse led cognitive behavior therapy to decrease depression symptoms and enhance psychological regulatory factors to increase adherence self efficacy should be examined.

Sense of coherence, self compassion, and self esteem may be mediators between adherence self efficacy and medication adherence or have an indirect effect on adherence self efficacy. Understanding the interplay between adherence self-efficacy, psychological factors, and medication adherence may lead to interventions to improve women's adherence to medication treatment. Future research is needed to examine how regulatory factors support or mediate adherence self efficacy. Using SAT to examine care may improve our understanding as to how to support women and their complex lives in living with HIV.

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Callouts

1. Women living with HIV have unique challenges related to antiretroviral medication adherence.
2. The relationship between contextual, environmental, and psychological regulatory factors may influence medication adherence.
3. Nurses have the opportunity to promote adherence self-efficacy by focusing on building self confidence and compassion and consistently and continually evaluating depression symptoms.

Table 1

Descriptive statistics of the study instruments.

Name	Mean (SD)	Range	Cronbach's α Coefficients
Center for Epidemiology Studies			
Depression Scale (CESD)	22.2(11.86)	0–60	.92
Berger Stigma Scale (Stigma)	87.6 (1.39)	24–152	.95
Health Care Provider Engagement (HCPE)	17.34(7.91)	7–52	.96
Adherence Self Efficacy (ASE)	92.5(27.1)	1–120	.95
Self Compassion Scale (SCS)	38.67(8.1)	14–60	.75
Self Esteem (SE)	19.54(6.22)	9–40	.72
Sense of Coherence (SOC)	57.73(15.08)	7–91	.81
3 day visual analog	87(22)	0–100	Single item
30 day visual analog	83(24)	0–100	Single item

Table 2

Sample Characteristics

	n	%*
Age (yr) range (20–70 years) M = 45 SD = .17		
Race		
Asian/Pacific Islander	11	3
African American/Black	170	50
Hispanic/Latino	55	16
Native American Indian	15	4
White/Anglo(non-Hispanic)	72	21
Other	12	4
Education		
11 th grade or less	126	37
High School or GED**	134	40
2 years College/ Technical School	61	18
College	13	4
Masters Degree or Higher	4	2
Self Report Income Adequacy		
Totally inadequate	62	18
Barely adequate	200	59
Enough	73	22
Children		
Yes	283	84
No	52	15
Screened Positive for Depression Symptoms (CESD > 16)		
Yes	224	66
No	114	34
AIDS Diagnosis		
Yes	196	58
No	134	40

Note.

* Percentages may not add up to 100% due to missing data

** GED = General Equivalency Diploma

Table 3

Intercorrelations for Measures of Adherence and Contextual, Environmental and Psychological Factors of Social Action Theory

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 3 day	1													
2. 30 day	.699**	1												
3. Age(c)	.128*	.121*	1											
4. EDU(c)	.053	.044	.133*	1										
5. INC(c)	-.001	.063	.041	-.139*	1									
6. Child(c)	-.023*	-.095	.050	-.039	-.004	1								
7. Race (c)	.060	.082	-.009	.061	-.053	-.161**	1							
8. HCPE(e)	-.102*	-.102*	-.099	-.079	-.057	-.090	-.017	1						
9. CESD(e)	-.230**	-.254**	-.100	-.093	-.183*	.010	-.030	.089	1					
10. STI(e)	-.107*	-.094*	-.096	.042	-.170**	.017	-.120*	.110*	.386**	1				
11. SCS(p)	.245**	.254**	.164**	.086	.132*	-.072	.048	-.098	-.643**	-.293**	1			
12. SE(p)	-.239**	-.278**	-.152**	-.123**	-.153**	.028	.045	.113*	.612**	.336**	-.693**	1		
13. ASE(p)	.421**	.450**	.054	.059	.167**	-.025	-.009	-.157**	-.273**	-.165**	.365**	-.388**	1	
14. SOC(p)	.174**	.257**	.064	.097	.171**	.039	-.017	-.180**	-.639**	-.346**	.603**	-.589**	.332**	1

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Note: C = contextual factor E = environmental factor, P = psychological factor, EDU = Education, INC = Income, HCPE = Healthcare Provider Engagement, CESD = Center for Epidemiology Screen for Depression, STI = Stigma, SCS = Self Compassion Scale, SE = Self Esteem, ASE = Adherence Self Efficacy, and SOC = Sense of Coherence.

Table 4

Regression Analysis of Social Action Theory Factors

Model 1: Summary of Contextual Factors predicting 3-day and 30-day adherence					
Variable	B	SE B	β	t	p
3-day Adherence					
Children	-.114	3.348	-.002	-.034	.973
Income	-.127	1.860	-.004	-.068	.946
Education	.780	1.557	.029	.501	.617
Race	.752	.873	.049	.861	.390
Age	.319	.135	.135	2.372	.018
30-day Adherence					
Children	-4.684	3.657	-.073	-1.281	.201
Income	2.279	2.009	.065	1.134	.258
Education	.962	1.682	.033	.572	.568
Race	.984	.946	.060	1.040	.299
Age	.310	.145	.121	2.131	.034
Note: 3-day $R^2 = .15$ (N = 316), $p = .211$					
30-day $R^2 = .07$ (N = 315), $p = .085$					
Model 2: Summary of Environmental Regulatory Factors Predicting 3-day and 30-day Adherence					
Variable	B	SE B	β	t	p
3-day Adherence					
Depression symptoms	-.425	.127	-.251	-3.334	.001
Stigma	-.017	.047	-.022	-.365	.715
Health care provider Engagement	-.243	.154	.086	-1.578	.116
30-day Adherence					
Depression symptoms	-.466	.138	-.254	-3.373	.001
Stigma	.011	.050	.012	.209	.835

Model 2: Summary of Environmental Regulatory Factors Predicting 3-day and 30-day Adherence

Variable	B	SE B	β	t	p
Health care provider Engagement	-.241	.172	-.076	-1.400	.163

Note. 3-day $R^2 = .05$ (N = 333), $p < .000$

30-day $R^2 = .07$ (N = 331), $p < .000$

Model 2: Regression Analysis Summary of Psychological Regulatory Factors Predicting 3-day and 30-day Adherence.

Variable	B	SE B	β	t	p
3-day Adherence					
Sense of Coherence	.226	.179	.096	1.264	.207
Self Esteem	-.175	.238	-.056	-.734	.464
Adherence Self Efficacy	.309	.051	.395	6.090	.000
Self Compassion	-.073	.086	-.058	-.852	.395
30-day Adherence					
Sense of Coherence	.091	.094	.065	.971	.332
Self Esteem	-.295	.260	-.085	-1.134	.258
Adherence Self Efficacy	.351	.056	.402	6.294	.000
Self Compassion	.043	.195	.016	.220	.826

Note 3-day $R^2 = .19$ (N = 318), $p < .001$

30-day $R^2 = .22$ (N = 316), $p < .001$

Model 3: Summary of Social Action Theory factors that Predict 3-day and 30-day Adherence

Variable	B	SE B	β	t	p
3-day Adherence					
Depression symptoms	-.179	.087	-.109	-2.071	.000
Adherence Self Efficacy	.306	.041	.391	7.461	.000

Note. 3-day $R^2 = .19$ (N = 333), $p < .000$

30-day $R^2 = .22$ (N = 331), $p < .000$