Situational Temptation for HIV Medication Adherence in High-Risk Youth

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Abstract

This study explored the role of situational temptation, a component of self-efficacy, in adolescent and young adult (ages 16–24) HIV medication adherence by assessing participants' perceptions of their temptation to miss medications in various situations (e.g., when medication causes physical side effects, when there is fear of disclosure of HIV status). Youth ($n = 186$; 83% African American) were participants in a multisite clinical trial examining the efficacy of a motivational intervention. Data were collected using computer-assisted personal interviewing. Youth believed the most tempting reasons or situations that might lead them to miss their HIV medications to be symptoms (if the medicine caused you to have other physical symptoms) and sick (if the medicine made you sick to your stomach or made you throw up or if it tasted bad), but these were not significantly associated with nonadherence. This suggests disconnection between youths' expectations of temptation and actual tempting situations associated with nonadherence. Situational temptations associated with nonadherence included lack of social support, needing a break from medications, and not seeing a need for medications. Interventions to improve adherence should consider perceptions of HIV medications, particularly the benefits of taking medications and expectations of physical symptoms. Interventionists and clinicians should consider situations that may tempt youth to miss doses of medication and help youth gain insight into these temptations. Emerging methods, such as Ecological Momentary Assessment (e.g., daily diaries, cell phone text messaging), may be useful in gaining insight into the day-to-day experience of youth living with HIV.

Introduction

NEARLY HALF of new HIV infections are among youth ages 15 to 24.¹ Advances in antiretroviral (ARV) medications have allowed for improvements in life expectancy and health outcomes for youth living with HIV (YLH).² However, suboptimal medication adherence (e.g., taking medications as prescribed less than 90% of the time) is associated with higher viral loads and can lead to further complications such as drug resistance or infections.³ Results of the few studies targeting YLH suggest a majority have suboptimal adherence (e.g., 79% of youth in a sample of high-risk youth⁴; 59% and 63%,^{5,6} respectively).⁷ A number of psychosocial and contextual factors (e.g., depression, HIV stigma) have been associated with poor medication adherence.⁸ Low self-efficacy is considered a primary driver of nonadherence to HIV medications in young

people. The purpose of the current study is to further explore the role of self-efficacy in adolescent and young adult HIV medication adherence in a multisite sample by assessing the various situations that may tempt youth to miss medications.

Bandura's^{9,10} self-efficacy theory posits that behavior is not determined exclusively by knowledge, but also by outcome and efficacy expectations (e.g., expecting that taking HIV medications as prescribed will help reduce viral load) relating to engaging in the behavior. Self-efficacy judgments are specific to behaviors and the situations in which they occur; that is, self-efficacy is defined at the behavior-situation unit of analysis.¹¹ Thus, there are two distinct components of self-efficacy: confidence in the capacity to perform a behavior (e.g., feeling sure about which medications to take at what times per day) and temptation to deviate from the behavior in certain situations (e.g., temptation to miss doses when medications

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cause adverse physical symptoms).¹² This second component of self-efficacy, situational temptation, represents a global tendency to be enticed to engage in an undesired behavior (e.g., suboptimal medication adherence) across a variety of challenging situations (e.g., when family/friends do not remind you to take your medications, or when drunk or high).

Although situational temptation has been largely ignored in favor of defining self-efficacy as confidence, it has been explored in a small number of studies. Higher self-efficacy (as confidence) has been associated with better medication adherence in adolescents and young adults living with HIV.¹³ Other studies have focused on addictive behaviors such as smoking in adults¹⁴ and adolescents,¹⁵ and dietary fat consumption.¹⁶ Situational temptation has also been examined in studies of risky sexual behaviors in adolescent college students.^{17,12} However, no study to date has specifically addressed situational temptation and medication adherence in YLH. The purpose of this exploratory study was to describe perceptions of situational temptation for nonadherence within a multisite sample of YLH within which a subset had been prescribed HIV medication due to compromised immune function. Second, we explored which situations were associated with suboptimal adherence among youth prescribed medications.

Method

Participants

The study utilized baseline data from Healthy Choices, a multisite clinical trial examining the efficacy of a motivational intervention to improve health risk behaviors in YLH. Participants were HIV positive (perinatally or behaviorally infected), age 16 to 24, and able to complete questionnaires in English. Youth with an active thought disorder were excluded due to an inability to complete questionnaires. Youth were also excluded from the study if they were currently involved in behavioral research targeting adherence, sexual risk, or alcohol and/or substance abuse or if they were involved in a substance abuse treatment program. Because the study targeted high-risk YLH, youth were screened at baseline and had to have engaged in at least one of three problem behaviors: a sexual risk problem (at least one unprotected sex act in the previous month); an alcohol or illicit drug use problem based on an adolescent medicine screener (CRAFT) or an HIV medication adherence problem (self-report of <90% adherence in the last month).¹⁸ Ten youth refused this baseline screening. Of 375 youth screened, 205 enrolled, 151 were ineligible, 15 refused enrollment, and 4 were lost to follow-up. Of the 205 enrolled, 19 did not complete baseline data. The final sample consisted of 186 participants.

Youth were recruited from five study sites across the United States. All five sites offered comprehensive, multidisciplinary care including social work and case management services and access to mental health services. The Adolescent Trials Network Units (ATNU) were located in Fort Lauderdale, Florida; Philadelphia, Philadelphia; Baltimore, Maryland; and Los Angeles, California. Additionally, a non-ATN site was located in Detroit, Michigan. The sites were chosen to represent a regional cross-section of the population to promote the ability to test the effectiveness of the intervention and ensure transportability. Indeed, the

sample demographics were consistent with the national HIV/AIDS epidemic.¹⁹

Procedures

The protocol was approved by each study site's Institutional Review Board (IRB). A certificate of confidentiality was obtained from the National Institutes of Health. Participants were approached during a regularly scheduled clinic visit or during supportive activities. All participants were screened to confirm seropositivity or provided documented test results from an earlier HIV screening. Informed consent was obtained from all participants, as well as an IRB-approved waiver of parental permission for youth ages 16 and 17. Data were collected from 2005 to 2007. Interviewers collected participant data using a computer-assisted personal interviewing (CAPI) method via an Internet-based application. Responses to CAPI questions were entered into the computer by the research interviewer. Participants received \$30 for their time, and food, childcare, and transportation to and from visits were available for participants at no cost.

Measures

Adherence to HIV medications. Participants were screened for three problem behaviors at study entry including adherence to HIV medications. Suboptimal adherence was defined as youth self-report of taking HIV medications as prescribed less than 90% of the time within the last month.

Situational temptation for medication adherence. Youth completed a 14-item instrument to assess situational temptation to take HIV medications adapted from an existing measure.²⁰ The temptation measure asks participants to rate how tempted they would be to miss their HIV medications under a number of different circumstances (e.g., if the prescriptions ran out, if the medications caused physical symptoms, if the participant was drunk or high) using a five-point Likert scale (1 = not at all tempted, 5 = extremely tempted). Higher scores indicate greater perceived temptation to miss doses of HIV medication. The measure had excellent reliability with Cronbach $\alpha = 0.93$.

Data analysis

The number of missing values per item for the measure ranged from 2 to 6 with an average of 4.5 per item. Analyses included only observed data because of the low number of missing responses and the statistical methods used. Descriptive statistics were used to explore the situational temptation items in the full sample. Within the subsample of youth prescribed HIV medication, independent samples *t* tests using PASW 18.0 (SPSS Inc., Chicago, IL) were conducted to assess differences in situational temptation item means between youth with suboptimal adherence and those with optimal adherence.

Results

Sample characteristics

Participants ranged in age from 16 to 24 years (mean [M] = 20.5 years, standard deviation [SD] = 2.4). Eighty-three percent of youth ($n = 155$) self-identified as African American.

More than half (52.7%) were male and approximately 55% of participants ($n=103$) identified as heterosexual. Fifty-six percent ($n=105$) of youth were prescribed HIV medications. Of these, 78% ($n=82$) reported taking their HIV medications as prescribed less than 90% of the time in the past month. Viral load ranged from undetectable to 750,000 copies per milliliter (median = 8406 copies per milliliter). Viral loads were relatively high for both youth prescribed HIV medications ($M=64,098.06$, $SD=142,868.38$, median = 7812.50 copies per milliliter) and youth not prescribed medications ($M=35,120.36$, $SD=76,758.96$, median = 8500.00 copies per milliliter). As expected, baseline viral load was highly skewed, so a logarithmic ($\log_{10}$) transformation was performed and used in subsequent analysis. Viral load was not significantly different between youth prescribed HIV medications and youth not prescribed medications, $t(183)=1.12$, $p=0.266$, 95% confidence interval (CI; [-0.15, 0.54]). However, within youth prescribed medication, viral load was significantly lower among those with optimal versus suboptimal adherence, $t(102)=-3.96$, $p=0.000$, 95% CI [-1.73, -0.58].

Situational temptation for medication non-adherence

Situational temptation (total mean score by subject) ranged from 1.0 to 5.0 with $M=2.38$ (1.07) and did not differ significantly between youth prescribed HIV medications and those

not prescribed HIV medications, $t(182)=-0.810$, $p=0.42$. However, within youth prescribed HIV medications ($n=105$), youth with suboptimal adherence ($M=2.58$, $SD=1.04$) had higher scores on the total situational temptation measure than youth with optimal adherence ($M=1.94$, $SD=1.03$), $t(102)=-2.61$, $p=0.01$, 95% CI [-1.13, -0.15].

Table 1 shows descriptive statistics for the individual situational temptation for medication adherence items for all participants ($n=186$) and separately for youth prescribed HIV medications ($n=105$) and not prescribed medications ($n=81$). Table 1 demonstrates items in descending order by greatest mean score to determine the top five tempting situations for the full sample. Symptoms (if the medicine caused you to have other physical symptoms, e.g., rash, headache, and Sick (if the medicine made you sick to your stomach or made you throw up or if it tasted bad) were the most highly endorsed as reasons or situations that might lead someone to miss their HIV medications. Next, Forgot (if you forgot) and MedDrunkHigh (if you were drunk or high) had the highest means, followed by Schedule (if it got in the way of your daily schedule (school work) or if you were too busy). For youth prescribed HIV medication, the top three items with the greatest means (Symptoms, Sick, and Forgot) were the same as for the full sample. However, unlike the full sample, Schedule had the fourth highest mean, followed by Refill (if you did not get prescriptions refilled; ran out). Sick,

TABLE 1. SITUATIONAL TEMPTATION TO MISS HIV MEDICATIONS: DESCRIPTIVE STATISTICS BY ITEM

Item	Full sample ($n=186$) M (SD)	Prescribed medications ($n=105$) M (SD)	Not prescribed medications ($n=81$) M (SD)
<i>Symptoms</i> : If the medicine caused you to have other physical symptoms (e.g., rash, headache)?	2.97 (1.51)	3.09 (1.52)	2.82 (1.49)
<i>Sick</i> : If the medicine made you sick to your stomach, or made you throw up or if it tasted bad?	2.86 (1.60)	2.83 (1.65)	2.91 (1.54)
<i>Forgot</i> : If you forgot?	2.45 (1.44)	2.58 (1.47)	2.27 (1.39)
<i>MedDrunkHigh</i> : If you were drunk or high?	2.42 (1.63)	2.45 (1.59)	2.39 (1.68)
<i>Schedule</i> : If it got in the way of your daily schedule or if you were too busy?	2.37 (1.41)	2.49 (1.43)	2.22 (1.37)
<i>Illness</i> : If you got sick with another illness and weren't feeling well (e.g., cold, flu, stomach bug)?	2.35 (1.53)	2.46 (1.56)	2.19 (1.49)
<i>Refill</i> : If you didn't get prescriptions, ran out?	2.34 (1.52)	2.47 (1.47)	2.16 (1.57)
<i>Break</i> : If you couldn't deal with it or you didn't feel like taking it and just needed a break?	2.30 (1.41)	2.39 (1.44)	2.17 (1.38)
<i>Understand</i> : If you didn't understand why you have to take medication?	2.30 (1.52)	2.35 (1.58)	2.24 (1.45)
<i>Diagnosis</i> : If taking medication reminded you of HIV because you just wanted to forget about the diagnosis?	2.27 (1.56)	2.28 (1.56)	2.26 (1.57)
<i>FindOut</i> : If you were worried that people would find out about your HIV status and you didn't want friends to ask questions, felt embarrassed?	2.26 (1.54)	2.31 (1.53)	2.19 (1.56)
<i>Healthy</i> : If you didn't think you needed medication because you could stay healthy without it?	2.21 (1.52)	2.15 (1.56)	2.28 (1.47)
<i>Family</i> : If family and/or friends didn't help you remember and didn't tell you that you should take it?	2.08 (1.42)	2.13 (1.39)	2.00 (1.46)
<i>Living</i> : If there was a change in your living situation, you moved?	2.07 (1.37)	2.13 (1.39)	1.99 (1.35)
Total Situational Temptation (Mean)	2.38 (1.07)	2.44 (1.07)	2.31 (1.08)

M, mean; SD, standard deviation.

followed by Symptoms, MedDrunkHigh, Healthy (if you did not think you needed medication because you could stay healthy without it) and Forgot were the top most highly endorsed items for the subset of youth not prescribed HIV medications.

Independent samples *t* tests

Independent samples *t* tests assessed differences between youth with optimal versus suboptimal adherence for each situation. Nine items did not significantly differ between groups ($p > 0.05$). Table 2 shows results of the *t* tests with the five items that were significantly different between groups listed first for clarity: Schedule, Break, Understand, Healthy, and Family. Of these five, only Schedule was one of the top five endorsed situations across either the whole sample or within youth prescribed HIV medications.

Discussion

The current study explored situational temptation for medication adherence in a multisite, high-risk sample of YLH. We assessed perceptions of situational temptation for non-adherence within the full sample and within a subset of youth who had been prescribed HIV medication due to compromised immune function. Across both these samples, youth endorsed three situations as the most tempting to miss medications: if the medicine caused physical symptoms, if the medicine caused stomach upset or nausea or had an unpleasant taste, and if the youth simply forgot to take the

medication. Interestingly, the first and second most highly endorsed items related to physical symptoms associated with taking HIV medications. Multiple studies have found links between physical symptoms associated with medications and medication adherence in adults and youth.^{21,22} Researchers have speculated that physical symptoms experienced while on HIV medications may be interpreted to mean that medications are causing harm or are not effective.²³ It is notable that even among the full sample (including youth not prescribed medications) physical symptoms were viewed as the most tempting reasons to miss medications. This may suggest that youths' expectations of negative physical symptoms should be addressed when considering beginning an HIV medication regimen. However, in the present study, items pertaining to physical symptoms were not the situations that actually differed between youth with suboptimal adherence and those without adherence problems.

The situations that actually differed between youth with optimal and suboptimal adherence represented various types of temptations. If the regimen got in the way of a participant's daily schedule or if family and/or friends did not help support and remind participants to take their medications are both based on practical or logistical reasons not to take medications. However, feeling as if they could not deal or cope with following their regimen or needed a break (medication holiday) is a more emotional reason to miss medications. Finally, if a participant questioned the necessity of taking HIV medications (did not think he or she needed

TABLE 2. SITUATIONAL TEMPTATION: YOUTH WITH SUBOPTIMAL AND OPTIMAL ADHERENCE ($N = 105$)

Item	Suboptimal adherence ($n = 82$) <i>M</i> (<i>SD</i>)	Optimal adherence ($n = 23$) <i>M</i> (<i>SD</i>)	<i>p</i>	95% <i>CI</i>
<i>Schedule</i> : If it got in the way of your daily schedule (school work) or if you were too busy?	2.65 (1.43)	1.91 (1.28)	0.028	−1.39, −0.08
<i>Break</i> : If you couldn't deal with it or you didn't feel like taking it and just needed a break?	2.56 (1.42)	1.83 (1.37)	0.031	−1.39, −0.07
<i>Understand</i> : If you didn't understand why you have to take medication?	2.54 (1.62)	1.70 (1.22)	0.023	−1.57, −0.12
<i>Healthy</i> : If you didn't think you needed medication because you could stay healthy without it?	2.35 (1.63)	1.48 (1.08)	0.018	−1.58, −0.15
<i>Family</i> : If family and/or friends didn't help you remember and didn't tell you that you should take it?	2.31 (1.42)	1.52 (1.08)	0.016	−1.42, −0.15
<i>Symptoms</i> : If the medicine caused you to have other physical symptoms (e.g., rash, headache)?	3.20 (1.50)	2.68 (1.56)	0.158	−1.24, 0.20
<i>Sick</i> : If the medicine made you sick to your stomach, or made you throw up or if it tasted bad?	2.91 (1.63)	2.52 (1.70)	0.316	−1.16, 0.38
<i>Forgot</i> : If you forgot?	2.71 (1.48)	2.13 (1.36)	0.093	−1.26, 0.10
<i>MedDrunkHigh</i> : If you were drunk or high?	2.61 (1.61)	1.86 (1.42)	0.052	−1.49, 0.01
<i>Illness</i> : If you got sick with another illness and weren't feeling well (e.g., cold, flu, stomach bug)?	2.59 (1.55)	2.00 (1.54)	0.108	−1.32, 0.13
<i>Refill</i> : If you didn't get prescriptions, ran out?	2.58 (1.43)	2.13 (1.58)	0.202	−1.13, 0.24
<i>Diagnosis</i> : If taking medication reminded you of HIV because you just wanted to forget about the diagnosis?	2.38 (1.60)	1.91 (1.38)	0.204	−1.20, 0.26
<i>FindOut</i> : If you were worried that people would find out about your HIV status and you didn't want friends to ask questions?	2.46 (1.58)	1.78 (1.24)	0.061	−1.39, 0.03

M, mean; *SD*, standard deviation; *CI*, confidence interval.

medications or that he or she could stay healthy without medications) appears to be cognitive temptations. Interestingly, these cognitive temptations are reasons based on perceptions of the benefits of medications. Future research might explore possible links between youths' perceptions of the benefits of medications and expectations of physical symptoms resulting from medications.

Youth endorsed different situations as the most tempting to miss medications than those that actually differed between youth with and without adherence problems, with the exception of medication getting in the way of daily schedule or routine. In particular, possible physical side effects from medication were the most concerning to youth but were not actually associated with non-adherence. This suggests disconnection between youths' expectations of temptation and actual tempting situations for nonadherence. Interventions might need to focus on youth awareness of actual situational temptation, as well as cognitive-behavioral strategies to overcome these. Newer methodologies, such as Ecological Momentary Assessment (EMA), might prove helpful to identify actual temptation versus perceived temptation. EMA refers to a set of methods originally developed in personality/social psychology research that have been extended to assessment of health behavior.²⁴ These methods allow a research participant or patient to report on symptoms, affect, behavior and cognitions in "real time" rather than rely on retrospective reporting. EMA has been used in behavioral medicine to assess daily variability of asthma and rheumatoid arthritis symptoms and perceptions of chronic pain.^{25,26} For YLH, EMA might be used to provide a clinician with an overview of a youth's daily medication adherence patterns under a variety of situations using tools, such as daily diaries or cell phone text messaging.

Youth in this study were in late adolescence and early adulthood, developmental periods often characterized by high rates of risk-taking behavior.²⁷ The present study illustrated that risk-taking may extend to health behaviors. Most YLH reported suboptimal medication adherence despite the benefits of taking antiretroviral medications and the potential complications of not following the medication regimen. Notably, viral load was not significantly different between youth prescribed HIV medications and youth not prescribed medications, perhaps as a result of the high rate of nonadherence. Our results support the link between self-reported adherence and health outcome in this population, as youth report of adherence was strongly associated with higher viral load within youth prescribed medications.

Although this study was among the first to explore situational temptation for medication adherence in high-risk youth living with HIV, there are several limitations. Our findings are intended to be descriptive and should be replicated with a larger sample size and more sophisticated measures and data analyses. This sample may be higher risk than the broader population of YLH as they were recruited based on risky behaviors, and this may have influenced our findings regarding adherence. Another limitation is that this study was conducted with a small clinic-based convenience sample and may not represent community samples. In addition, we define optimal adherence as 90% or greater medication compliance. There is no gold standard for assessing or operationalizing adherence to antiretroviral medications.²⁸ Some medication regimens (e.g., non-nucleoside reverse transcriptase inhibitor (NNRTI)) are more forgiving, with adequate adherence de-

fined as greater than 80%.²⁹ However, 90%–95% adherence was the clinical standard during the time the data were collected for the current study. It is also important to note that patients may overestimate their medication adherence in self-report measures.³⁰

Future research should continue to explore situational temptation for adherence to medications in high-risk youth living with HIV and in the broader context of all youth living with HIV. Interventions to improve adherence should consider perceptions of HIV medications, particularly the benefits of taking medications and expectations of physical symptoms. Interventionists and clinicians should consider situations that may tempt youth to miss doses of medication and help youth gain insight into these temptations. Emerging methods, such as Ecological Momentary Assessment, may be useful in gaining insight into the day-to-day experience of the medication regimen of YLH.

Acknowledgments

This work was supported by The Adolescent Trials Network for HIV/AIDS Interventions (ATN) [U01-HD040533 from the National Institutes of Health through the National Institute of Child Health and Human Development (B. Kaspogiannis, S. Lee)], with supplemental funding from the National Institutes on Drug Abuse (N. Borek) and Mental Health (P. Brouwers, S. Allison). The study was scientifically reviewed by the ATN's Behavioral Leadership Group. Network, scientific and logistical support was provided by the ATN Coordinating Center (C. Wilson, C. Partlow) at The University of Alabama at Birmingham Network operations and data management support was provided by the ATN Data and Operations Center at Westat (J. Korelitz, J. Davidson, D.R. Harris). We acknowledge the contribution of the investigators and staff at the following ATN 004 sites that participated in this study: Children's Diagnostic and Treatment Center (Ana Puga, M.D., Esmine Leonard, B.S.N., Zulma Eysallenne, R.N.); Children's Hospital of Los Angeles (Marvin Belzer, M.D., Cathy Salata, R.N., Diane Tucker, R.N., M.S.N.); University of Maryland (Ligia Peralta, M.D., Leonel Flores, M.D., Esther Collinetti, B.A.); University of Pennsylvania and the Children's Hospital of Philadelphia (Bret Rudy, M.D., Mary Tanney, M.P.H., M.S.N., C.P.N.P., Adrienne DiBenedetto, B.S.N.); University of Southern California (Andrea Kovacs, M.D.), and Wayne State University Horizons Project (K. Wright, D.O., P. Lam, M.A., V. Conners, B.A.). We sincerely thank the youth who participated in this project.

Author Disclosure Statement

No competing financial interests exist.

References

1. Joint United Nations Programme on HIV/AIDS. Report on the global AIDS epidemic. International AIDS Conference. Mexico City: August 2008.
2. Watson D, Farley J. Efficacy of and adherence to highly active antiretroviral therapy in children infected with human immunodeficiency virus type 1. *Pediatr Infect Dis J* 1999;18: 682–696.
3. Mullen J, Leech S, O'Shea, S, Chrystie I., du Mont G, Ball C, Sharland M, Cottam F, Zuckerman M, Rice P, Easterbrook P.

- Antiretroviral drug resistance among HIV-1 infected children failing treatment. *J Med Virol* 2002;68:299–304.
4. MacDonell K, Naar-King S, Murphy D, Parsons J, Harper G. Predictors of medication adherence in high risk youth of color living with HIV. *J Pediatr Psychol* 2010;35:593–601.
 5. Murphy DA, Wilson C, Durako S, Muenz L, Belzer M. Antiretroviral medication adherence among the REACH HIV-infected adolescent cohort. *AIDS Care* 2001;13:27–40.
 6. Naar-King S, Templin T, Wright K, Frey M, Parsons J, Lam P. Psychosocial factors and medication adherence in HIV-positive youth. *AIDS Patient Care STDs* 2006;20:44–47.
 7. Reisner SL, Mimiaga MJ, Skeer M, Perkovich B, Johnson CV, Safren SA. A review of HIV antiretroviral adherence and intervention studies among HIV-infected youth. *Top HIV Med* 2009;17:14–25.
 8. Rudy BJ, Murphy DA, Harris R, Muenz L, Ellen J. Patient-related risks for nonadherence to antiretroviral therapy among HIV-infected youth in the United States: A study of prevalence and interactions. *AIDS Patient Care STDs* 2009;23:185–194.
 9. Bandura A. *Social Learning Theory*. New York: General Learning Press, 1977.
 10. Bandura A. *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice-Hall, 1986.
 11. Maibach E, Murphy DA. Self-efficacy in health promotion research and practice: Conceptualization and measurement. *Health Educ Res* 1995;10:37–50.
 12. Parsons JT, Halkitis PN, Bimbi D, Borkowski, T. Perceptions of the benefits and costs associated with condom use and unsafe sex among late adolescent college students. *J Adolesc* 2000;23:377–391.
 13. Rudy BJ, Murphy DA, Harris DR, Muenz, L, Ellen J. Prevalence and interactions of patient-related risks for non-adherence to antiretroviral therapy among perinatally infected youth in the United States. *AIDS Patient Care STDs* 2010;24:97–104.
 14. Breitling L, Twardella D, Raum E, Brenner H. Situational temptation scores and smoking cessation in general care. *Psych Addict Behav* 2009;23:362–367.
 15. Plummer BA, Velicer WF, Redding CA, Prochaska J, Rossi JS, Pallonen UE, Meier KS. Stage of change, decisional balance, and temptations for smoking. Measurement and validation in a large, school-based population of adolescents. *Addict Behav* 2001;26:551–571.
 16. Rossi SR, Greene GW, Rossi JS, Plummer BA, Benisovich SV, Keller S, Velicer WF, Redding CA, Prochaska JO, Pallonen UE, Meier KS. Validation of decisional balance and temptation measures for dietary fat reduction in a large school-based population of adolescents. *Eat Behav* 2001;2:1–18.
 17. Fedding CA, Rossi JS. Testing a model of situational self-efficacy for safer sex among college students: Stage of change and gender-based differences. *Psychol Health* 1999;14:467–486.
 18. Knight JR, Shrier LA, Bravender TD, Farrell M, Vander Bilt J, Shafer HJ. A new brief screen for adolescent substance abuse. *Arch Pediatr Adolesc Med* 1999;153:591–596.
 19. Centers for Disease Control and Prevention. Subpopulation estimates from the HIV Incidence Surveillance System—United States, 2006. *Morb Mortal Wkly Rep* 2008;57:985–989.
 20. Parsons JT, Rosof E, Mustanski B. Patient related factors predicting HIV medication adherence among men and women with alcohol problems. *J Health Psychol* 2007;12:357–370.
 21. Fogarty L, Roter D, Larson S, Burke J, Gillespie J, Levy R. Patient adherence to HIV medication regimens: A review of published and abstract reports. *Patient Educ Couns* 2002;46:93–108.
 22. Steele RG, Grauer DW. Adherence to antiretroviral therapy for pediatric HIV-infection: Review of the literature and recommendations for research. *Clin Child Fam Psychol Rev* 2003;6:17–30.
 23. Gonzalez JS, Penedo FJ, Llabre MM, Duran RE, Antoni MH, Schneiderman N, Horne R. Physical symptoms, beliefs about medications, negative mood, and long-term HIV medication adherence. *Ann Behav Med* 2007;34:46–55.
 24. Shiffman S, Stone AA, Hufford MR. Ecological momentary assessment. *Ann Rev Clin Psychol* 2008;4:1–32.
 25. Smyth JM, Stone AA, Hurewitz A, Kaell A. Effects of writing about stressful experiences on symptom reduction in patients with asthma or rheumatoid arthritis: A randomized trial. *JAMA* 1999;281:1304–1309.
 26. Stone AA, Broderick JE, Schwartz JE, Shiffman S, Litcher-Kelly L, Calvanese P. Intensive momentary reporting of pain with an electronic diary: Reactivity, compliance, and patient satisfaction. *Pain* 2002;104:343–351.
 27. Park MJ, Mulye TP, Adams SH, Brindis CD, Irwin, CE. The health status of young adults in the United States. *J Adolesc Health* 2006;39:305–317.
 28. Simoni JM, Kurth AE, Pearson CR, Pantalone DW, Merrill JO, Frick PA. Self-report measures of antiretroviral therapy adherence: A review with recommendations for HIV research and clinical management. *AIDS Behav* 2006;10:227–245.
 29. Bangsberg DR. Less than 95% adherence to nonnucleoside reverse-transcriptase inhibitor therapy can lead to viral suppression. *Clin Infect Dis* 2006;43:939–941.
 30. Wilson IB, Carter AE, Berg KM. Improving the self-report of HIV antiretroviral medication adherence: Is the glass half full or half empty? *Curr HIV/AIDS Rep* 2009;6:177–186.

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