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Health Values of Patients Coinfected With HIV/Hepatitis C:

Are Two Viruses Worse Than One?

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Abstract

Objectives: We sought to assess health values of patients coinfected with HIV/hepatitis C (HCV) and compare them with those of patients singly infected with HIV or HCV and to characterize and assess the relationship of clinical and nonhealth-related factors with health values.

Subjects: We studied a total of 203 subjects infected with HIV, HCV, or both.

Measures: We assessed rating scale (RS), time tradeoff (TTO), and standard gamble (SG) values, and we explored associations of health values with the Mental Component Summary (MCS) and Physical Component Summary (PCS) of the SF-12; number of bothersome symptoms from the HIV Symptoms Index; spirituality, as assessed by the Functional Assessment of Chronic Illness Therapy, Spiritual Well-being scale; as well as with a number of demographic, clinical, and psychosocial characteristics.

Results: Of the 203 subjects, 59 (29%) had HIV monoinfection, 69 (34%) had HCV monoinfection, and 75 (37%) were coinfected. The mean (SD) health values for the cohort were: RS = 0.69 (0.23), TTO = 0.88 (0.24), and SG = 0.78 (0.30). Infection type was related, albeit differently, to TTO values (mean values for patients with coinfection = 0.82; HIV = 0.91; and HCV = 0.91 [$P < 0.05$]) and SG values (coinfection = 0.77; HIV = 0.70; and HCV = 0.87; $P < 0.05$). In multivariable models, RS scores were significantly associated with sexual orientation, PCS scores, MCS scores, symptoms, and spirituality (adjusted $R^2 = 0.61$); TTO with symptoms and spirituality (adjusted $R^2 = 0.23$); and SG with infection type, PCS scores, and symptoms (adjusted $R^2 = 0.24$).

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Conclusions: Health values and their correlates varied by method of assessment. Health values appear to be driven more by symptoms, health status, and spirituality than by number of viral infections.

Keywords

quality of life; health values; HIV; hepatitis C

Decisions concerning the initiation of antiviral therapy against HIV and/or hepatitis C virus (HCV) have to balance benefits versus risks of therapy. Treatments can suppress the viruses, but the treatments are expensive and complex, and not all patients achieve durable viral response.[1,2] Given the natural history of HIV, HCV, and HIV/HCV coinfection and the complexities, costs, and toxicities of the currently available treatment regimens, quality of life considerations are of the utmost importance for patients infected with one or both viruses.

Although a consensus has emerged regarding the importance of health-related quality of life (HRQOL) assessment in diseases such as HIV and HCV, there is no agreement among researchers on how one should assess HRQOL.[3,4] There are now numerous instruments in existence, emanating from 2 fundamentally different approaches to assessing HRQOL: health status measurement and health utility/value/preference assessment.

In general, health status measures describe a person's functioning in one or more domains. Various instruments have been used previously to assess health status in patients with HIV and HCV.[5,6] Health value measures, in contrast, assess the value or desirability of a state of health against an external metric.[3,7,8] Here, the most common instruments are the standard gamble (SG), time tradeoff (TTO), and rating scale (RS).[8,9] The main use of health values is in guiding decision making where they serve as “quality-adjustment factors” for calculating quality-adjusted life years (QALYs) in decision analyses and cost-effectiveness analyses.[3,7,8] There is no gold standard for measuring health values, and each method has its pros and cons. The SG generally is accepted to be the most valid form for assessing preferences because it is grounded most closely in the axioms of utility theory; however, some have argued that the TTO is preferable because tradeoffs of life expectancy may be easier to understand than probabilities.[10-12] The RS, perhaps the simplest of the 3 measures, is not considered by some to be a true measure of utility because it does not involve comparison against an external metric, such as risk, time, or money, but RS results often are used as is or transformed to SG or TTO scores.[13] The results obtained by the different methods vary because each captures different facets of health values (ratings of health states, time preferences, and risk attitude) to different degrees.[10-12]

A few investigators have directly assessed health values from patients with HCV[14,15] or HIV[16-19]; however, there have been few reports of health values in patients coinfected with HIV/HCV.[14] We also sought to assess potential determinants of health values, and we developed a conceptual framework based on the work of Wilson and Cleary,[20] and Tsevat, [11] as well as our previous experience studying utilities in subjects with HIV.[18,19] Health status, clinical variables, and demographic variables account for only a minority of the variance in utilities, especially for the TTO and SG (as opposed to RS where respondents only rate their current health), leaving the majority unexplained.[11,18,19] On the basis of that previous work, we hypothesized a priori that additional variance in health values might be explained not only by infection type (HIV, HCV, and coinfection), but also via additional clinical factors (such as depression and symptoms) and nonhealth-related factors such as spirituality and religion, social support, and personality traits (such as risk attitude and self-esteem). We thus designed this study to include measures to assess those issues. Specifically, the purpose of this study

was 2-fold: (1) to assess health values of patients coinfected with HIV/HCV and compare them with those of patients singly infected with HIV or HCV and (2) to characterize and assess the relationship of clinical and nonhealth-related factors with health values.

METHODS

Study Subjects

We recruited a convenience sample from hepatology and infectious diseases clinics at the University of Cincinnati Medical Center and from infectious diseases clinics at the Cincinnati and Pittsburgh Veterans Affairs Medical Centers. Data were obtained primarily by patient interview and supplemented by chart review. Subjects had documentation in the medical record of chronic HCV and/or HIV infection. The Institutional Review Boards at the sites approved the study, and all patients provided written informed consent for participation in the study.

Outcome Measures

After completing the other questionnaires, all subjects performed the RS, TTO, and SG (in that order) using the computer-assisted assessment software U-Maker.[18] The program was operated by a trained interviewer and viewed simultaneously by the interviewer and the subject.

The RS question was in the form of a "feeling thermometer," in which subjects were asked to rate their current health state along a scale ranging from 0 (representing death) to 100 (excellent health). The RS has been shown to have a reliability of 0.86–0.94 based on replicated measures taken during the same interview and a 1-week test–retest reliability of 0.77.[21]

The TTO was posed as a choice between living x years in one's present state of health versus ($x - t$) years in perfect health. We chose x so that it approximates the patient's life expectancy: 15 years (this represents an approximate aggregate life expectancy for HIV-infected, HCV-infected, and coinfected patients). Time t was varied systematically in a ping-pong fashion until an indifference point was found between living 15 years in one's current state of health and ($15 - t$) years in perfect health. The output of the TTO was a utility ($15-t$)/15 on a continuous scale from 0 (dead) to 1 (perfect health). The TTO has been found to have a reliability of 0.77–0.88 based on replicated measures taken during the same interview and a 1-week test-retest reliability of 0.87.[21]

Standard Gamble

The SG was posed as a choice between: (1) the certainty of living the remainder of life in one's current state of health or (2) a gamble between perfect health for the remainder of life with probability p versus immediate death with probability ($1 - p$). The probability p was varied systematically in a ping-pong fashion until the subject was indifferent between preferring the certainty of living the remainder of life in their current state of health and preferring the gamble. The indifference probability p_i equals the utility for the patient's current state of health. The SG has been shown to have a reliability of 0.77–0.92 based on replicated measures taken during the same interview and a 1-week test–retest reliability of 0.80.[21]

Other Measures

Demographic and Clinical Data—We collected the following demographic data during the interviews: date of birth; gender; race; sexual orientation; marital status; housing situation; education level; employment status; insurance status; number of children; number of other dependents; religion; and history of substance use. Clinical data were collected via patient report and medical record review. For those infected with HIV, clinical data included year diagnosed with HIV; symptom status (asymptomatic, symptomatic, or AIDS); pregnancy status; disease severity (history of opportunistic infections; lowest and current CD4 count;

highest and current viral load; history of AIDS-related hospitalizations); and current antiretroviral regimen. For HCV-infected patients, clinical data included year diagnosed with HCV, disease severity (history of decompensated cirrhosis [variceal bleeding, ascities, encephalopathy], liver biopsy results [Metavir fibrosis score],[22] and laboratory values, including the most recent serum alanine aminotransferase levels and quantitative HCV PCR values) and HCV treatment history (never treated, treated in the past, treated currently).

Health Status—We used the SF-12 questionnaire to measure health status.[23] The SF-12 is a validated subset of questions contained in the SF-36, evaluates the same domains as the SF-36, and also permits derivation of 2 summary scores: the Mental Component Summary (MCS) and Physical Component Summary (PCS; each scored from 0 to 100 with a norm of 50). The SF-12 has evidence of good internal consistency with Cronbach's alphas ranging from 0.82 to 0.87 on the PCS and 0.70 to 0.84 on the MCS.[23] In addition, the SF-12 has been shown to have good test–retest reliability with coefficient ranges of 0.73–0.84 (PCS) and 0.71–0.80 (MCS).[23]

Depressive Symptoms—We administered the CESD-10 depression scale[24] a 10-item short form of the original 20-item Center for Epidemiological Studies–Depression Scale (CES-D), which has good predictive accuracy.[24] Each of the 10 questions captures the frequency of a particular mood or symptom in the previous week on a 4-point scale ranging from 0 (none of the time) to 3 (most of the time). After reversing the positive mood items, scores on the items are summed such that they range from 0 (best) to 30 (worst). A score of 10 or greater is considered indicative of significant depressive symptoms.[24,25] The CES-D has evidence of good reliability (Cronbach's alphas of 0.63–0.93; test-retest reliability of 0.61).[25,26]

Symptom Distress—We used a 20-question HIV Symptoms Index (HSI).[27] Each response was endorsed on a 5-point Likert scale (0–4) with 0 representing the absence of that symptom and 4 indicating that the patient did have the symptom and it bothered them “a lot.” The HSI is strongly associated with the physical and mental health summary scales of the MOS-HIV measure and with disease severity, independent of CD4 cell count and viral load.[27] As previously described by Kilbourne and colleagues, because 5 items of the HSI (fatigue, memory, sadness, anxiety, and insomnia) relate closely to analogous elements of the CESD-10, we did not analyze those 5 items.[25] Of the remaining 15 items, we counted the number of symptoms considered to be bothersome (“it bothers me” or “it bothers me a lot”), yielding a possible score between 0 and 15.[25]

Social Support—To capture perceived availability of social support, we used the Interpersonal Support Evaluation List.[28,29] The internal consistency reliability coefficient for the total scale has been found to range from 0.88 to 0.90.[28,29] On the 12-item version of the Interpersonal Support Evaluation List that we used, each item was endorsed on a 4-point Likert scale (1–4) and, after reversing negative items, the responses were summed to provide a total support score (range: 12–48).

Spirituality—Spirituality was measured using the Functional Assessment of Chronic Illness Therapy Spiritual Well-being scale (FACIT-SpEx), a 23-item measure of spirituality capturing meaning, peace, and faith.[30] Responses are provided on a 5-point Likert scale (0–4). After reversing negative items, responses were summed to yield an overall spirituality score (range: 0 [low] to 92 [high]). Data addressing the reliability of the FACIT-SpEx indicate that its internal consistency is high (Cronbach's $\alpha = 0.92$).[30]

Religiosity—To address religiosity, we administered the Duke Religion Index (DRI), a 5-item measure.[31] Items were scored on 3 five- or six-point Likert scales, yielding scores for 3

aspects of religiousness: organized, nonorganized, and intrinsic religiosity. The 3 intrinsic religiosity items on the DRI were extracted from Hoge's 10-item scale, which was has a Cronbach's α of 0.75.[32]

Self-Esteem—We used Rosenberg's 6-item global self-esteem measure, which consists of 3 positively framed items and 3 negatively framed items, each scored from 1 to 4.[33-35] A total score for the 6 items was calculated by summing the responses after reversing the negative ones. The Rosenberg measure has been found to have a Cronbach's α of 0.88.[36]

Risk Attitude—To assess attitudes about taking risks, we administered the 6-item risk-taking scale from the Jackson Personality Index.[37] Response categories range from 1 (strongly agree) to 6 (strongly disagree). After reversing 3 items, results were summed to yield a score between 6 and 36 with higher scores indicating greater risk-seeking attitudes. The Cronbach's α for this version of the scale is 0.71.[37]

Analyses

Descriptive statistics included means and standard deviations for continuous variables, such as the scales, and percents for categorical variables. For comparison among groups, we used one-way analysis of variance, χ^2, and *t* tests. We estimate that we had 80% power to detect a difference in utility scores between groups of 0.07–0.13 depending on the scale and the groups.

Bivariate relationships with health values were estimated using Spearman's correlations, Student *t* test for continuous data, and χ^2 tests for categorical data. To assess determinants of health values, we developed multivariable linear regression models using ordinary least squares regression (OLS). Variables found to be significant in previous research (such as gender, injection drug use status, presence/absence of children, and risk attitudes) as well as those significantly associated with the outcome variables in bivariate analyses (at a $P < 0.10$ level) were entered as candidate variables into the models. Final models were determined using backwards elimination, retaining only significant factors ($P < 0.05$). Because the use of OLS for determining the correlates of the (skewed) utility values is not optimal, we also used other methods such as ordinal logistic regression and different selection algorithms. Results from those analyses were qualitatively similar to the OLS results reported.

RESULTS

Sample Characteristics

Of the 203 subjects, 59 (29%) had HIV monoinfection, 69 (34%) had HCV monoinfection, and 75 (37%) were coinfected. The mean (SD) age for the cohort was 45.7 (8.3) years; 157 (77%) were men; 118 (58%) were white; and 82 (42%) had a history of injection drug use. Coinfected subjects knew they had been HIV-infected for 9.2 years on average and HCV-infected for 6.0 years on average. Singly HIV-infected subjects knew they had been infected 9.4 years on average and HCV-infected subjects knew of their infection for 5.4 years on average. A smaller percentage of coinfected subjects were women, were white, had never used injection drugs, or had pursued education after high school as compared with subjects with HIV or HCV monoinfection (Table 1). Fewer coinfected subjects had been treated for HCV infection than HCV monoinfected subjects, although similar proportions had undetectable HCV RNA levels at the time of their interview.

Health Status and Psychosocial Comparisons

Regardless of infection type (HIV, HCV or coinfection), subjects reported on average between 3 and 4 bothersome symptoms on the HSI and had health status scores (mean MCS and PCS scores) that were substantially lower than national norms (Table 2). HIV/HCV coinfected

subjects had significantly ($P < 0.05$) lower mean PCS scores and were less risk-seeking than subjects with HIV monoinfection and had significantly more depressive symptoms, had less social support, were less risk seeking, and had lower self-esteem scores than HCV-monoinfected subjects.

Health Values

The mean (SD) RS value for the entire cohort (ie, subjects with HIV, HCV, or coinfection) was 0.69 (0.23). The mean TTO score was 0.88 (0.24) indicating that, on average, patients were willing to give up 1.8 years of life in exchange for perfect health. The mean SG score was 0.78 (0.30) indicating that, on average, patients were willing to take a 22% chance of immediate death in exchange for the complementary chance of perfect health. The median RS value was 0.75, the median TTO was 0.995 (57% were unwilling to trade more than 1 month of life in their current state for perfect health and 21% were unwilling to trade any time), and the median SG value was 0.925 (ie, more than half of subjects were unwilling to take more than a 7.5% chance of immediate death for a chance at perfect health). RS, TTO, and SG values were moderately correlated with each other (r = 0.42–0.46).

Correlates of Health Values

In bivariate analyses, there were no statistically significant differences in RS values by infection type (Table 3). Infection type was significantly ($P < 0.05$) associated, albeit differently, with TTO (coinfection = 0.82, HIV = 0.91, and HCV = 0.91) and SG values (coinfection = 0.77, HIV = 0.70, and HCV = 0.87). For subjects with HCV infection, health values were not associated with alanine aminotransferase levels, Metavir score, or HCV RNA level. HCV treatment history also was not significantly associated with health values. HIV RNA level and CD4 cell count were not significantly associated with health values for subjects with HIV.

Correlates of Rating Scale Values

A number of variables were significantly associated ($P < 0.1$) with RS values in bivariate analyses and were thus entered as candidate variables in multivariable models: sexual orientation, employment, having dependent children, PCS score, MCS score, number of bothersome symptoms, depressive symptoms, social support, self-esteem, intrinsic religiosity, and spirituality (Table 4). In the final multivariable model, RS scores were significantly associated ($P < 0.05$) with sexual orientation, PCS, MCS, number of bothersome symptoms and spirituality (adjusted $R^2 = 0.61$; Table 5).

Correlates of Time Tradeoff Values

Race, sexual orientation, employment, infection type, PCS score, MCS score, number of bothersome symptoms, depressive symptoms, social support, self-esteem, intrinsic religiosity, and spirituality were associated with TTO values in bivariate analyses (Tables 3 and 4). Multivariable results showed that only number of bothersome symptoms and spirituality level were significantly associated with TTO scores (adjusted $R^2 = 0.23$; Table 5).

Correlates of Standard Gamble Values

Sexual orientation, employment, infection type, PCS score, MCS score, number of bothersome symptoms, depressive symptoms, social support, self-esteem, nonorganized religious activity, intrinsic religiosity, and spirituality were associated with SG values in bivariate results (Tables 3 and 4). In the final multivariable models, SG scores were significantly associated with infection type (patients with HCV monoinfection had the highest scores), PCS, and number of bothersome symptoms (adjusted $R^2 = 0.24$; Table 5).

DISCUSSION

In this study, we assessed health status, health ratings, and utilities for current health in subjects with HIV infection, HCV infection, or HIV/HCV coinfection. We also studied how patients incorporate multiple viral illnesses into their health values and assessed determinants of health values. We found that patients with HIV, HCV, or coinfection reported experiencing several bothersome symptoms and had SF-12 summary health status scores that were substantially lower than national norms. Others have also shown that HIV and HCV affect health status, especially for those with more severe disease.[38-40] We also showed that HIV/HCV coinfected subjects had significantly more depressive symptoms, had less social support, were less risk seeking, and had lower self-esteem scores than HCV-infected subjects. We suspect those differences partly relate to differences in demographic characteristics between those groups (eg, the HCV monoinfected group was comprised of subjects that were more commonly white, heterosexual, higher educated, and employed). Although there have been several studies that have elucidated the impact of symptoms on health status in patients with chronic viral illnesses, limited information is available on the impact of symptoms on health values, and our study adds new insights on that issue.

Our subjects' health values are similar to those that have been previously published for patients with HIV or HCV monoinfection.[14,15,17-19] We found that many subjects were unwilling to trade any time in exchange for perfect health, as has been shown by others.[18,19] Among all of our subjects, 57% were unwilling to trade more than 1 month of life in their current state in exchange for perfect health and 21% were unwilling to trade any time at all, and subjects with HIV infection were more willing to gamble. Tsevat and coworkers found that many patients with HIV noted that time was too valuable to trade, but that they were used to taking risks in their daily life, particularly in their treatment of HIV/AIDS.[18]

We showed that RS, TTO, and SG values were only moderately correlated with each other and were correlated with different variables. It is not surprising that the different measures resulted in different mean preference values because these elicitation methods capture different facets of health values (ratings of states, time preferences, and risk attitude) to different degrees[12]; although, some of the variation could have been due to issues such as order of administration (we administered the RS first, then the TTO and SG), subject fatigue (health values were assessed at the end of the interview), and differing expectations of life expectancy (in the TTO, subjects were given a 15-year time horizon and in the SG, as is commonly practiced, life expectancy was not mentioned).

Like others, we found that health status, while significantly associated with health values, explained little of the variance, especially for the TTO and SG.[11,16,18,19,41,42] We were able to identify 2 additional factors, namely symptoms and spirituality, that are associated with health values. We suspect that the limited association of health status and the lack of association of treatment and disease stage with utilities may be at least partly accounted for by the association between symptoms and utilities. In any case, future work is needed to explore the association of symptoms in more detail. If certain symptoms are strongly associated with health values (and other outcomes), then perhaps those key symptoms can be targets of interventions to improve HRQOL.

From a methodological and perhaps philosophical standpoint, directly-derived SG and TTO values are complicated metrics that include other aspects of life beyond just health (eg, spirituality). As noted by Tsevat, directly-derived utilities appear to measure how patients value their life with disease rather than how they value their health with disease.[11] These findings support that health state classification systems, which map health status onto health utilities

obtained from the general public, should incorporate these other aspects of health (beyond just health status) to produce utility estimates that are more equivalent with directly-derived values.

Assessing health values in HIV/HCV coinfected patients presented an opportunity to examine how patients incorporate multiple illnesses into health values. It is not known if the disutility (1-utility) of coinfection is simply equal to the disutility of HIV added to the disutility of HCV or if there is a more complex interplay. Our TTO results would fit either an additive model in which the 2 disutilities are summed and subtracted from 1.0 to calculate the overall utility for coinfection, or a multiplicative model in which the 2 utilities are multiplied to get the utility value. However, the inconsistency of our SG and TTO results and the lack of a monotonic relationship for our SG and RS results do not support any such model. These findings have implications for decision modeling of health states that incorporate multiple diseases, implying that health values for those health states need to be directly assessed and not imputed from values for single disease states. Many researchers have shown that there is substantial variability in health values depending how they were derived, not only showing, as we have, variability among directly-derived utility methods (eg, RS, TTO, SG), but also among health state classification systems (eg, Health Utility Index or the EuroQOL EQ-5D) and among transformation techniques.[10-13,18,19,43-49] The variation and inconsistency of the values obtained from the different methods and the lack of a gold standard definitely imply that methods should be not be used interchangeably within cost-utility analyses, that cost-utility ratios obtained from different studies may not be comparable (eg, in league tables[50]), that multiple methods should be used to determine utilities to better define the range of possible values for a given health state, and that sensitivity analyses around health values should always be performed in decision and cost-utility analyses.

This study had several limitations. The subjects in this study were recruited from tertiary care sites in 2 Midwest cities and underrepresented Hispanic subjects, women, and active drug users; therefore, our results may not be generalizable to all patients with HIV, HCV or coinfection in care (or not receiving care). Also, the manner in which cases were identified could have biased the results. HCV mono-infected patients are generally identified because they present with liver enzyme abnormalities, whereas, in the coinfected group, HCV testing is considered routine, enabling identification of “asymptomatic” HCV infection. Because we relied on the medical record to classify infection status of subjects, there may have been some misclassification; however, we believe that misclassification was minimal. Finally, although this is the largest study of health values in HIV/HCV coinfected subjects to date, our power to detect small differences in health values across groups was limited.

In conclusion, we found that patients with HIV, HCV, or coinfection reported experiencing several bothersome symptoms and had SF-12 health status scores that were substantially lower than national norms. Health values and correlates of health values varied by method of assessment and appear to be driven more by symptoms, health status, and spirituality than by number of infections. Our findings have implications both for decision and cost-effectiveness modeling of these disease states and for designing possible interventions to improve health values.

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TABLE 1

Cohort Characteristics

Characteristic	Coinfection (n = 75)	HIV (n = 59)	HCV (n = 69)
Average Age, yrs	46.4*	41.2	48.7
Male, %	95†	80	57
White, %	44†	51	80
Ever used injection drugs, %	71†	5	42
Mean (SD) alcohol use, drinks/month	21.9 (66.4)	12.3 (25.9)	9.3 (38.7)
Heterosexual, %	48†	29	99
Education beyond high school, %	33†	49	58
Employed, %	32‡	31	64
CD4 cell count			
Mean (SD), cells/μL	443 (287)	394 (337)	
≤50 cells/μL, %	7	7	
51–200 cells/μL, %	15	27	
201–500 cells/μL, %	44	37	
>500 cells/μL, %	35	29	
HIV disease stage			
AIDS, %	41*	17	
Symptomatic, %	5	5	
Asymptomatic, %	54	78	
Undetectable HIV viral load, %	57	56	
Ever treated for HCV, %	13‡		67
Undetectable HCV viral load, %	17		19

*The coinfection value is significantly different from the HIV value ($P < 0.05$).

†The coinfection value is significantly different from both the HIV and HCV values ($P < 0.05$).

‡The coinfection value is significantly different from the HCV value ($P < 0.05$).

TABLE 2

Selected Results by Infection Type

Scale	Coinfection Mean (SD)	HIV Mean (SD)	HCV Mean (SD)
Spirituality (0–92, higher score = more spiritual)	67.4 (18.3)	63.2 (16.8)	62.0 (19.7)
No. bothersome symptoms (0–15 higher score = more symptoms)	3.8 (3.7)	3.7 (3.5)	3.1(3.6)
Mental Component Summary (0–100, higher score = better function)	42.8 (12.8)	41.0 (10.4)	45.1 (11.6)
Physical Component Summary (0–100, higher score = better function)	41.0 (10.2)*	44.9 (10.9)	44.3 (10.6)
Depressive symptoms (0–30, higher score = more depressive symptoms)	12.6 (7.0)†	11.6 (6.0)	10.2 (7.5)
Social support (12–48, higher score = more perceived support)	37.0 (7.8)†	36.9 (7.1)	40.5 (6.6)
Self-esteem (6–24, higher score = more self-esteem)	18.2 (3.8)†	19.0 (3.4)	20.4 (3.0)
Risk attitude (6–36, higher score = more risk seeking)	17.4 (5.3)‡	19.5 (5.1)	20.0 (6.2)
Organized religious activity (1–6, higher score = more activity)	3.1 (1.7)	2.6 (1.5)	3.3 (1.7)
Nonorganized religious activity (1–6, higher score = more activity)	2.6 (1.8)	2.9 (2.0)	3.0 (1.8)
Intrinsic religiosity (3–15, higher score = more religious)	12.0 (2.6)	11.2 (3.2)	11.5 (3.5)

* The coinfection value is significantly different from the HIV value ($P < 0.05$).

† The coinfection value is significantly different from the HCV value ($P < 0.05$).

‡ The coinfection value is significantly different from both the HIV and HCV values ($P < 0.05$).

TABLE 3

Health Values by Infection Type

Infection Type	Rating Scale Mean (SD)	Time Tradeoff Mean (SD)	Standard Gamble Mean (SD)
Coinfection	0.67 (0.23)	0.82 (0.31)*	0.77 (0.32)†
HIV	0.71 (0.24)	0.91 (0.20)	0.70 (0.33)
HCV	0.68 (0.24)	0.91 (0.19)	0.87 (0.23)

* The coinfection value is significantly different from both the HIV and HCV values ($P < 0.05$).

† The coinfection value is significantly different from the HCV value ($P < 0.05$).

TABLE 4

Correlations With Health Values

Characteristic	Rating Scale (r)	Time Tradeoff (r)	Standard Gamble (r)
Age	−0.03	−0.13†	0.03
Sex (female = 1 vs. male = 0)	−0.03	−0.01	0.02
Marital status (single = 1 vs. married = 0)	−0.03	−0.01	−0.07
Insurance status (no coverage = 1 vs. coverage = 0)	−0.04	0.07	−0.02
Race (white = 1 vs. nonwhite = 0)	−0.11	−0.14*	−0.13†
Sexual orientation (heterosexual = 1 vs. other = 0)	−0.17*	−0.15*	0.06
Housing stability (stable = 1 vs. unstable = 0)	0.06	−0.01	0.03
Education (at least high school graduate = 1 vs. not high school graduate = 0)	0.11	−0.01	0.02
Employment (employed = 1 vs. unemployed = 0)	0.33*	0.09	0.13†
Children (have children = 1 vs. no children = 0)	−0.16*	−0.06	−0.04
Religion (affiliated with a religion = 1 vs. no affiliation = 0)	−0.08	−0.03	0.04
Alcohol use (0–360 drinks/mo, higher = more)	0.07	0.06	0.00
Injection drug use (used in past = 1 vs. never used = 0)	−0.07	−0.08	0.09
Spirituality (0–92, higher score = more spiritual)	0.49*	0.37*	0.31*
No. bothersome symptoms (0–15, higher score = more bothersome symptoms)	−0.65*	−0.36*	−0.38*
Mental Component Summary (0–100, higher score = better function)	0.50*	0.26*	0.23*
Physical Component Summary (0–100, higher score = better function)	0.65*	0.36*	0.35*
Depressive symptoms (0–30, higher score = more depressive symptoms)	−0.64*	−0.35*	−0.33*
Social support (12–48, higher score = more perceived support)	0.40*	0.23*	0.26*
Self-esteem (6–24, higher score = more self-esteem)	0.48*	0.32*	0.32*
Risk attitude (6–36, higher score = more risk seeking)	−0.08	−0.04	−0.06
Organized religious activity (1–6, higher score = more activity)	0.06	0.06	0.13†
Nonorganized religious activity (1–6, higher score = more activity)	0.09	0.05	0.17*
Intrinsic religiosity (3–15, higher score = more religious)	0.14*	0.13†	0.19*

*$P \leq 0.05$.

†$0.05 < P \leq 0.10$.

TABLE 5

Multivariable Determinants of Health Values

Covariate	Rating Scale (β Coefficient)	Time Tradeoff (β Coefficient)	Standard Gamble (β Coefficient)
Mental Component Summary (0–100, higher = better function)	0.003		
Physical Component Summary (0–100, higher = better function)	0.010		0.007
No. bothersome symptoms (0–15, higher = more bothersome symptoms)	−0.016	−0.021	−0.023
Spirituality (0–92, higher = more spiritual)	0.002	0.004	
Heterosexual (vs. Not)	−0.084		
Infection type (vs. HCV)			
HIV			−0.163
Coinfection			−0.060*
Model adjusted R^2	0.61	0.23	0.24

*$P = 0.18$.