Factors Associated with Past Research Participation Among Low-Income Persons Living with HIV

Jacquelyn Slomka, Ph.D., R.N.,¹ Georgios Kypriotakis,² John Atkinson, DrPH,³ Pamela M. Diamond, Ph.D.,³ Mark L. Williams, Ph.D.,⁴ Damon J. Vidrine, DrPH,⁵ Roberto Andrade, M.D.,⁶ and Roberto Arduino, M.D.⁷

Abstract

We described influences on past research participation among low-income persons living with HIV (PLWH) and examined whether such influences differed by study type. We analyzed a convenience sample of individuals from a large, urban clinic specializing in treating low-income PLWH. Using a computer-assisted survey, we elicited perceptions of research and participating in research, barriers, benefits, “trigger” influences, and self-efficacy in participating in research. Of 193 participants, we excluded 14 who did not identify any type of study participation, and 17 who identified “other” as study type, resulting in 162 cases for analysis. We compared results among four groups (i.e., 6 comparisons): past medical participants ($n=36$, 22%), past behavioral participants ($n=49$, 30%), individuals with no past research participation ($n=52$, 32%), and persons who had participated in both medical and behavioral studies ($n=25$, 15%). Data were analyzed using chi-square tests for categorical variables and ANOVA for continuous variables. We employed a multinomial probit (MNP) model to examine the association of multiple factors with the outcome. Confidence in ability to keep appointments, and worry about being a ‘guinea pig’ showed statistical differences in bivariate analyses. The MNP regression analysis showed differences between and across all 6 comparison groups. Fewer differences were seen across groupings of medical participants, behavioral participants, and those with no past research experience, than in comparisons with the medical-behavioral group. In the MNP regression model ‘age’ and level of certainty regarding ‘keeping yourself from being a guinea pig’ showed significant differences between past medical participants and past behavioral participants.

Introduction

THE BEST CLINICAL AND PUBLIC HEALTH PRACTICES and the most effective treatments for HIV/AIDS are assumed to be determined through scientifically rigorous and ethically sound clinical and behavioral research. Therefore, the ability to attract, recruit, enroll, and retain participants in HIV-related research is essential to conducting quality research.¹ From the beginning of the HIV/AIDS epidemic, investigators conducted extensive research on individuals’ willingness to take part in HIV vaccine trials, so popula-

tions would be ready for testing a newly-developed vaccine.² While development of an effective vaccine has remained elusive, medical treatment for HIV/AIDS has burgeoned, and heightened attention is being paid to factors affecting participation in treatment-related clinical trials and behavioral research. In addition, recognition of an under-representation of minorities in clinical trials disproportionate to the disease burden of minority populations^{3–5} has led to increasing numbers of studies to understand motivations for participating in HIV-related research across diverse populations.

¹Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, Ohio.

²Louis Stokes VA Medical Center-Geriatric Research Education and Clinical Center, MetroHealth Medical Center, and Case Western Reserve University, Cleveland, Ohio.

³School of Public Health, and ⁷Division of Infectious Diseases, School of Medicine, University of Texas Health Science Center at Houston, Houston, Texas.

⁴School of Public Health, Florida International University, Miami, Florida.

⁵Department of Behavioral Sciences, University of Texas MD Anderson Cancer Center, Houston, Texas.

⁶Department of Infectious Diseases, Baylor College of Medicine, Houston, Texas.

An earlier version of this paper was presented at the American Society for Bioethics and Humanities 13th Annual Meeting, Minneapolis, MN, October 15, 2011.

Multiple influences on participation in HIV-related research have been described in the literature. A systematic review of barriers to participating in vaccine trials described potential participants' concerns related to vaccine safety, study design, inconveniences of participating, social risks, and mistrust.⁶ The examination of ethnic and minority views about participating in vaccine research identified similar issues that also included concerns about HIV infection and/or seropositivity induced by a vaccine; issues of vaccine efficacy, safety, and side effects; HIV conspiracy beliefs; distrust of government and/or researchers; adequacy of knowledge and information about HIV and research; and post-study follow-up and access to the tested vaccine.⁷⁻¹⁴ Factors such as burdens and inconveniences of participating; financial payment and compensation for medical care and health insurance; altruism as motivation; and degree of comfort with research staff were also noted in these studies. Similar factors have been described in other disease-based research on participating, such as in cancer trials¹⁵ and hypertension studies.¹⁶

In non-vaccine studies of HIV-related research participation, Sengupta and colleagues found distrust of institutions to be a primary barrier to participation.¹⁷ On the other hand, low CD4 T-cell counts, a diagnosis of AIDS, altruism, a desire for control over one's illness, physician influence, trust in one's healthcare provider, and compassionate professionals in a patient-focused clinic setting have been associated with enhanced participation.¹⁸⁻²¹

Few investigators have considered the role of study type in examining participation in HIV-related research. Our earlier qualitative research showed that individuals with or at risk for HIV perceived risks and benefits of hypothetical survey, medical, and vaccine studies differently,²² suggesting that perception of risk-benefit ratio based on type of study could also be a factor in deciding whether to participate in research.

Most likely due to variations in populations, research sites, and study designs, no single trait or process has clearly emerged as a major influence on HIV patients' participation in research, or as a predictor of enrollment.²³ However, results from various studies suggest emerging patterns of influences

related to patients, as well as health professionals,²⁴ which may affect individuals' participation in research. The goal of our study was to describe and analyze patient characteristics, attitudes, and beliefs associated with past participation in research among a population of multi-ethnic, low-income persons living with HIV (PLWH). We assessed whether differences existed among participants in 4 categories: those who participated in medical studies, in behavioral studies, in both medical and behavioral studies, and those with no past research participation (NPRP). We hypothesized that factors affecting participating in research would vary among categories of research participation.

Methods

Study design and sample

Using qualitative interviews and a computer-assisted survey, we examined influences on past participation in research among persons living with HIV (PLWH). We present quantitative data from this study. Survey data were collected from December 2009 to May 2010 from a convenience sample of 200 patients in a large, southwestern urban clinic, a facility established specifically for primary care of low-income PLWH. Participants were recruited through posted advertisements, word-of-mouth, and clinician referral. This study was approved by the Institutional Review Boards (IRBs) of the investigators' institutions. Written informed consent was obtained and a \$25 gift card was provided. Five patients did not complete the survey and 2 had missing data, resulting in 193 completed surveys. We excluded 14 individuals who did not identify any kind of study participation, and 17 who identified "other" as a study kind, resulting in 162 cases for analysis.

Survey development

We developed a survey with questions categorized according to the 5 constructs of the Health Belief Model, a classic theory of behavior change²⁵ (Table 1). We assumed that

TABLE 1. SAMPLE QUESTIONS FOR ADAPTED HEALTH BELIEF MODEL CONSTRUCTS

<i>Adapted Health Belief Model construct</i>	<i>Sample questions/scale</i>
Impact of illness on decision to participate in a research study	In general, how would you describe your health? Scale: Excellent = 0, Good = 1, Fair = 2, Poor = 3
Benefits of research; benefits of participating in research	Doctors and nurses will pay more attention to you if you are in a research study. You can get new medications for your HIV if you are in a research study. Scale: Strongly disagree = 1; Strongly agree = 5
Barriers to participating; inconveniences, burdens of participating in research	How worried are you ... ... that you will be treated like a "guinea pig" in a research study? ... that a research study will interfere with your current HIV treatment? Scale: Not at all worried = 1; Worried a lot = 5
"Triggers" to participating in a study	In deciding to be in a research study, how important ... ... is your doctor's opinion? ... is the amount of money you get paid for being in the research? Scale: Not at all important = 1; Very important = 5
Self-efficacy: Degree of certainty that one can perform activities associated with participating in research	You can get to all the appointments for a research study. You can tell your doctor if you want to stop being in a research study. Scale: Cannot do at all = 1; Completely certain I can do = 5

TABLE 2. CHARACTERISTICS FOR THE OVERALL SAMPLE AND BY TYPE OF PAST STUDY PARTICIPATION

Variables	Overall			Medical		Behavioral		No past participation		Medical-behavioral		p Value
	N	Mean(SD)/%	Range	N	Mean(SD)/%	N	Mean(SD)/%	N	Mean(SD)/%	N	Mean(SD)/%	
Demographics												
Age	162	45.3 (8.47)	23–62	36	44.0 (9.86)	49	46.5 (7.39)	52	45.0 (8.81)	25	45.6 (7.72)	0.57
Ethnicity (black) ^b	162	73.5%	0–1	36	69%	49	84%	52	71%	25	64%	0.24
Female gender	162	36%	1–2	36	31%	49	35%	52	38%	25	40%	0.85
Education	162	11.18 (2.31)	2–21	36	11.6 (1.73)	49	11.14 (1.20)	52	11.19 (2.40)	25	10.6 (3.24)	0.42
Medical factors												
Health status ^c	162	1.38 (0.78)	0–3	36	1.25 (0.77)	49	1.35 (0.75)	52	1.44 (0.80)	25	1.48 (0.82)	0.61
Drug use	162	64%	0–1	36	61%	49	61%	52	65%	25	72%	0.79
Years since diagnosis	162	12.49 (7.35)	0–28	36	12.42 (7.46)	49	13.90 (7.50)	52	11.5 (6.90)	25	11.92 (7.84)	0.41
Taking HIV medications	162	86%	0–1	36	92%	49	82%	52	83%	25	92%	0.41
Nonmedical factors												
Trust in own doctor	162	21.49 (4.38)	5–25	36	22.69 (4.01)	49	21.86 (4.22)	52	20.52 (4.51)	25	21.08 (4.64)	0.12
Amount money paid	162	3.12 (1.44)	1–5	36	2.94 (1.39)	49	3.18 (1.44)	52	3.21 (1.45)	25	3.08 (1.58)	0.84
Health literacy score	162	55 (16.97)	0–66	36	55 (16.29)	49	51 (20.08)	52	56 (15.77)	25	58 (12.92)	0.32
How confident are you?												
Can get to all appointment	162	4.31 (1.01)	1–5	36	4.61 (0.73)	49	4.29 (1.04)	52	4.02 (1.18)	25	4.56 (0.71)	0.03 ^a
Can understand information about study	162	4.40 (0.87)	1–5	36	4.44 (0.88)	49	4.47 (0.84)	52	4.23 (0.96)	25	4.56 (0.71)	0.37
Can tell doctor ‘stop’	162	4.62 (0.88)	1–5	36	4.53 (1.0)	49	4.63 (0.88)	52	4.65 (0.88)	25	4.68 (69)	0.90
Not be a ‘guinea pig’	162	4.38 (1.14)	1–5	36	4.22 (1.17)	49	4.45 (1.04)	52	4.38 (1.19)	25	4.44 (1.23)	0.82
Disagree or agree?												
Do not understand what a research study is	162	2.27 (1.64)	1–5	36	1.78 (1.44)	49	2.18 (1.64)	52	2.67 (1.71)	25	2.28 (1.65)	0.09
Can get new medications	162	3.49 (1.54)	1–5	36	3.64 (1.53)	49	3.31 (1.47)	52	3.35 (1.70)	25	3.96 (1.27)	0.28
Doctors, nurses pay more attention	162	2.85 (1.59)	1–5	36	3.25 (1.73)	49	2.53 (1.43)	52	2.69 (1.65)	25	3.20 (1.44)	0.11
Can get information	162	3.09 (1.53)	1–5	36	3.28 (1.49)	49	3.24 (1.48)	52	2.92 (1.63)	25	2.84 (1.49)	0.51
Can stop bad habits	162	3.48 (1.56)	1–5	36	3.47 (1.63)	49	3.69 (1.56)	52	3.13 (1.63)	25	3.80 (1.19)	0.21
Can help others	162	4.40 (1.10)	1–5	36	4.56 (0.97)	49	4.27 (1.27)	52	4.29 (1.18)	25	4.68 (0.63)	0.31
Studies should be interesting	162	4.39 (0.99)	1–5	36	4.53 (0.88)	49	4.29 (1.10)	52	4.38 (0.95)	25	4.40 (1.04)	0.75
Expect to be paid	162	3.23 (1.46)	1–5	36	3.14 (1.61)	49	3.41 (1.55)	52	2.96 (1.22)	25	3.60 (1.44)	0.24
Not worried or worried?												
Will be treated as ‘guinea pig’	162	2.33 (1.46)	1–5	36	1.97 (1.42)	49	2.16 (1.40)	52	2.81(1.51)	25	2.20 (1.35)	0.03 ^a
Will interfere with current treatment	162	2.49 (1.52)	1–5	36	2.19 (1.39)	49	2.51 (1.56)	52	2.67 (1.65)	25	2.52 (1.33)	0.55
Will not get best treatment	162	2.17 (1.39)	1–5	36	2.11 (1.56)	49	2.44 (1.39)	52	2.31 (1.37)	25	1.80 (1.15)	0.48
Fear of side effects	162	2.96 (1.52)	1–5	36	2.75 (1.54)	49	3.02 (1.59)	52	3.13 (1.52)	25	2.80 (1.35)	0.63
Others will find out	162	1.59 (1.16)	1–5	36	1.64 (1.20)	49	1.45 (1.00)	52	1.77 (1.35)	25	1.44 (0.92)	0.49
Not important/important												
Doctor’s opinion	162	4.26 (1.16)	1–5	36	4.61 (0.90)	49	4.0 (1.35)	52	4.25 (1.14)	25	4.28 (1.02)	0.12
Opinion of minister	162	2.96 (1.58)	1–5	36	3.11 (1.67)	49	3.0 (1.51)	52	2.75 (1.58)	25	3.08 (1.63)	0.70
Information from Internet	162	3.64 (1.26)	1–5	36	3.69 (1.39)	49	3.53 (1.23)	52	3.63 (1.19)	25	3.80 (1.35)	0.84
Availability of other treatment options	162	4.40 (1.03)	1–5	36	4.47 (0.94)	49	4.37 (1.03)	52	4.23 (1.21)	25	4.72 (0.61)	0.26
Religious beliefs	162	3.17 (1.64)	1–5	36	3.11 (1.70)	49	3.08 (1.63)	52	3.23 (1.64)	25	3.32 (1.63)	0.93

^a $p < 0.05$.^bNon-Black = 43 (26.5%) (i.e., 20 (12%) White; 19 (12%) Hispanic, and 4 (2.5%) “other.”^cExcellent = 0, Good = 1, Fair = 2, Poor = 3.

participation in a research study would be influenced by multiple factors, including perceptions of one's severity of HIV illness; benefits of research and of participating in research; barriers, harms, and inconveniences of participating; "cues" that might trigger participation; and "self-efficacy beliefs"—individuals' confidence in their ability to accomplish specific tasks related to research participation. In addition to demographics and general participation questions, Likert-style questions relating to benefits, barriers, and triggers to action were formulated. Self-efficacy questions were modeled using Bandura²⁶ as a guide. Content of questions was informed by the literature and by results of previous pilot research.

Disease severity was assessed by self-reported CD4 T-cell count, HIV viral load, and health status. In addition, the *Brief Illness Perception Questionnaire*²⁷ assessed individuals' perceptions of cause, cure, timeline, and emotional impact of illness.

Published validated scales measured distrust in the healthcare system,²⁸ trust in one's own physicians,²⁹ trust in the medical profession,²⁹ and trust in medical researchers.³⁰ Also included were the Multidimensional Health Locus of Control scale,³¹ and the Rapid Estimate of Adult Literacy in Medicine (REALM),³² a health literacy screening tool.

Responses to the question, "Have you ever been in a research study other than this survey study?" determined group membership for analysis. Those responding 'no' were categorized as having "no past research participation (NPRP)." A 'yes' response generated a request to check 1 or more of 6 categories describing kinds of studies in which they participated (testing medicines; vaccines; behavior change; interview/survey; focus group; other). Those checking medicine and/or vaccine studies were classified as past "medical" participants; those who reported participating in one or more kinds of behavioral studies were classified as "behavioral" participants. Participants in both medical and behavioral categories of study type were classified as "medical-behavioral" participants. Four nationally known experts on research participation and ethics provided content validation of the written survey. Investigators then used QDS^{TM} software³³ to program the survey for Audio Computer-Assisted Self-Interviewing (ACASI), which enabled participants to see and hear computerized survey questions, and click answers in private. ACASI has been shown to be effective for collecting sensitive data and for use with individuals who may have decreased reading ability.³⁴

The survey was pre-tested with a convenience sample of 30 participants, resulting in reduction of several items and minor modifications in wording. The computer-assisted survey took approximately 30 min to complete.

Data analysis

Fifty-two respondents (32%) had NPRP, 49 (30%) had participated in behavioral research only, 36 (22%) in medical research only, and 25 (15%) had participated in both medical and behavioral studies. We measured the outcome, past study participation, by first computing univariate and bivariate statistics for the overall sample, and for all categories of past study participation and NPRP. In addition, we computed whether observed differences in the response means and proportions across the four categories of outcomes were statistically significant. For categorical variables, we performed chi-square significance tests and for continuous, one-way

analysis of variance with the Bonferroni adjustment for post-hoc analysis. To test the relationship between the covariates and the outcome, we used a multinomial probit model³⁵ in the Stata11 statistical environment³⁶

In the probit model, the inverse standard normal distribution of the probability is modeled as a linear combination of the predictors. Frequently the multinomial logit model, instead of probit, is used to analyze what factors affect individual preferences among multiple (more than two) alternatives, because the results of the multinomial logit are very intuitive and easy to interpret. However, a main assumption of the multinomial logit model is that there is no correlation among the discrete preferences. In this study, three of the categories of the outcome—past medical study participation, past behavioral study participation, and past medical-behavioral study participation—are interdependent, since any participation in a study may be close complements or substitutes, as opposed to NPRP. If the assumption of independence of preferences is not satisfied, the results of the multinomial logit are not likely to be valid. For this reason, we utilized the probit model to estimate the effects of the covariates on the "preference" for study participation. These probit coefficients are less likely to be biased if the assumptions are violated. In the case that the assumptions of independence hold, the results of the probit model will be identical to the logit model. In earlier phases of the analysis, we performed different modeling specifications by examining study participation using a sequential binary logit model, as well as by using a multinomial logit model. The results we obtained were qualitatively the same. We used the maximum likelihood estimation procedure to estimate the multinomial probit model for study participation.

Explanatory and control variables

Though we assumed participation in research involved a variety of influences, we narrowed the number of factors to be included in our model to avoid over-fitting. We included statistically significant factors from the bivariate comparisons. For nonsignificant items, we also included the following groups of individual-level explanatory and control variables that have been associated, in the literature, with participating in research, and that could affect participation patterns in our sample: demographics (age, gender, ethnicity, years of education) and medical factors (years since HIV diagnosis, whether currently taking HIV medications, self-reported health status). Self-reported HIV viral load and CD4 T-cell counts were not included due to missing data. We included the 'trust in one's own physician' scale²⁹ score, and the REALM³² (health literacy) score because of the currency of these topics in the literature. Other nonmedical variables were included based on their substantive importance through discussion in the literature and previous pilot work. (Tables 2 and 3 show abbreviated labels of all variables included in the MNP analysis.)

Results

Descriptive results

All participants were of low income, with 97% reporting \$1500 or less monthly income, including half reporting less than \$500 income per month. Similar to Floyd et al.,³⁷

TABLE 3. ESTIMATED COEFFICIENTS AND 95% CONFIDENCE INTERVALS IN MULTINOMIAL PROBIT MODEL FOR PAST STUDY PARTICIPATION

<i>Independent variables</i>	<i>No past participation vs. medical</i>	<i>No past participation vs. behavioral</i>	<i>Medical vs. behavioral</i>	<i>No past participation vs. medical-behavioral</i>	<i>Medical-behavioral vs. medical</i>	<i>Medical-behavioral vs. behavioral</i>
Demographics						
Age	-0.029 (-0.082-0.023)	0.034 (-0.016-0.084)	0.064 (0.014-0.113) ^a	-0.013 (-0.073-0.047)	-0.17 (-0.078-0.045)	0.047 (-0.009-0.103)
Ethnicity (black) ^c	-0.292 (-1.155-0.571)	0.472 (-0.380-1.324)	0.764 (-0.210-1.737)	-0.793 (-1.685-0.099)	0.501 (-0.438-1.440)	1.265 (0.260-2.270) ^a
Female gender	-0.285 (-1.226-0.657)	-0.320 (-1.128-0.488)	-0.035 (-0.904-0.834)	0.570 (-0.361-1.50)	-0.855 (-1.876-0.166)	-0.890 (-1.811-0.032)
Education	0.072 (-0.123-0.267)	-0.024 (-0.171-0.122)	-0.097 (-0.290-0.097)	-0.165 (-0.345-0.016)	0.237 (0.019-0.455) ^a	0.140 (-0.046-0.327)
Medical factors						
Health status	-0.310 (-0.828-0.207)	-0.176 (-0.739-0.384)	0.133 (-0.441-0.707)	-0.179 (-0.845-0.487)	-0.131 (-0.798-0.535)	0.001 (-0.705-0.707)
Drug use	0.217 (-0.535-0.969)	-0.196 (-0.848-0.456)	-0.413 (-1.188-0.362)	0.616 (-0.305-1.538)	-0.399 (-1.364-0.566)	-0.812 (-1.731-0.107)
Years since diagnosis	0.022 (-0.030-0.075)	0.048 (-0.003-0.098)	-0.026 (-0.026-0.077)	-0.002 (-0.062-0.059)	0.024 (-0.035-0.082)	0.049 (-0.010-0.109)
Taking HIV medications	1.60 (0.429-2.770) ^a	0.128 (-0.844-1.101)	-1.472 (-2.566-0.377) ^a	1.718 (0.297-3.139) ^a	-0.118 (-1.428-1.190)	-1.590 (-2.892-0.287) ^a
Nonmedical factors						
Trust in own doctor	0.098 (-0.037-0.233)	0.137 (0.037-0.237) ^a	0.039 (-0.088-0.166)	-0.067 (-0.191-0.056)	0.165 (0.016-0.314) ^a	0.204 (0.088-0.321) ^b
Amount money paid	-0.349 (-0.716-0.018)	-0.064 (-0.438-0.310)	0.285 (-0.066-0.637)	-0.739 (-1.214-0.264) ^a	0.390 (-0.081-0.861)	0.675 (0.194-1.157) ^a
Health literacy score	-0.011 (-0.039-0.016)	-0.021 (-0.049-0.006)	-0.010 (-0.036-0.016)	0.013 (-0.026-0.052)	-0.024 (-0.063-0.014)	-0.034 (-0.074-0.006)
<i>How confident are you?</i>						
Can get to all appointments	0.463 (-0.079-1.006)	-0.087 (-0.546-0.372)	-0.550 (-1.129-0.029)	0.693 (-0.027-1.413)	-0.230 (-1.05-0.589)	-0.780 (-1.529-0.031) ^a
Can understand information about study	0.128 (-0.369-0.626)	0.332 (-0.152-0.815)	0.203 (-0.299-0.706)	0.784 (0.168-1.40) ^a	-0.655 (-1.31-0.002) ^a	-0.452 (-1.031-0.126)
Can tell doctor 'stop'	-0.742 (-1.369-0.115) ^a	-0.325 (-0.909-0.259)	0.417 (-0.162-0.996)	-0.937 (-1.643-0.231) ^a	0.195 (-0.513-0.903)	0.612 (-0.053-1.277)
Not be a 'guinea pig'	-0.340 (-0.683-0.003)	0.036 (-0.314-0.386)	0.376 (0.027-0.726) ^a	-0.072 (-0.520-0.375)	-0.268 (-0.729-0.193)	0.108 (-0.331-0.548)
<i>Agree or disagree</i>						
Do not understand research what a research study is	-0.461 (-0.723-0.198) ^b	-0.326 (-0.580-0.072) ^a	0.135 (-0.129-0.398)	-0.195 (-0.531-0.142)	-0.266 (-0.589-0.058)	-0.131 (-0.474-0.211)

(continued)

TABLE 3. (CONTINUED)

<i>Independent variables</i>	<i>No past participation vs. medical</i>	<i>No past participation vs. behavioral</i>	<i>Medical vs. behavioral</i>	<i>No past participation vs. medical-behavioral</i>	<i>Medical-behavioral vs. medical</i>	<i>Medical-behavioral vs. behavioral</i>
Can get new medications	-0.079 (-0.414-0.257)	0.140 (-0.188-0.468)	0.219 (-0.10-0.537)	0.242 (-0.159-0.643)	-0.321 (-0.723-0.081)	-0.102 (-0.488-0.284)
Doctors, nurses pay more attention	0.249 (-0.059-0.557)	-0.226 (-0.533-0.082)	-0.475 (-0.780-0.170) ^a	0.361 (-0.024-0.745)	-0.111 (-0.514-0.292)	-0.586 (-0.973-0.199) ^a
Can get information	0.109 (-0.180-0.399)	0.071 (-0.210-0.352)	-0.038 (-0.327-0.251)	-0.506 (-0.876-0.137) ^a	0.615 (0.231-1.00) ^a	0.578 (0.227-0.928) ^b
Can stop bad habits	0.143 (-0.162-0.449)	0.267 (-0.030-0.564)	0.124 (-0.202-0.450)	0.458 (0.161-0.755) ^a	-0.315 (-0.635-0.005)	-0.191 (-0.518-0.136)
Can help others	0.013 (-0.505-0.531)	-0.063 (-0.463-0.337)	-0.076 (-0.562-0.410)	0.086 (-0.556-0.727)	-0.073 (-0.745-0.60)	-0.149 (-0.753-0.455)
Studies should be interesting	0.037 (-0.410-0.484)	-0.169 (-0.627-0.288)	-0.206 (-0.639-0.227)	-0.517 (-1.02-0.012) ^a	0.554 (0.076-1.032) ^a	0.347 (-0.095-0.789)
Expect to be paid	0.410 (0.051-0.768) ^a	0.311 (-0.047-0.669)	-0.099 (-0.441-0.243)	1.04 (0.574-1.501) ^b	-0.628 (-1.104-0.152) ^a	-0.727 (-1.177-0.277) ^a
<i>How worried are you?</i>						
Will be treated as 'guinea pig'	-0.269 (-0.646-0.108)	-0.331 (-0.738-0.077)	-0.062 (-0.493-0.369)	-0.095 (-0.518-0.328)	-0.174 (-0.632-0.284)	-0.236 (-0.703-0.232)
Will interfere with current treatment	0.008 (-0.400-0.415)	0.226 (-0.154-0.606)	0.218 (-0.171-0.608)	0.460 (0.038-0.882) ^a	-0.453 (-0.909-0.003)	-0.234 (-0.627-0.158)
Will not get best treatment	0.152 (-0.268-0.572)	0.194 (-0.190-0.578)	0.042 (-0.403-0.488)	-0.864 (-1.480-0.247) ^a	1.016 (0.364-1.667) ^a	1.058 (.441-1.675) ^b
Fear of side effects	-0.054 (-0.409-0.301)	0.051 (-0.275-0.377)	0.105 (-0.227-0.437)	-0.154 (-0.535-0.227)	0.10 (-0.261-0.461)	0.205 (-0.156-0.566)
Others will find out	0.034 (-0.416-0.483)	-0.294 (-0.697-0.110)	-0.327 (-0.778-0.123)	-0.082 (-0.572-0.407)	0.116 (-0.394-0.625)	-0.211 (-0.698-0.275)
<i>How important?</i>						
Doctor's opinion	0.049 (-0.452-0.550)	-0.519 (-0.950-0.088) ^a	-0.568 (-1.052-0.083) ^a	-0.527 (-1.02-0.028) ^a	0.575 (0.039-1.112) ^a	0.008 (-0.396-0.412)
Opinion of minister	0.173 (-0.210-0.555)	0.326 (0.043-0.609) ^a	0.153 (-0.213-0.520)	0.149 (-0.288-0.585)	0.024 (-0.460-0.508)	0.177 (-0.233-0.588)
Information from Internet	-0.078 (-0.399-0.242)	-0.154 (0.474-0.165)	-0.076 (-0.403-0.251)	0.101 (-0.293-0.496)	-0.180 (-0.590-0.230)	-0.256 (-0.666-0.155)
Availability of other treatment options	0.256 (-0.183-0.696)	0.420 (-0.004-0.844)	0.164 (-0.302-0.630)	1.03 (0.459-1.606) ^b	-0.777 (-1.378-0.175) ^a	-0.613 (-1.158-0.067) ^a
Religious beliefs	-0.003 (-0.320-0.314)	-0.101 (-0.387-0.184)	-0.098 (0.396-0.199)	0.152 (-0.225-0.528)	-0.155 (-0.540-0.231)	-0.253 (-0.615-0.109)

The reference category for the first, second and fourth columns is "no past participation"; for the 3rd column the reference category is "medical"; and for the 5th and 6th columns, the reference category is "medical-behavioral."

^a $p < 0.05$, ^b $p \leq 0.001$; 'black vs. non-black; number of obs = 162, Log pseudolikelihood = -150.57435, Wald $\chi^2(99) = 226.42$, prob > $\chi^2 = 0.0000$.

participants' attitudes toward research were primarily positive. In response to the question, "Have you ever been asked to be in an HIV medication research study, but decided not to be in it?", 19 (12%) of the 162 respondents had been asked and declined (6 with NPRP, 3 in the medical-behavioral group, and 5 each in the medical and behavioral groups).

In the ANOVA results, two variables showed statistically significant differences: 'confidence in one's ability to get to all appointments for a research study', $F(3,158)=3.17$, $p<0.05$, and 'worry about being treated as a guinea pig', $F(3,158)=2.95$, $p<0.05$. Table 2 summarizes population characteristics and the mean or percentage, standard deviation, and range for all the variables we included in the multinomial probit analysis for the overall sample, as well as broken by study participation type.

Multinomial probit model results

Table 3 presents the estimated conditional coefficients of the multinomial probit model explaining type of study participation of our sample. Results suggest that there were diverse explanations for past study participation among participants in 6 comparison groups of medical, behavioral, medical-behavioral, and those with NPRP.

Some results were consistent with expected findings. For example, in Table 3, patients who reported taking HIV medications currently were more likely to be in the medical or medical-behavioral group when compared with behavioral or NPRP groups. Individuals who reported greater agreement with the statement "You do not understand what a research study is" were more likely to be in the NPRP group than in either the medical or behavioral groups. Overall, the medical-behavioral group showed multiple statistically significant results, compared to the single classification groups of medical, behavioral, and NPRP.

Discussion

We conducted a study of low-income PLWH to determine influences on past participation in HIV-related research, and whether such influences vary by study type. We attributed the high number of statistically significant results in the medical-behavioral group to its small size relevant to the number of covariates, but were able to interpret our major findings. Research participants' inability to get to appointments and fear of being treated as a "guinea pig" have been noted as potential barriers to research participation, especially among minority populations.^{38,39} Both items reflecting these concepts showed statistically significant differences in bivariate group comparisons, but only the former retained significance when other factors were included in the MNP model.

In some instances, the medical-behavioral group appeared to "act" similarly to the medical group. For example, participants in both the medical and medical-behavioral groups were more likely to agree that 'doctors and nurses pay more attention to research participants' in comparison with the behavioral group. Increased attention by medical personnel or the real or perceived offer of better medical care or services for research participants raises concerns in the medical ethics literature because such attention or services can be seen as potential inducements to participate in research.⁴⁰ Such attention, perceived or observed by participants in medical studies, could be alternately explained not as inducement, but as simply re-

flecting the additional monitoring of presumably higher-risk medical studies⁴¹ or as required by study protocols.

Individuals with NPRP were also more confident than medical and medical-behavioral participants in their ability to tell a physician they want to stop participating in a study. Freedom to withdraw from a research study is a requirement for ethical research,⁴² but may necessitate participants' confidence in their ability to tell physicians they want to stop participating. While our study cannot clarify why such higher confidence was associated with individuals with NPRP, we speculate that medical participants may have more to lose by withdrawing from a study, if they are participating because their treatment options are limited, whether by their disease or by financial constraints.

In deciding to participate in a study, individuals who placed greater importance on physician opinion were more likely to be in the NPRP and medical groups, compared to the behavioral group. That medical participants and individuals with NPRP placed greater importance on physician opinion may reflect the nonparticipant's lack of knowledge about research, and the medical participant's need for advice when research becomes an option in complex treatment decisions. If behavioral research is viewed as less risky or less beneficial than medical research, individuals may believe participation in a behavioral study may not rise to the level of needing a physician's advice. However, individuals placing greater importance on physician opinion were also more likely to be in the NPRP and medical groups, compared to the medical-behavioral group, suggesting that, in this instance, the medical-behavioral group was "acting" more like the behavioral group.

Worthington and colleagues⁴³ found that low CD4 T-cell counts, treatment with antiretroviral medication, and years in treatment were strong predictors of research participation. Similarly, we found that current use of HIV medications was associated with medical and medical-behavioral study participation, when compared to both behavioral participation and NPRP. We did not find that self-reported health status and years since diagnosis (rather than years in treatment) were associated with participating in research. Self-reported CD4 T-cell counts and HIV viral loads resulted in incomplete data, so we were unable to evaluate biological measures of disease severity. If current use of HIV medication implies disease severity, then our finding suggests a parallel with studies on cancer research participation, where patients may choose research participation in response to worsening health caused by advancing disease.⁴⁴

Some differences, such as the expectation of payment, or the worry that "you will not get the best possible treatment for your HIV in a research study" were difficult to interpret, especially when they involved the medical-behavioral group. We should be cautious in the interpretation of the results for the specific comparisons due to limited sample size and the mixed composition of the medical-behavioral group.

Participant trust is often considered in studies of participating in research. In our study, higher trust in one's own physician was associated with greater likelihood that individuals had participated in a behavioral study when compared to the medical-behavioral and the NPRP categories, and in a medical study when compared to the medical-behavioral group. The significance of these findings is unclear, but are in keeping with varied results from other studies. For example,

Volkman et al.⁴⁵ associated greater trust in physicians with increased willingness to participate; Sengupta *et al.*¹⁷ showed that distrust of institutions was an important barrier to HIV/AIDS research participation, while Garber *et al.*⁴⁶ found neither trust nor distrust associated with participation rates of minority populations. We were also unable to explain why individuals in the medical-behavioral group placed greater importance on the availability of treatment options in deciding to be in research study, when compared with medical, behavioral, and NPRP groups. In cancer research, for example, the lack of viable treatment options has been associated with a strong willingness to participate in high-risk cancer trials.⁴⁷ In our study, there were no statistically significant relationships when the single-category medical and behavioral groups were compared to the NPRP group, and with each other.

Our study had several limitations. Using a convenience sample at a single site limited generalizability. Phrasing of survey questions, and order and mode of asking may have shaped responses.⁴⁸ We tried to control bias with experts' review of questions and survey pre-testing. Although use of ACASI should enhance response quality, some respondents may have misunderstood certain questions, or provided answers to please investigators or present themselves positively. In addition, because we did not specify HIV/AIDS research in determining group membership, our results should be interpreted cautiously in applying them to specific HIV/AIDS research.

Our classification method may have influenced our results because we were unable to control for perceptions of risk in different types of studies. We grouped different medical and behavioral studies together, even though differences in risk-benefit ratios can vary within and across studies and can be perceived differently by investigators and participants. For example, IRBs may perceive some HIV-related behavioral research (e.g., asking about individuals' sexual practices) as very personally invasive and therefore more objectionable or harmful than a minimal risk medical study: for example, a flu vaccine follow-up study, requiring an immunization and blood draw. However, our prior research found that individuals were often wary of medical studies that involved injection or ingestion of medication, and yet demonstrated control of situations involving participation.⁴⁹ Therefore a 'minimal-risk' flu study could likewise be perceived as having greater risk than a personally invasive behavioral study, especially if individuals believe they are better able to control the risks of behavioral research. That is, ability to misrepresent personal information and fewer perceived consequences of withdrawing from a behavioral study than a medical study may provide participants control over 'risky' behavioral research. Although clarification of the meanings of 'risk' in different kinds of research was outside the scope of our study, information regarding participants' perceptions of risk would enhance future studies on participating in research.

Inclusion of a large number of covariates compared to sample size is an important consideration in estimating both size and magnitude of the coefficients. We acknowledge this limitation in our study. However, due to the complexity of factors that may influence preference in study participation, we decided not to exclude covariates that we regarded as important, based both on previous studies and on our hypotheses. Moreover, because decisions to participate in re-

search are multidimensional, many factors needed to be included.

The use of 4 categories resulting in 6 comparison groups may have diluted our results so that statistical significance occurred, but was not meaningful. From our findings we were unable to determine whether the medical-behavioral category constituted a discreet group with unique characteristics, whether its participants behaved more like either medical or behavioral participants, or whether the category had no meaning as a separate one. We were also unable to know the time sequence of medical-behavioral participation and its possible significance: for example, did behavioral participation make an individual more amenable to medical participation, or vice versa?

Finally, when individuals in the NPRP group elected to participate in our survey, they became de facto "behavioral participants." Their willingness to participate may have confounded their responses as members of the NPRP group. While this limitation is impossible to manage, it speaks to numerous challenges that have been noted⁵⁰ in conducting research on research processes.

Mills and colleagues²³ have noted that some influences on research participation are commonly shared, while others may be unique and valid for an individual alone. Our study suggests that some influences are related to type of study participation. Practical implications include continuing efforts in educating patients about research and study participation and promoting dialogue with current participants about advantages and disadvantages of continuing participation. Findings related to low-income populations of PLWH may help IRBs make more inclusive protocol and policy decisions that encompass participant perspectives based on actual research experience.

Acknowledgments

We are grateful to the clinical, research, and administrative staff at the site where this study was conducted. We also thank Dr. Sandra Timpson and Ms. Hina Budhwani for their invaluable assistance in carrying out this research, and our participants for their willingness to take part in our study.

This project was supported by Grant Number R21AI079674 from the National Institute of Allergy and Infectious Diseases (NIAID), Jacquelyn Slomka, Principal Investigator. The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official views of the NIAID.

Author Disclosure Statement

Dr. Andrade reports serving as Consultant/Advisor with Abbott and Gilead.

References

1. Halpern SD, Metzger DS, Berlin JA, Ubel PA. Who will enroll? Predicting participation in a Phase II AIDS vaccine trial. *J Acquir Immune Defic Syndr* 2001;27:281-288.
2. Koblin BA, Heagerty P, Sheon A, et al. Readiness of high-risk populations in the HIV Network for Prevention Trials to participate in HIV vaccine efficacy trials in the United States. *AIDS* 1998;12:785-793.
3. Gifford AL, Cunningham WE, Heslin KC, et al. Participation in research and access to experimental treatments

- by HIV-infected patients. *N Engl J Med* 2002;346:1372–1382.
4. Sullivan PS, McNaghten AD, Begley E, Hutchinson A, Cargill VA. Enrollment of racial/ethnic minorities and women with HIV in clinical research studies of HIV medicines. *J Natl Med Assoc* 2007;99:242–250.
5. Djomand G, Katzman J, diTommaso D, et al. Enrollment of racial/ethnic minorities in NIAID-funded networks of HIV vaccine trials in the United States, 1988 to 2002. *Public Health Rep* 2005;120:543–548.
6. Mills E, Cooper C, Guyatt G, et al. Barriers to participating in an HIV vaccine trial: A systematic review. *AIDS* 2004;18:2235–2242.
7. Meyers K, Metzger DS, Navaline H, Woody GE, McLellan AT. Vaccine trials: Will intravenous drug users enroll? *Am J Public Health* 1994;84:761–766.
8. Strauss RP, Sengupta S, Kegeles S, et al. Willingness to volunteer in future preventive HIV vaccine trials: Issues and perspectives from three U.S. communities. *J Acquir Immune Defic Syndr* 2001;26:63–71.
9. Buchbinder SP, Metch B, Holte SE, Scheer S, Colletti A, Vittinghoff E. Determinants of enrollment in a preventive HIV vaccine trial. Hypothetical versus actual willingness and barriers to participation. *J Acquir Immune Defic Syndr* 2004;36:604–612.
10. Allen MA, Liang TS, La Salvia T, Tjugum B, Gulakowski RJ, Murguia M. Assessing the attitudes, knowledge, and awareness of HIV vaccine research among adults in the United States. *J Acquir Immune Defic Syndr* 2005;40:617–624.
11. Golub ET, Purvis LA, Sapun M, et al. Changes in willingness to participate in HIV vaccine trials among HIV-negative injection drug users. *AIDS Behav* 2005;9:301–309.
12. Roberts KJ, Newman PA, Duan N, Rudy ET. HIV vaccine knowledge and beliefs among communities at elevated risk: Conspiracies, questions and confusion. *J Natl Med Assoc* 2005;97:1662–1671.
13. Newman PA, Duan N, Roberts KJ, et al. HIV vaccine trial participation among ethnic minority communities. Barriers, motivators, and implications for recruitment. *J Acquir Immune Defic Syndr* 2006;41:210–217.
14. Priddy FH, Cheng AC, Salazar LF, Frew PM. Racial and ethnic differences in knowledge and willingness to participate in HIV vaccine trials in an urban population in the Southeastern US. *Int J STD AIDS* 2006;17:99–102.
15. Mills EJ, Seely D, Rachlis B, et al. Barriers to participation in clinical trials of cancer: A meta-analysis and systematic review of patient-reported factors. *Lancet Oncol* 2006;7:141–148.
16. Gadegbeku CA, Stillman PK, Huffman MD, Jackson JS, Kusek JW, Jamerson KA. Factors associated with enrollment of African Americans into a clinical trial: Results from the African American study of kidney disease and hypertension. *Contemp Clin Trials* 2008;29:837–842.
17. Sengupta S, Strauss RP, DeVellis R, Quinn SC, DeVellis B, Ware WB. Factors affecting African-American participation in AIDS research. *J Acquir Immune Defic Syndr* 2000;24:275–284.
18. Ross MW, Jeffords K. Reasons for entry into and understanding of HIV/AIDS clinical trials: A preliminary study. *AIDS Care* 1994;6:77–82.
19. Stone VE, Mauch MY, Steger K, Janas SF, Craven DE. Race, gender, drug use, and participation in AIDS clinical trials. Lessons from a municipal hospital cohort. *J Gen Intern Med* 1997;12:150–157.
20. Madge S, Mocroft A, Wilson D, et al. Participation in clinical studies among patients infected with HIV-1 in a single treatment center over 12 years. *HIV Med* 2000;1:212–218.
21. Mueller M. Clinical, technical, and social contingencies and the decisions of adults with HIV/AIDS to enroll in clinical trials. *Qual Health Res* 2004;14:704–713.
22. Slomka J, Ratliff EA, McCurdy S, Timpson S, Williams ML. Perceptions of risk in research participation among underserved minority drug users. *Subst Use Misuse* 2008;43:1640–1652.
23. Mills E, Kumanan W, Rachlis B, et al. Barriers to participation in HIV drug trials: A systematic review. *Lancet Infect Dis* 2006;6:32–38.
24. King WD, Defreitas D, Smith K, et al., for the Underrepresented Populations Committee of the Adult AIDS Clinical Trials Group (AACTG). Attitudes and perceptions of AIDS Clinical Trials Group site coordinators on HIV clinical trial recruitment and retention: A descriptive study. *AIDS Patient Care STDS* 2007;21:551–563.
25. Janz NK, Champion VL, Strecher VJ. The Health Belief Model. In: Glanz K, Rimer BK, Lewis FM, eds. *Health Behavior and Health Education. Theory, Research, and Practice*. 3rd Edition. San Francisco: Jossey-Bass, 2002, pp. 45–66.
26. Bandura A. Guide for constructing self-efficacy scales. In: Pajares F, Urdan T, eds. *Self-Efficacy Beliefs of Adolescents*. Greenwich, CT: Information Age Publishing, Inc., 2006, pp. 307–337.
27. Broadbent E, Petrie KJ, Main J, Weinman J. The Brief Illness Perception Questionnaire. *J Psychosom Res* 2006;60:631–637.
28. Rose A, Peters N, Shea JA, Armstrong K. Development and testing of the Health Care System Distrust Scale. *J Gen Intern Med* 2004;19:57–63.
29. Dugan E, Trachtenberg F, Hall MA. Development of abbreviated measures to assess patient trust in a physician, a health insurer, and the medical profession. *BMC Health Serv Res* 2005;5:64–70.
30. Hall MA, Camacho F, Lawlor JS, DePuy V, Sugarman J, Weinfurt K. Measuring trust in medical researchers. *Med Care* 2006;44:1048–1053.
31. Wallston BS, Wallston KA, Kaplan GD, Maides SA. The development and validation of the health related locus of control (HLC) scale. *J Consult Clin Psychol* 1976;44:580–585.
32. Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: A shortened screening instrument. *Fam Med* 1993;25:391–395.
33. QDS™ (Questionnaire Development System). Bethesda, MD: Nova Research Company, 2006.
34. Lessler JT, O'Reilly JM. Mode of interview and reporting of sensitive issues: Design and implementation of audio computer-assisted self-interviewing. *NIDA Res Monogr* 1997;167:366–382.
35. Greene WH. *Econometric Analysis*. 5th ed. Upper Saddle River, NJ: Prentice Hall, 2003.
36. StataCorp Statistical Software: Release 11. College Station, TX: Stata Corporation, 2010.
37. Floyd T, Patel S, Weiss E, Zaid-Muhammed S, Lounsbury D, Rapkin B. Beliefs about participating in research among a sample of minority persons living with HIV/AIDS in New York City. *AIDS Patient Care STDS* 2010;24:373–380.
38. El-Sadr W, Capps L. The challenge of minority recruitment in clinical trials for AIDS. *JAMA* 1992;19:954–957.
39. Corbie-Smith G, Thomas SB, Williams MV, Moody-Ayers S. Attitudes and beliefs of African Americans toward participation in research. *J Gen Intern Med* 1999;14:537–546.

40. Denny CC, Grady C. Clinical research with economically disadvantaged populations. *J Med Ethics* 2007;33:382–385.
41. Slomka J, Ratliff EA, McCurdy S, Timpson S, Williams ML. Decisions to participate in research: Views of underserved minority drug users with or at risk for HIV. *AIDS Care* 2008;20:1224–1232.
42. Emanuel EJ, Wendler D, Grady C. What makes clinical research ethical? *JAMA* 2000;283:2701–2711.
43. Worthington CA, Gill MJ. Participation in HIV research: The importance of clinic contact factors. *AIDS Patient Care STDS* 2008;22:619–625.
44. Gaskin DJ, Weinfurt KP, Castel LD, et al. An exploration of relative health stock in advanced cancer patients. *Med Decis Making* 2004;24:614–624.
45. Volkmann ER, Claiborne D, Currier JS. Determinants of participation in HIV clinical trials: The importance of patients' trust in their provider. *HIV Clin Trials* 2009;10: 104–109.
46. Garber M, Hanusa BH, Switzer GE, Mellors J, Arnold RM. HIV-infected African Americans are willing to participate in HIV treatment trials. *J Gen Intern Med* 2007;22: 17–42.
47. Agrawal M, Grady C, Fairclough DL, Meropol NJ, Maynard K, Emanuel EJ. Patients' decision-making process regarding participation in Phase I oncology research. *J Clin Oncol* 2006;24:4479–4484.
48. Aday LA. *Designing and Conducting Health Surveys*. 2nd edition. San Francisco: Jossey-Bass, Inc.; 1996.
49. Slomka J, Ratliff EA, McCurdy SA, Timpson S, Williams ML. Decisions to participate in research: Views of underserved minority drug users with or at risk for HIV. *AIDS Care* 2008;20:1224–1232.
50. Sachs GA, Hougham GW, Sugarman J, et al. Conducting empirical research in informed consent: Challenges and questions. *IRB (Supplement)* 2003;25:S4–S10.

Address correspondence to:
Jacquelyn Slomka, Ph.D., R.N.
Frances Payne Bolton School of Nursing
Case Western Reserve University
10900 Euclid Avenue
Cleveland, Ohio 44106-4904
E-mail: jacquelyn.slomka@case.edu