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Research Participant-Centered Outcomes at NIH-Supported Clinical Research Centers

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Abstract

Background—Although research participation is essential for clinical investigation, few quantitative outcome measures exist to assess participants' experiences. To address this, we developed and deployed a survey at 15 NIH-supported clinical research centers to assess participant-centered outcomes; we report responses from 4,961 participants.

Methods—Survey questions addressed core aspects of the research participants' experience, including their overall rating, motivation, trust, and informed consent. We describe participant characteristics, responses to individual questions, and correlations among responses.

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Conflict of Interest

National Research Corporation Picker, Inc. provided survey fielding, validation, and reporting expertise as part of a contract to the Rockefeller University. Dr. Yessis was formerly employed by NRC Picker during the design of the research. Rockefeller University has granted a royalty- free license to National Research Corporation Picker to administer the survey commercially. Neither Dr. Yessis, nor any of the authors nor their hosting institutions has any financial interest in National Research Corporation Picker, Inc. (formerly NRC Picker, Inc.) or any future commercial survey.

Results—Respondents broadly represented the research population in sex, race, and ethnicity. Seventy-three percent awarded top ratings to their overall research experience and 94% reported no pressure to enroll. Top ratings correlated with feeling treated with respect, listened to, and having access to the research team (R^2=0.80 - 0.96). White participants trusted researchers (88%) than did non-white participants collectively (80%) ($p<0.0001$). Many participants felt fully prepared by the informed consent process (67%) and wanted to receive research results (72%).

Conclusions—Our survey demonstrates that a majority of participants at NIH-supported clinical research centers rate their research experience very positively and that participant-centered outcome measures identify actionable items for improvement of participant's experiences, research protections, and the conduct of clinical investigation.

Introduction

Human subjects' participation in research studies is vital to advancing medical science. Optimizing participant's experiences while simultaneously ensuring that studies are conducted safely and ethically are critically important to successful conduct of clinical research. Modern patient-centered approaches to selecting outcome measures look less to patient 'satisfaction,' which is a relative concept, dependent on the individual's construct and perspective,[1] and instead favor asking patients for their perceptions of what actually occurred, collecting actionable data enabling the care team to design specific interventions. Decades of empiric research investigating patients' experiences in hospital settings using standardized, validated surveys that measure patients' perceptions of their clinical care have led to performance improvement programs that have had a major impact on improving clinical care.[2] As a result, such surveys have been incorporated into hospital accreditation and hospital reimbursement programs.[3] In contrast, although intense interest has been expressed about whether clinical research studies are conducted according to high bioethical standards and what motivates research participants to volunteer,[4-8] we are unaware of any validated surveys that obtain empiric participant-centered outcomes to judge the effectiveness of current practices or to make improvements based on participants' experiences and perspectives For example, using the patient-centered orientation described above, rather than asking how satisfied a participant was with the consent process, one can ask whether she or he understood the consent discussions and whether the participant's experiences during the study matched her or his expectations developed during the recruitment and consent process.[9]

To address the deficiencies in measures used and approach to assessing the research participant experience, we first rigorously developed a standardized Research Participant Perception Survey (RPPS) based on themes from focus groups of research participants and research professionals.[10] We then deployed the survey to research participants at 15 NIH-supported clinical research centers in the United States and validated the tool based on returned responses.[9] The goal of the current study was to obtain outcome data from the survey that can be used to inform the public about participation in research studies, enhance participants' experiences and protections, and improve the conduct of clinical research through continuous performance improvement. We recently reported a brief summary of

select aspects of our study;[11] the present publication reports the comprehensive and detailed description of the research.

Methods

Participating Institutions

The following institutions participated in the fielding of the survey: Baystate Medical Center, Boston University, Clinical Center at the National Institutes of Health, Duke University, Feinstein Institute for Medical Research, Johns Hopkins University, Oregon Health & Science University, Stanford University, The Rockefeller University, The University of Rochester, Tufts New England Medical Center, University Hospitals of Cleveland, Case Western Reserve University, University of Texas Southwestern Medical Center, Vanderbilt University, and Yale University.

The Questionnaire

The RPPS design, questions, and response scales have been reported previously,[9] and are aligned with the structure and standards used in The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey.[3] Briefly, the RPPS questionnaire included 77 questions addressing the full continuum of the research participation experience, from the time when the volunteer first learned about the research study, through the consent process and study conduct, until the completion of participation. Eleven of the questions were designed to assess characteristics of the participants' demographics including race, ethnicity, primary language, previous research participation, whether they participated in the research protocol as a healthy volunteer or as a disease-affected participant (protocol type), and their motivation for joining and remaining in the study).[9] Ethical and regulatory and privacy board approvals of the survey fielding were obtained at each site as required.[9]

Survey Distribution and Validation

The RPPS survey was distributed to 18,890 research participants at 15 NIH-supported clinical research centers (13 sites with Clinical and Translational Science Awards (CSTAs), one General Clinical Research Center (GCRC), and the NIH Clinical Center); 92% (17,203) of mailed surveys were deliverable. Survey reliability and validity were assessed based on 4,961 returned surveys and included tests of face value and content validity, a robust assessment of survey and item completion, and psychometric analysis.[9] The 29% response rate was evaluated for representativeness by comparison with the HCAHPS survey upon which it was modeled, and by comparing the response sample with those of the overall survey sample. The survey sample at each institution consisted of either a random sample of the unselected total available sample of research participant from the two years prior to fielding, or a subset of participants that excluded specific population(s) (most commonly mental health, substance abuse, or HIV studies) according to the restrictions placed by local IRBs, privacy boards or leadership.[9] Ten of 15 participating institutions (representing 80% of the response sample) placed no restriction or only a single restriction on the inclusion of participants in the survey dataset. Assessment of non-responders through telephone contact was considered, but was rejected because it would compromise the uniformity of response

mode, investigators believed it violated participants' autonomy to decline, and most institutions prohibited it based on privacy considerations.

Question Scoring

"Top-Box" Scoring—The scoring for actionable and overall questions was performed in alignment with HCAHPS standards using the "top-box" response and "positive" scores. The "top box" response is the optimal or most positive response(s) option for a given question. The "positive" score is the percentage of all responses in a sample, after excluding "not applicable" or blank responses, that are "top box" responses.[12]

Overall Experience—Research participants were asked to rate their overall experiences on a scale from 0 (worst) to 10 (best), and to indicate whether they would recommend joining a research study to a friend or family members.[3,9] The "top-box" response for this question was defined as either a 9 or 10, based on evidence that this definition reduces sensitivity to patient response tendency. [13]

Actionable Questions—Fifty-five questions were considered actionable (i.e., asking whether, and how often, specific events or activities happened). Actionable questions included whether participants felt they exercised autonomy, understood the components of informed consent and other critical information, and felt respected and valued by the research team.[9] Actionable questions were first analyzed after dichotomizing the responses into "top-box" scores versus all other responses. To provide more detail, some responses were further analyzed based on an ordinal scale.

Motivation Questions—Questions addressing motivation to join, stay in, or leave a research study asked participants to use a four-point scale to rate the importance of each of 12 to 15 possible factors affecting their decisions. The rating "Very Important" was the "top-box" response for dichotomized analyses of these questions. Mean rating scores were used descriptively to compare rankings of factors between subgroups. Subgroups for these analyses were defined by whether the participant enrolled in a study that did or did not require a disease/disorder for eligibility, or did or did not involve a study drug or procedure.

Dimensions

To analyze broad themes and facilitate summarizing the results, related actionable questions were grouped into validated conceptual domains or dimensions. Three dimensions have elements in common with perception surveys of medical care (Respect for Patient Preferences, Education/Information/Communication, and Coordination of Care).[4] Two novel dimensions, Informed Consent and Trust, captured information fundamental to clinical research participation.[9]

Statistical Methods

The main descriptive statistics for all respondents and for various subgroups were frequencies of individual questions, or cross-tabulations of pairs of questions. To compare the proportions of "top box" responses for a question (the outcome) between two groups, Fisher's exact test was used. If the groups defined by the second question retained their

original ordinal scale, logistic regression was used to compute a test for trend in the proportions, and if more than two groups were defined by the second question but the groups were unordered (e.g. race), the extension of Fisher's exact test was used (test of homogeneity). To assess the correlation between two variables, both on an ordinal scale, Spearman's nonparametric correlation was computed. For sets of possible motivators for joining or remaining in a study, motivators were ranked (either overall or within subgroups) by comparing their mean scores, where a response of "Very important" was scored as '1,' "Somewhat important" as '2,' "Not very important" as '3,' and "Not important at all" as '4.' To assess which small set of questions or factors best predicted the primary outcome of a participants' "overall experience" (using the 0 to 10 scale), forward stepwise multiple regression was used, with all actionable research participant experience questions asked on a four point scale. Items entered the model if they had an alpha <0.05, and were removed if p>0.10. All *p*-values are two-sided, with p<0.05 considered statistically significant.

Results

Demographics

4,961 completed surveys were received from the 15 participating centers. The ethnic composition of the aggregate sample was 5% Hispanic. White participants made up the largest racial group (85%), followed by African-Americans (12%), Asians (3%), Native American or Alaskan Natives, and Native Hawaiian (2%) or Pacific Islanders (1%). The demographics of the response set have been previously reported.[9] The racial and ethnic characteristics of the response sample were comparable to those of the overall research population to whom the survey was mailed (mailing sample), based on data from the eight institutions able to provide data on race and ethnicity for their entire sample population (Table 1). Gender was reported from 4 of the 15 centers; participants from these 4 centers represented approximately 20% of both the mailing and response samples. Females made up 61% of the mailing sample and 60% of the response sample from these centers. Thirty-seven percent of respondents reported participating as healthy volunteers; the remainder participated based on having a disease or disorder being studied. Forty-six percent of participants received a new drug or device or experienced a study procedure.[9]

Overall Experience and Willingness to Recommend Participation to Others

As we previously reported,[11] in aggregate, 73% of participants (range across centers, 61-81%) rated their overall research experience very highly ("9" or "10") (Figure 1) and 66% reported they would "definitely" recommend research participation to friends or family (Figure 2). Participants' overall ratings did not differ based on whether they participated as healthy volunteers or disease-affected individuals (p=0.09), whether their protocols involved investigational agents or procedures (p=0.92), or how they learned about the study (p=0.27). Participants were more likely to rate their overall experiences very highly when they: trusted the investigators and nurses, felt treated with respect by the investigators and nurses, felt that investigators and nurses listened to them, received understandable answers from investigators and nurses in response to questions, and were able to meet with the principal investigator as much as they wanted (all p<0.0001 for trend; Table 2). In a multiple regression analysis, participants' answers to the question "How often were you treated with

courtesy/respect by the investigator/doctor?" accounted for 82% of the variance in participants' overall ratings of their research experiences, with an adjusted R^2 value of 0.81. Collectively, the answers to six questions incorporating the above themes increased the adjusted R^2 to 0.96 (Table 3).

Informed Consent

Nearly all participants reported experiencing no pressure either to join or to stay in the study, and virtually all participants understood they could leave the study if they wanted (Table 2). Approximately 80% of participants felt that informed consent documents and discussions provided understandable information that explained the study, including the risks. However, only 67% of respondents felt "completely prepared" for what to expect in the study by the consent form. Participants' feelings about the quality of the informed consent process showed a strong positive relationship to their overall research experience (Table 2).

Motivation to Join and Remain in a Study

The motivation to join a research study most often rated as 'very important' was "To help others" (64%), followed by "Concern about the topic" (56%). These remained the top motivations regardless of participant or study type (Table 4). The next most important motivations for participants with a disease or in a therapeutic study were "To find out more about my disease," and "To gain access to new treatment," whereas healthy volunteers and those not receiving experimental therapies rated "Because of a center's reputation" and "To obtain education/learning" as the next most important motivations. Only 14% of participants rated "To earn money" as 'Very important,' with healthy volunteers ranking it 6th in importance; participants with specific diseases or participating in therapeutic studies ranked it 12th. "To obtain free health care" was "Very important" to only 12% of participants. Participants' motivations to remain in a study identified "Feeling valued as a partner," and "Perceived benefits" as important factors (Table 4)

Sharing Research Study-Related Data with Participants

As we previously reported[11] twenty-three percent of participants reported receiving a summary of research results. Of those who did not receive a summary, 85% indicated that they would have liked to have received one. Similarly, 65% of all participants wanted to receive the results of their routine lab studies. When asked to rate items that "Would be important in a future study," 62% of respondents rated as "Very important" the "Sharing of routine test results with me or my doctor" and 72% gave the same rating to having a "Summary of the overall research results shared with me."

Trust

As we previously reported,[11] overall, 86% of respondents trusted the research team completely. Of these, many felt that they were treated with courtesy and respect (99%), were treated as valued partners (79%), and were listened to carefully by investigators (93%) or research coordinators (95%). Based on historical reports of human protections violations involving minority populations[14] and a general perception of persisting mistrust of medical

research by minority populations[15,16] we analyzed trust data of subgroups by race and ethnicity. Among the 5 racial/ethnic groups analyzed, whites had a somewhat higher level of trust for the research team (88% "top-box" responses; $p<0.0001$) than did the 4 non-white groups collectively, whose percentages did not differ significantly ($p=0.88$), ranging narrowly from 78 to 82% (Table 5).

Generalizability of Findings

The generalizability of the results of our study may be limited by the response rate and the types of institutions that participated. The response rate in our study, 29%, is similar to the ~33% national response rate in the same year for the HCAHPS hospital survey, which is used to judge the quality of institutional performance as the basis for reimbursement by the Centers for Medicare and Medicaid Services (CMS),[17] but somewhat lower than the rates for mailed surveys (35 and 38%) in the validation studies of the HCAHPS survey.[18,19] We did not attempt to contact non-responders using financial incentives and telephone contacts, as these methods have been demonstrated to introduce positive bias.[18,19] In fact, HCAHPS makes a downward adjustment of the favorable response rates of telephone surveys to better match them to mail surveys.[19] Moreover, our population was similar in gender, age and education to the mailed response population in the large HCAHPS validation study, in which consistency of survey mode (e.g., mailed surveys) was more important in minimizing bias than were patient-mix adjustments to account for nonresponse bias.[9,18]

In an attempt to detect potential response bias, we examined whether the centers differed in their overall ratings according to response rate. The percentages of participants rating their overall experiences as very positive in the two institutions with the highest response rates (74 and 70%, respectively) were 75 and 69%, which are very similar to the favorable ratings of 74 and 67% in the institutions with the lowest response rates (18 and 23%, respectively), as well as very similar to the overall rate for the entire study population of 73%. When dichotomized into groups with response rates above and below the mean value, the positive overall ratings were 75 and 71%, respectively. Responders from the institutions with above average responses were somewhat more likely than those in the lower responding group to recommend joining a research study (69 vs. 62%).

We also examined whether later responders to the two-wave mailing were different from earlier responders based on a presumption that late responders may share some characteristics of non-responders. Approximately 77% of respondents submitted their responses after the first request and the remainder after the second. The very favorable scores for overall ratings were 75 and 67% in those responding to the initial and subsequent request, respectively, and the likelihood of recommending participation to others was 67 and 62%, respectively. Thus, based on these internal data, whereas responses varied slightly by institutional response rate and timing of responses, the broad conclusions of our study are the same across these variables.

To further examine the generalizability of our findings, we compared the demographics of the respondents to those of the sample populations. We obtained gender, age, ethnicity and race data on the mailed research population sample from 4, 6 and 8 of our 15 participating centers respectively (some centers did not have all variables available) representing 62-77%

of the total mailed sample, and compared them with the demographics of the response sample from those same institutions. The results are shown in Table 1 and demonstrate very similar ethnicity and gender distributions in those receiving the survey compared to those responding to the survey. The racial data are also similar; a somewhat higher percentage of white participants responded than were mailed the survey, but this higher response rate may reflect, at least in part, a smaller percentage of “More than one race” or “Unknown/missing” responses for race in the response sample.

Our study was conducted primarily at major academic medical centers that focus on conducting clinical research and that were funded through the NIH GCRC and CTSA programs and the NIH Intramural Program. Thus, the results may not be generalizable beyond this cohort. However, since 61 CTSA institutions are now broadly distributed across the U.S., they represent an important segment of clinical research conducted in the U.S. to which the work may be generalizable.

Discussion

Our study provides comprehensive outcome data on how 4,961 participants from 15 different NIH-supported clinical research centers perceived their research experiences. We found that nearly three-quarters of respondents rated overall research experiences very high, and that two-thirds would definitely recommend participating in research studies to friends and family members. We also found that two-thirds of respondents felt fully prepared by the consent process for their participation, and nearly all respondents felt free from pressure to join the study and knew that they were free to leave the study at will. While these data are in general heartening with regard to most participants’ experiences, we consider it troubling that approximately one-third of participants did not feel fully prepared by the informed consent process and approximately one-fifth did not fully understand the consent document. This information can be used to inform process improvement, and the survey can then be redeployed to measure the efficacy of the interventions using these participant-centered measures.

Based on the multiple regression analysis, we hypothesize that the greatest benefit in improving participants’ perceptions will come from investigators and staff demonstrating respect for participants as valued partners in the research endeavor, listening carefully to them, sharing research data with them, making sure that they know how to reach members of the research team, being available when they make contact, and making sure that participants fully understand what to expect when enrolling in a study (Table 3). Since feeling valued as a partner in the research undertaking was highly correlated as an individual question with participants’ ratings of their overall experience across education and protocol type, we note that younger participants, Asian participants, and participants in poorer health who gave their experiences high overall ratings were less likely than other groups to feel like valued partners (Figure 3). Targeted additional research is needed to validate whether the underpinnings of the positive experiences in these groups are indeed different.

Our data also indicate that altruism is a major motivation for research participants across race, education, and protocol type, providing support for similar conclusions from previous

smaller studies.[4,5,20,21] Of note, even participants whose diseases were being treated as part of the study, ranked altruism as their highest motivation, although they also considered personal benefit very important, a combination that has been termed "conditional altruism."[10,21] We conclude that focusing on participant altruism provides an important way to engage the public in the research partnership and improve both participation rates and research experiences.

A large majority of participants want to receive information about the results of the study, perhaps reflecting their desire to be considered valued members of the research team and to assess the impact of their altruistic action. While returning aggregate study results to participants raises a number of potentially complex issues of logistics and participant education, and the return of personal research results is often limited by the regulatory restrictions of the Clinical Laboratory Improvement Act, we believe that it deserves serious attention as standard policy.[22-25]. In recent years, regulators have required that aggregate clinical trial data be shared on public websites,[26] however, only recently has systematic access for the participant been entertained.[27] Providing even basic interim and/or final study summaries, signed by the lead investigator, would demonstrate respect for participants' contribution to, and investment in, the research

Given the concerns expressed in the Institute of Medicine's 2010 report about the public's trust in the research enterprise,[28] the relatively high percentage of participants expressing trust in research team members is reassuring. Nonetheless, the difference in trust experienced by white participants versus non-white racial groups as a whole raises important questions that require further study data. Interestingly, the level of trust among African-American participants was similar to that of other non-white participants, despite concerns that mistrust of medical research is especially prevalent among African-Americans.[15] The increasing consideration given recently to patient-centered outcomes[29] and to community participation in clinical research[30] further indicate the need for performance improvement in clinical investigation. Similarly, concerns about conducting research among the under-and un-insured may also implicate trust, both trust in individual investigators and trust in systems.[31,32] Although our study was unable to analyze responses by socioeconomic status (SES) proxies (education, income, or insurance status), future studies should explore the role of trust in differences in research participation experiences among lower SES and safety-net populations. This might be particularly important as researchers examine clinical research conducted among community provider organizations, as recruitment and retention practices may be very different outside of the major NIH-supported institutions. The increasing consideration given patient-centered outcomes and community participation in the clinical research endeavor, signals both need and opportunity for using participant-centered outcomes to drive performance improvement in clinical investigation.

Given the demonstrable value of empiric evidence in science, it is surprising that there have been so few previous attempts to obtain broad-based data from research participants using validated survey instruments. One might have thought that the intense focus on the ethical principles, rules, and oversight of research involving human subjects after the Nuremberg code in 1946,[33] the description of unethical human research studies by Beecher in 1966,[34] and the public outcry in 1972 in response to revelations about the Tuskegee Public Health

Service Study,[14] would have stimulated an attempt to learn systematically about research participants' perceptions first-hand. Klitzman and Appelbaum have explained the decision of the U.S. Department of Health, Education, and Welfare in the 1970s to institute a "prospective regulatory approach" through IRB review as reflecting the need for immediate action in response to the abuses that were identified. This prospective approach led to a focus on process indicators, such as properly produced and executed informed consent forms, as well as procedures for monitoring and auditing of studies. These measures provide valuable safeguards against unethical human investigation, but they do not assess whether the desired outcome has been achieved as perceived by the research participant. To address this deficiency, they called for instituting retrospective analysis based on "objective, validated questionnaires" to assess "how well subjects understood the study or whether they were distressed by the research procedures."[35] We believe that this need remains unmet, and that our study and the developed survey contribute to progress on this important goal.

Our study has several limitations. As with all survey research, non-response bias may affect the results. We could not assess the potential impact of non-response bias directly because of privacy concerns. Our survey completion response rate was, however, comparable to that of typical hospital surveys with demonstrated utility in patient-centered process improvement[9] and our assessments of late responders and high and low responding centers did not reveal any strong trends toward non-response bias. Another limitation may be that individuals overstated their altruistic motives to appear more socially acceptable. To minimize this effect we chose an anonymous survey format and a mode of administration (i.e., mail rather than telephone or face-to-face methods) that were intended to encourage candor and were consistent with analogous patient-care surveys.

Since our study was conducted at NIH-supported clinical research centers, the results may not be broadly representative of clinical research conducted throughout the U.S. These institutions tend to focus on clinical investigation and provide resources to support such research. For example, many participating centers were accredited by the Association for Accreditation of Human Research Protection Programs[9] and 80% of CTSAs utilize Research Subject Advocates to enhance informed consent and other participant protections.[36] Since the survey instrument we developed is now publically available (http://www.nationalresearch.com/research-participant-survey/), future studies can address this important issue directly. Our study originated from a bilateral collaboration between the NIH Clinical Center and the Rockefeller University General Clinical Research Center prior to the establishment of the NIH Clinical and Translational Science Award (CTSA) program, but the charge to the CTSAs to improve the clinical research enterprise, and the resources made available through the CTSA program to support this project, were extremely important in enabling the study. The recent Institute of Medicine report reviewing the CTSA program[30] emphasized the need for developing a "learning health care system"[37] and we believe that the participant outcomes obtained with the use of our survey are an important component of a "learning clinical research system." Broad participation by the 61 currently funded CTSAs and other institutions in using and refining this survey questionnaire would provide both robust benchmarking data and opportunities to identify and disseminate best practices. These are vital elements in continuous performance improvement of the clinical research enterprise, the ultimate goal of this research.

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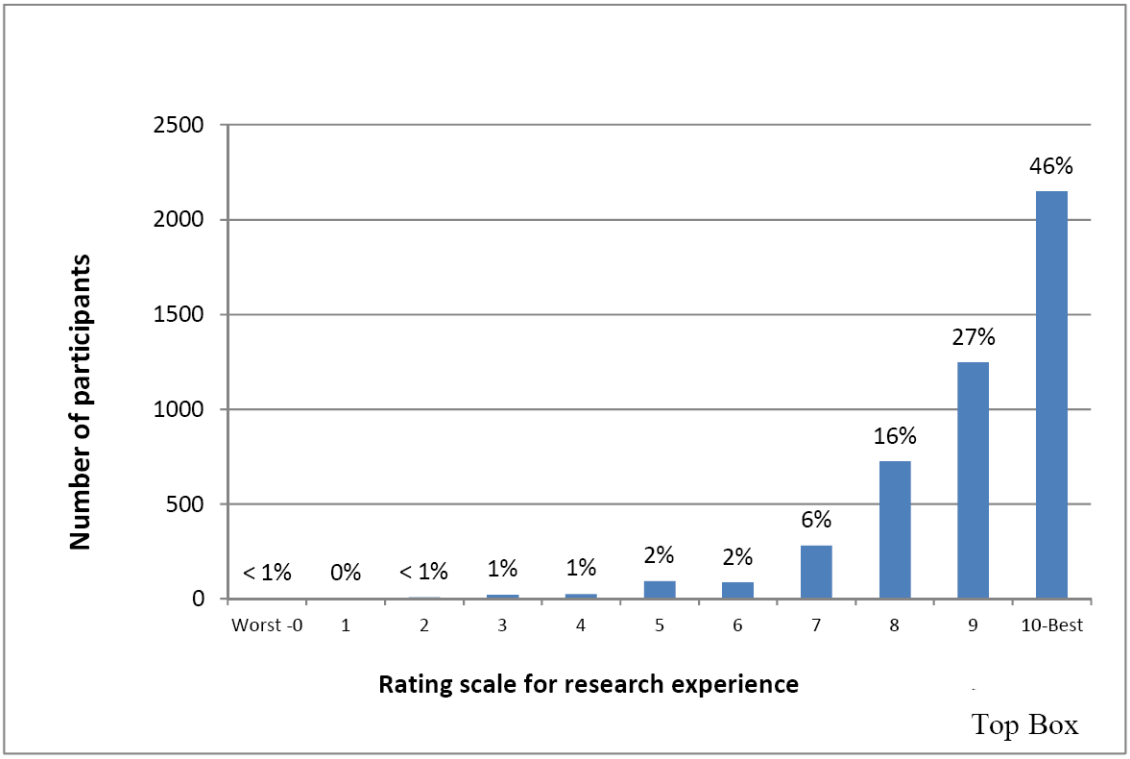


Figure 1.
Participants' ratings of their overall research experience (N=4961)

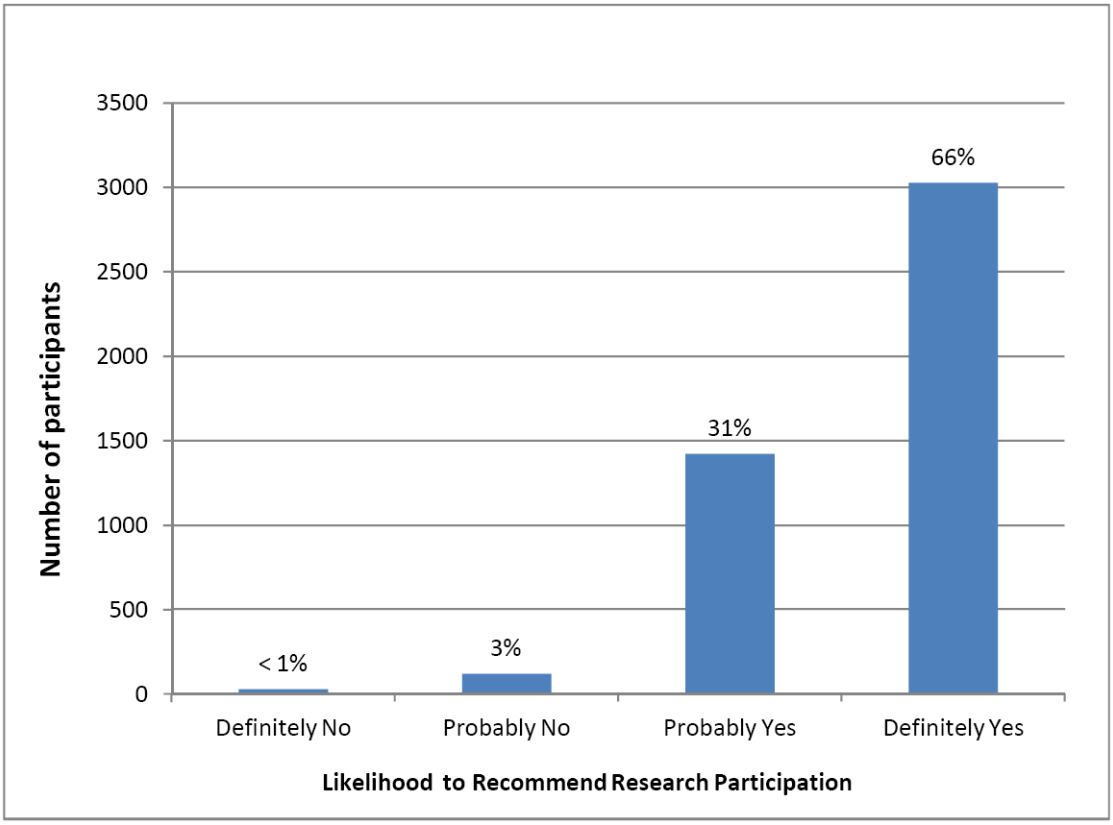
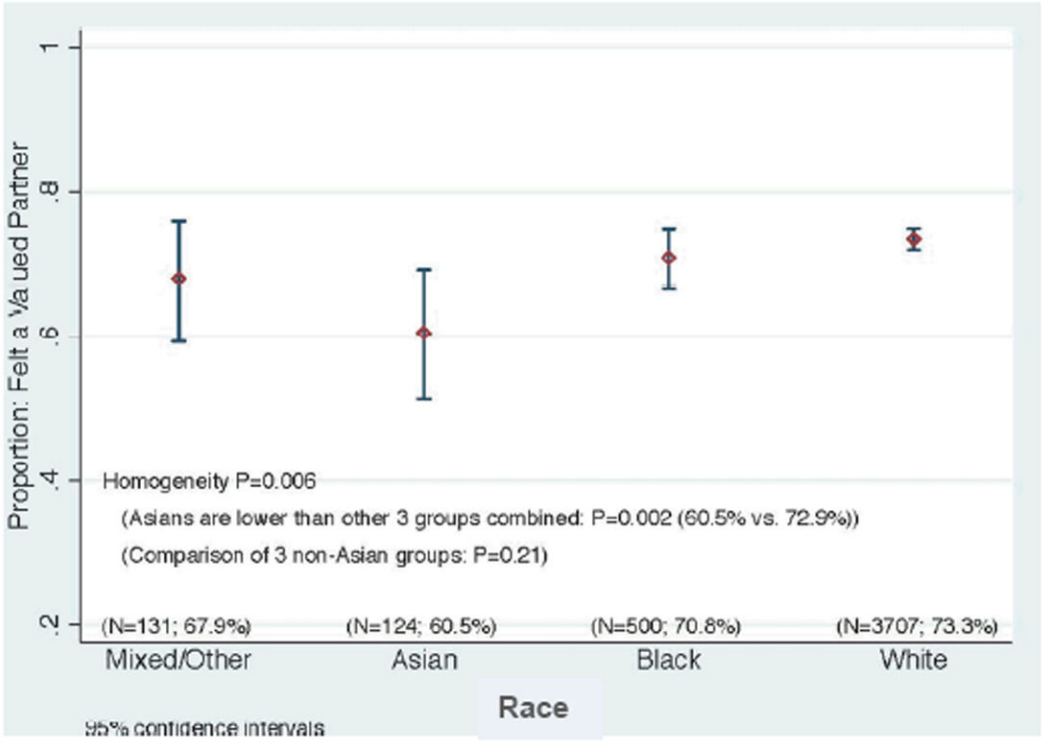
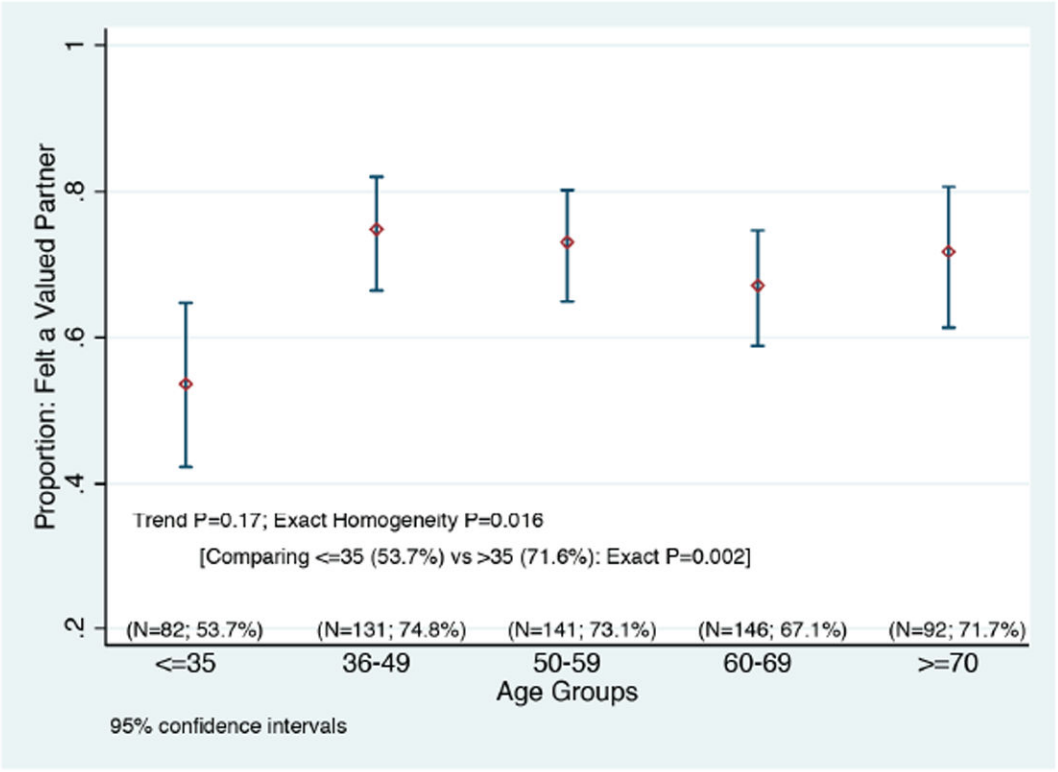


Figure 2.
Participants' ratings of their likelihood to recommend research participation to family or friends (N=4961).

(a)



(b)



(c)

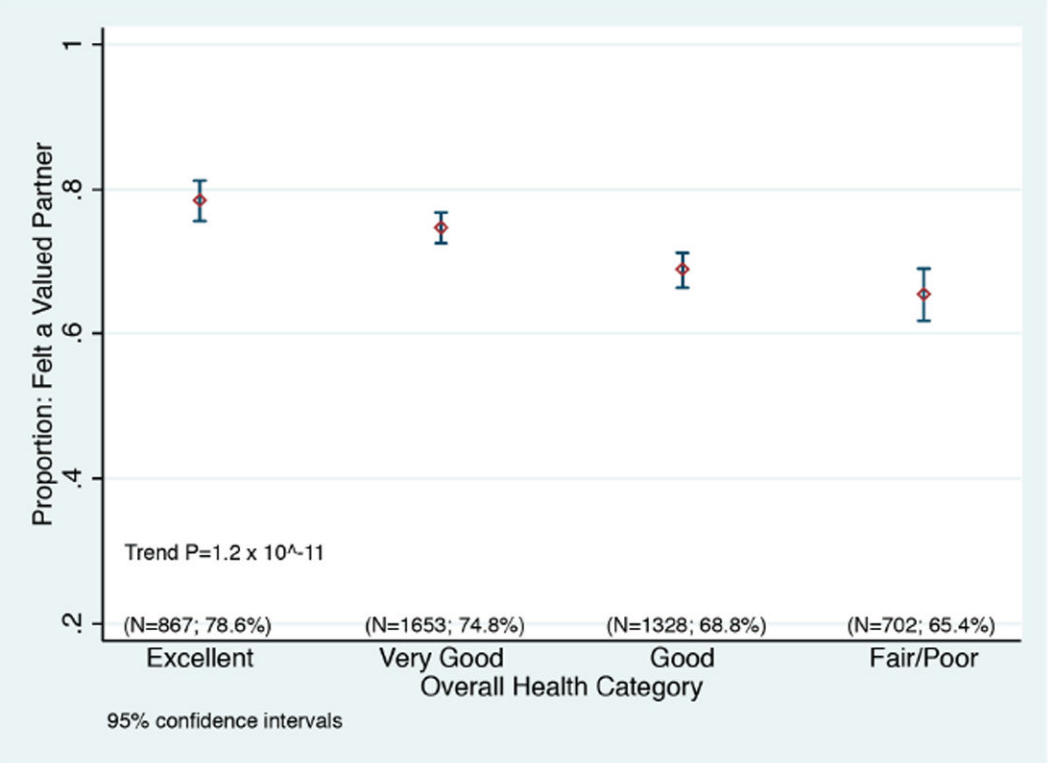


Figure 3.

Correlation between rating the overall experience with an optimal, top box score ("9" or "10"), and rating "Feeling like a valued partner in research" with a top box score ("always"), according to a) race, b) participant age, and c) participant's self-rating of his/her overall health.

Table 1

Demographics of research participants to whom the survey was sent compared to those who responded.*

Participant characteristics		Mailed sample*		Response sample for the centers providing 'mailing sample' data	
Ethnicity		**N**	**%**	**N**	**%**
	Hispanic	784	6.70%	120	6.70%
	Non-Hispanic	10,848	93.30%	1,684	93.30%
Race					
	American Indian or Alaskan Native	98	0.7%	35	1.5%
	Asian	474	3.3%	79	3.4%
	Black or African American	1,509	10.4%	210	9.2%
	Native Hawaiian/Pacific Islander	45	0.3%	13	0.6%
	White	10,909	74.8%	1,958	85.3%
	More than one race	827	5.7%		
	Unknown/missing	716	4.9%		
Gender					
	Female	1991	54.9%	553	56.8%
	Male	1507	41.5%	392	40.2%
	Missing	130	3.6%	29	3.0%

* Data are from 6 centers that provided the data on ethnicity, 8 centers that provided data on race, and 4 centers that provided data on gender.

Table 2

Relationship of "Top Box" rating of the overall research experience and respondent characteristic or responses to specific actionable questions (N=3180-4961)

Respondent characteristic or Question Response Option (percentage)	Percentage with a Particular Characteristic or Question Response Option Who Rated Their Overall Research Experience "Top Box"*	P-Value
Sample Characteristics		
Study limited to participants with certain disease		
Yes (63%)	73	Exact P=0.09
No (37%)	74	
Study involved drug or new device/procedure		
Yes (49%)	74	Exact P=0.92
No (51%)	74	
Dimension: Communication/Information/Education		
Research doctor listened carefully		
Always (86%)	79	
Usually (11%)	41	Trend P<0.0001
Sometimes/Never (3%)	26	
Nurse listened carefully		
Always (97%)	79	
Usually (1%)	35	Trend P<0.0001
Sometimes/Never (1%)	18	
Research doctor answered questions so I could understand		
Always (87%)	79	
Usually (11%)	38	Trend P<0.0001
Sometimes/Never (2%)	31	
Nurse answered questions so I could understand		
Always (91%)	78	
Usually (7%)	33	Trend P<0.0001
Sometimes/Never (1%)	21	

Respondent characteristic or Question Response Option (percentage)	Percentage with a Particular Characteristic or Question Response Option Who Rated Their Overall Research Experience "Top Box"*	P-Value
Dimension: Respect for Participant Preferences		
Principal investigator treated me with courtesy and respect		
Always (94%)	77	
Usually (5%)	23	Trend P<0.0001
Sometimes/Never (1%)	26	
Research nurse treated me with courtesy and respect		
Always (96%)	76	
Usually (4%)	19	Trend P<0.0001
Sometimes/Never (<1%)	19	
Met with principal investigator as much as I wanted to		
Always (61%)	84	
Usually (28%)	60	Trend P<0.0001
Sometimes/Never (11%)	50	
Dimension: Trust		
Had confidence and trust in the principal investigator		
Always (90%)	78	
Usually (8%)	33	Trend P<0.001
Sometimes/Never (1%)	27	
Had confidence and trust in the research nurse		
Always (90%)	78	
Usually (9%)	32	Trend P<0.0001
Sometimes/Never (2%)	20	
Dimension: Informed Consent		
Felt pressure from the research staff to join		
Never (94%)	75	P<0.001
Not Never** (6%)	46	

Respondent characteristic or Question Response Option (percentage)	Percentage with a Particular Characteristic or Question Response Option Who Rated Their Overall Research Experience "Top Box"*	P-Value
Risks included in the informed consent form		
Always (81%)	80	P<0.001
Not Always*** (19%)	49	
Study details included in the informed consent form		
Yes (80%)	80	P<0.001
No (20%)	52	
Had enough time before signing consent		
Yes (79%)	79	P<0.001
No (21%)	49	
Informed consent form understandable		
Always (78%)	79	P<0.001
Not Always* (22%)	54	
Prepared for what to expect by informed consent form		
Completely (67%)	83	P<0.001
Mostly + Somewhat + Not at all (33%)	53	

* "Top-Box" ratings were either a "9" or "10" on a 10 point scale, with 10 being best.

** "Not Never" combines responses "Sometimes" + "Usually" + "Always"

*** "Not Always" combines responses "Usually" + "Sometimes" + "Never"

Table 3

Final multiple regression model with “overall research participant experience” as the outcome

Items included in model*	R^2	Adjusted R^2 for each additional question in the model**
• Treated with courtesy and respect by the investigator or research doctor	0.816	0.809
• Prepared for what happened by information and discussions provided before participation	0.896	0.888
• Research doctor or investigator listened carefully	0.939	0.932
• Prepared for what to expect by informed consent documents	0.950	0.942
• Knew how to reach research team	0.961	0.953
• Able to reach member of research team when needed	0.968	0.959

* Item phrases summarize the content of the question and not its exact wording in the questionnaire.

** Adjusted R^2 serves as an indicator of the ability of a subset of items in the questionnaire to explain overall research participant experiences (Adjusted R^2 – 0.959, F-4.44, $p<0.046$).

Table 4

Ranked weighted averages of participants' ratings of the factors influencing their decisions to join or to stay in a research study (N= 4000-4300)

Factors Influencing Decision	Relative importance in decision to join a study				Relative importance in decision to remain in a study			
	Subgroups				Subgroups			
			Study involves drug device, procedure				Study involves drug device, procedure	
	Healthy Volunteer	Disease Affected volunteer	No	Yes	Healthy Volunteer	Disease-affected volunteer	No	Yes
To help others	1	1	1	1	1	2	1	1
Concern about the topic	2	2	2	2	2	3	2	2
Because of center's reputation	3	6	4	5	4	7	4	7
To obtain education/learning	4	5	3	6	5	5	3	6
To find out more about my disease	7	3	5	4	8	1	6	4
To gain access to new treatment	8	4	6	3	10	6	8	5
Because no other options available	11	7	11	7	13	10	12	10
To obtain free healthcare	9	10	10	9	12	12	13	12
Because of prior positive experience	5	8	7	8	7	11	9	11
To earn money/payment	6	12	8	12	9	15	11	15
Because of family influence	10	11	9	11	14	14	14	14
Because of caregiver encouragement	12	9	12	10	15	13	15	13
Because of relationship with the team	-	-	-	-	11	9	10	9
Because of improved health	-	-	-	-	6	4	7	3
Because of feeling valued	-	-	-	-	3	8	5	8

Table 5

Subgroup analyses for trust and confidence in the research team

Race/Ethnic Group (n=4407)	**Percentage with "top-box" Overall Experience rating responding "Always" to having trust/confidence in both investigator and nurse***	
White (n=3503)	88	p<0.0001
Asian (n=120)	79	p=0.88 across Non-White groups
African-American (n=465)	80	
More than one race (n=111)	78	
Hispanic (n=208)	82	
All respondents	86	

* Responses were dichotomized into 'always' had trust and confidence in the research team, or 'not always'.

"Top-Box" responses rates among non-white groups were not significantly different from each other (p – 0.88, Fisher's exact test), but were lower as a group than the "Top-Box" response rate of whites (p<0.0001).