



Published in final edited form as:

Pediatrics. 2010 June ; 125(6): e1475–e1482. doi:10.1542/peds.2009-1796.

THE EFFECT OF DIFFERENT RISK/BENEFIT TRADE-OFFS ON PARENTS' UNDERSTANDING OF A PEDIATRIC RESEARCH STUDY

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Abstract

Objective—Informed decision-making requires that parents and research subjects understand the risks and benefits of a study, yet research suggests that comprehension of these elements is often poor. This study was designed to examine the effect of factors including manipulation of risk/benefit tradeoffs, numeracy, and socio-demographics on parents' understanding of risks and benefits.

Methods—4,685 parents completed an Internet survey in which they were randomized to receive information about the risks and benefits of a hypothetical pain treatment study presented in one of four different scenarios. Parents' gist (essential) and verbatim (exact) understanding and their perceptions of the risks and benefits, were compared across scenarios. The effects of parental socio-demographics and numeracy were also examined.

Results—Participants randomized to consider a research study offering the possibility of improved outcomes had higher gist and verbatim understanding of the information than participants considering studies that only offered reductions in the risk of side effects. Furthermore, these parents perceived the risks of the study to be significantly lower compared with the scenarios that offered the same risks but less benefit. Caucasian race, college education, and higher numeracy were all associated significantly with improved gist and verbatim understanding.

Conclusions—Research studies which offer only improved outcomes to participants may be evaluated more thoroughly than those that only offer reduced risks, and individual characteristics significantly moderate parents' ability to comprehend risk/benefit information. These results are important toward developing strategies to improve the ways in which risks and benefits are communicated to parents and research subjects.

Keywords

Risk/benefit trade-offs; pediatric research; Decision-making; numeracy

INTRODUCTION

Comprehension of the risks and benefits of research is central to the informed consent process yet, several studies have shown that the interpretation and understanding of risks and benefits is often incomplete.¹⁻³ Not surprisingly, many research participants are ill-prepared for the complexity of the information provided. Indeed, Peters et al. note that a “hierarchy of skills” is required for informed decision-making including the ability to understand the information, make calculations, weigh factors, and make inferences and trade-off decisions.⁴ Of note too, is the fact that parents may weigh decisions for their children differently than they would for themselves.⁵⁻⁷

Critical to the process of understanding research information is the manner by which it is presented. Recent studies have shown that risks and benefits are better understood when presented in graphical format rather than text and tables,^{8, 9} as incremental change rather than relative or absolute values¹⁰ and, as percentages rather than frequencies (e.g., 15 out of 100).¹¹ Despite this, there is much to learn regarding the optimal methods of presenting risks and benefits to research participants and, in particular, parents of child subjects.

Of note, little is known about how the characteristics of a specific treatment or intervention (in psychological terms; the “option set”) affect research subjects’ willingness to participate. For example, many clinical studies involve comparing a standard treatment to a newer alternative. Yet, there are good theoretical reasons to believe that subjects may not view all such studies alike. In some studies, the new treatment alternative is believed to offer increased benefits to the subject (i.e., a “gain”). In other studies, however, the new option is being considered because it carries reduced risk. Psychologically, such options are often seen not as a “gain” but instead as simply a reduced potential for “loss.” Indeed, there are plenty of data to show that people often treat things they perceive as losses differently from those they perceive as gains.¹²⁻¹⁶

This study was designed to explore the effect of different types of risk/benefit trade-offs on parents’ understanding of a trial of an investigational drug for postoperative pain in children. To do so, we created 4 distinct scenarios, 3 of which included various risk/benefit trade-offs and a fourth in which all the attributes were improved (no trade-off). This latter scenario provided a “control” condition to determine parental understanding of a clinical trial that only offered improved outcomes. We also explored how individual differences in numeracy and sociodemographics affected parents’ knowledge, attitudes, and choices.

METHODS

Population

This internet-survey study was deemed exempt by the University of Michigan's Institutional Review Board. Participants were drawn from a panel of individuals supplied by Survey Sampling International (SSI, Fairfield CT) who provided a stratified random sample of demographically diverse participants. Eligible participants included parents aged 25-55 years who had at least one child under the age of 18 years. The process by which SSI contacted and randomized participants has been reported in detail elsewhere.^{8, 9}

Procedures

Participants received information about one hypothetical clinical study comparing two drugs (A and B) for the treatment of postoperative pain in children. A more detailed description of the survey is described elsewhere⁹ but, in summary, Drug A represented the standard treatment and drug B an investigational new drug yet to be tested in children. The risks and benefits of the two drugs were presented in absolute terms e.g., “60 out of 100 (60%) of children who take

drug A will experience good pain relief after surgery.” Comparison of the risks and benefits between the two drugs was expressed as the incremental change e.g., “Compared with children who take drug A, 2 fewer children out of 100 (2%) who take drug B will experience slowed breathing.” Our choice of absolute and incremental descriptors of risks and benefits was based on research showing that use of incremental risk formats increases understanding by focusing attention on how the intervention changes personal risk.^{10, 17, 18}

a) Risk / Benefit Trade-offs—Parents were randomized (computer-generated) to receive information about the study in one of the 4 scenarios that varied in terms of the incremental risk/benefit differences between the two drugs. The risks and benefit of drug A were identical across all scenarios, while those of drug B were varied to provide different incremental changes to the benefit (pain relief), a minor but common risk (itching), and a serious but rare risk (slowed breathing) [Table 1]. In all scenarios, drug B reduced the risk of both side effects. However, in one scenario labeled here as “No Trade-off”, drug B also increased the likelihood of pain relief and thus an improvement in all dimensions. The remaining 3 scenarios (labeled “Risk 1,” “Risk 2,” and “Risk 3”), provided different risk benefit trade-offs wherein drug B offered a reduced likelihood of pain relief and varying degrees of risk reductions.

b) Individual Characteristics—Several individual characteristics were measured to examine their effects on parents’ understanding:

- i. Numeracy (quantitative literacy) was measured using the Subjective Numeracy Scale which measures numerical adeptness.^{19, 20} Numeracy was presented as a dichotomous variable of low and high numeracy based on the median split.
- ii. Need for Cognition (NFC) refers to an individual’s tendency to engage in effortful thinking and was measured using a previously validated scale.²¹ Subjects were categorized as having low or high NFC based on the median split.
- iii. Socio-Demographic characteristics included age, gender, race/ethnicity, education, English speaking, income, number of children, and whether or not the subject or their child had participated in a prior research study.

Measures of Understanding

i) Gist knowledge—Gist knowledge is a measure of the ability to understand the essential meaning of the information presented. Four questions in the survey measured gist knowledge (see appendix). The number of correct answers was totaled to provide an overall estimate of gist (0-4). For the purposes of this study, we defined “adequate” understanding as ≥ 3 correct answers out of a possible 4. This definition was based on previous studies^{8, 9} and the premise that since 100% understanding is neither likely nor necessary for participants to be fully informed, a metric for “adequate” understanding would be more pragmatic.

ii) Verbatim knowledge—Verbatim knowledge is the ability to correctly identify the numerical risk and benefit statistics. Seven items in the survey addressed verbatim understanding (see appendix). A sensitivity analysis using different cut-off points (e.g., 5/7 vs 6/7) to define “adequate” found qualitatively similar results (see appendix), therefore for the purposes of this study, adequate verbatim understanding was defined as ≥ 5 correct answers out of 7.

Measures of Parents’ Perceptions

Parents rated how likely they would have been to enroll their child in the study had it been *real* (1-11 interval scale where 1 = “not at all likely” and 11 = “extremely likely”). Furthermore, parents were asked to score their perceptions of the amount of risk and benefit that the study

would pose to their child had they enrolled (1-11 interval scales where 11 = “extreme” benefit or risk, see appendix).

c) Statistical Analysis—Statistical analyses were performed using SPSS® statistical software (SPSS Inc., Chicago, IL). Sample size was based on previous data indicating the need for a minimum sample size of 4,800 ($\alpha = 0.05$, $\beta = 0.20$, two-sided) to detect clinically important differences between groups.⁹ Parametric data were compared using analysis of variance with post-hoc analysis using either Tukey or Dunnett's C tests depending on the equality of variances. Nonparametric data were analyzed using Mann Whitney-U, chi-square, and Fisher's Exact test, as appropriate. Data are expressed as percentages and mean \pm SD. Significance was accepted as $P < 0.016$ (Bonferroni corrected).

RESULTS

A total of 6,686 subjects accessed the Internet survey. Of these, 295 were excluded because they did not meet the parent eligibility criterion (Figure 1). Of the remaining 6,381 subjects, 1,424 were excluded because they did not complete the survey and 272 were excluded because they completed it “too quickly” (i.e., < 300 secs). Exclusion cut-off times were based on previous experience with the justification that those who appeared to “skim” through the material were unlikely to be giving it sufficient thought. There was no difference in the demographics of those who responded and those who did not. Data are therefore presented for a total of 4,685 subjects.

The demographics of the parents randomized to the various risk/benefit scenarios are described in Table 2. There were no significant differences in demographics between groups.

a) Parents' Understanding by Risk/Benefit Scenario

Parents' understanding of items related to pain relief, itching, and slowed breathing for each of the 4 scenarios is described in Table 3. Parents who received the “no trade-off” scenario, which offered increased benefit of pain relief together with a concomitant reduction in complication risks, had greater gist and verbatim understanding compared with parents who received one of the other three scenarios that only conferred risk reductions. Of note, parents randomized to the no trade-off scenario had greater understanding not just of the benefits but also of the risks of itching and slowed breathing, despite the fact that these statistics were identical to those reported in the Risk 1 scenario.

b) Parents' Perceptions of the Risks and Benefits by Scenario

Parents who received the no trade-off scenario correctly perceived the potential benefits to the child as being significantly greater than those receiving either of Risk scenarios 1, 2, or 3 (6.8 ± 2.5 vs 6.1 ± 2.5 , 6.1 ± 2.5 , 5.9 ± 2.5 , respectively, 1-11 scale, $P < 0.01$). Furthermore, despite the fact that the no trade-off scenario and the Risk 1 and 3 scenarios offered essentially the same risk reductions, parents who received the no trade-off scenario viewed them differently, perceiving the risks to be significantly lower (5.6 ± 2.5 vs 6.0 ± 2.4 and 6.1 ± 2.4 , respectively, $P < 0.01$). Parents who received the no trade-off scenario also reported that they would be more likely to enroll their child in the study had it been real compared to those receiving the other scenarios (6.7 ± 2.9 vs 5.9 ± 2.9 , 6.3 ± 2.9 , 5.9 ± 2.9 , respectively, $P < 0.01$).

c) Numeracy and NFC

Parents with higher numeracy had greater gist and verbatim understanding of the risks and benefits of the research (Table 4). Additionally, for each scenario, parents with higher numeracy perceived the risks to be less and the benefits to be higher than those with low numeracy (5.6 ± 2.5 vs 6.1 ± 2.4 , $P < 0.001$ and 6.4 ± 2.6 vs 6.0 ± 2.5 , $P < 0.001$, respectively).

Parents with higher numeracy were also more likely to report that they would have enrolled their child in the study had it been real (6.5 ± 3.0 vs 5.9 ± 2.9 , $P < 0.001$, respectively). Higher parental NFC was associated with significantly improved verbatim understanding but had no apparent effect on gist understanding.

d) Socio-demographic Variables

Table 5 compares parents' understanding by socio-demographic variables. Results showed that gist and verbatim understanding were greater among subjects who were Caucasian and who had higher education. Hispanic participants also demonstrated significantly greater verbatim understanding than African Americans. Across all scenarios, Caucasian parents perceived both the risks and benefits to be lower compared with parents of other race/ethnicities (5.7 ± 2.4 vs 6.1 ± 2.5 , $P < 0.001$ and 6.1 ± 2.5 vs 6.5 ± 2.6 , $P < 0.001$, respectively). Males had similar gist understanding compared with females but significantly better verbatim understanding. Subjects whose first language was English had significantly greater gist understanding than those whose primary language was other than English.

DISCUSSION

This study examined parents' understanding of the risks and benefits of a hypothetical clinical drug trial, posed in various risk/benefit trade-off scenarios. Results suggest that the "No trade-off" scenario, the only scenario that included both increased benefit and reduced risks, appeared to evoke a higher level of scrutiny among participants than did any of the three scenarios which only involved reductions in the risk of complications.

Waters et al. suggest that medical tradeoff decisions require patients to consider at least 4 probabilities related to the risks and benefits of accepting or rejecting a treatment.¹¹ Our illustrative study scenarios were even more complex, reflecting the reality that most clinical interventions have more than 1 benefit and/or 1 risk. In our hypothetical study, parents were required to consider the relative likelihoods of the primary drug benefit (pain relief) and two attendant side-effects (itching and slowed breathing) between two drugs. Faced with this complex interpretative task, only a quarter of the participants had adequate understanding of the benefits (pain relief) of the study. Yet, participants who viewed the no trade-off scenario showing increased pain relief were not only more knowledgeable about benefits (as one might expect), but were also more so of the magnitude of the risk reductions associated with the experimental treatment. Such knowledge gains could imply that learning that the trial intervention might increase pain relief heightened participants' attention to the details of the risk/benefit information being shown. Alternatively, it is possible that the 3 trade-off scenarios posed additional cognitive tasks that may have interfered with the participants' ability to concentrate on the required calculations.

Also, of interest was the observation that subjects randomized to the no tradeoff scenario not only accurately perceived the benefit of drug B to be greater but also perceived the risks of itching and slowed breathing to be significantly less than did participants who viewed the other scenarios that offered the same probability of risk but with less benefit. This pattern is consistent with the so-called "affect heuristic," which is the tendency to rely on the affective or emotional valence of option characteristics (perceived "goodness" or "badness") in decision making.²²⁻²⁴ Because of the affect heuristic, most people expect things which have high benefits (a "good") also to have low risks, even though benefits and risks are often positively, rather than negatively, correlated in the real world.

This affect heuristic is particularly relevant in decision making about clinical research. Because parents and patients tend to react to treatment alternatives (in research or otherwise) based on the feelings that each alternative evokes in them, certain types of research – those that evoke

feelings of being “good” – will likely engender higher levels of participation than others. While most parents would agree that reducing the side-effects of analgesia is valuable, such risk reductions do not have the emotional power of relieving more pain. The different levels of knowledge, risk perceptions, and willingness to participate among parents who received the no trade-off scenario versus the other conditions probably reflect this difference in affect.

The comprehension of probability information requires a certain degree of cognitive effort and, as such, may pose a challenge to many lay individuals. In our study, cognitive effort was lessened somewhat by presenting incremental risk which simultaneously provides information regarding the baseline risk and the actual change in risk, and thus does not require an arithmetic calculation.¹⁰ Indeed, Waters et al. have shown that decreasing the amount of cognitive effort results in greater accuracy in trade-off decisions.¹¹ However, although the use of incremental changes in risks and benefits may have reduced the cognitive effort required by the participants in this study, the ability to understand the information was, nevertheless, strongly associated with their numeracy. This is important given that approximately 22% of Americans demonstrate “below basic” numeracy²⁵ and this has may be a barrier to the communication and understanding of basic medical data.^{19, 20, 26-28} Low numeracy has also been shown to affect risk and benefit perception, compliance with treatment, utility elicitation, and decision-making.^{29, 30} In one study, Fagerlin et al. showed that innumerate women were more likely to overestimate their risk of breast cancer³⁰ and in another, low numeracy patients had significantly higher expectations of treatment benefit than numerate individuals.³¹ Similarly, our findings demonstrate that parents with poor numeracy have less understanding of research risks and benefits and when presented with identical risks, tended to overestimate them compared to their more numerate counterparts.

Results also showed that understanding was moderated by the education level and race of the participants. Caucasian parents were shown to have significantly greater gist and verbatim understanding of the information compared with participants of different race/ethnicities. Recently, Rajakumar et al. showed that compared with white parents, African Americans had significantly greater distrust regarding their child's participation in research and perceived the risk of research to be higher.³²

Results of this study should be interpreted in the context of the potential limitations. First, this study involved an Internet survey and, as such, may have been biased towards those with the benefit of Internet access. Our use of an Internet survey was based on previous experience and the fact that this approach allowed us to conduct a randomized controlled experiment using a large diverse number of individuals quickly. Second, responses to the survey were based on a hypothetical clinical study and therefore may not represent “real life” attitudes and perceptions. Nevertheless, there is compelling evidence to show that hypothetical methodologies are integral to emotional theory construction and that behaviors based on real versus hypothetical situations are highly correlated.^{33, 34}

This study identified several factors that moderate parents' understanding and perceived salience of the risks and benefits of a clinical study. In particular, it draws clinicians' and researchers' attention to the reality that people do not evaluate whether or not to participate in research in the abstract. Specific details about the potential interventions, such as whether the study arms offer the possibility of increased benefit versus risk reduction, appear to affect not only parent attitudes but also their ability to process the study information in the first place. Identification of such factors is important in that it reminds us that medical and research information presented in a “one size fits all format” denies both the heterogeneity of clinical situations and the ability of many individuals to assimilate and fully comprehend the material. These data, therefore, inform and motivate further study to examine ways in which research information can be “tailored” to the study design and the characteristics and learning abilities

of the individual parent or research participant and thus better ensure their informed decision-making.

Sensitivity Analysis

A sensitivity analysis using different cut-points for the definition of “adequate” resulted in qualitatively similar results. For example, adequate gist measured as ≥ 2 correct answers out of 4 revealed that 79.8, 76.3, 77.5 and 73.7% of parents in the no trade-off, risk 1, risk 2, and risk 3 scenarios, respectively fulfilled this criterion compared with 65.0, 57.8, 59.8, and 56.0% using a criterion of ≥ 3 correct answers out of 4. Similarly, adequate verbatim measured as ≥ 5 correct answers out of 7 revealed that 62.3, 54.3, 50.0, and 49.0% of parents in the no trade-off, risk 1, risk 2 and risk 3 scenarios, respectively fulfilled this criterion compared with 48.7, 41.5, 36.0, and 34.4% using a criterion of ≥ 6 correct answers out of 7.

Acknowledgments

The authors wish to thank Bob Burbach and Aaron Pearlman for their help with the design and development of the Internet survey. We also thank Julie Parow, Rosemarie Pitsch, and Nicole Exe for their help in testing the survey instrument. Finally, we thank Dr. Peter Ubel for his insightful comments.

Supported in part by a grant to Dr. Tait from The National Institutes of Health, NICHD (R01 HD053594). Dr. Zikmund-Fisher is supported by a career development award from the American Cancer Society (MRSG-06-130-01-CPPB), and Dr. Fagerlin was supported by an MREP early career award from the U. S. Department of Veteran's Affairs. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs. The authors have no financial or commercial interests pertaining to this study. This study has not been registered as a clinical trial.

APPENDIX

GIST QUESTIONS:

Based on all the information that the researcher gave you about Drug A and Drug B, please answer the following questions:

Who is less likely to experience pain after surgery: A child who was randomized to receive Drug A, or a child who was randomized to receive Drug B?

- Child who received Drug A
- Child who received Drug B
- They are equally likely

Who is more likely to experience itching: A child who received Drug A or a child who received Drug B?

- Child who received Drug A
- Child who received Drug B
- They are equally likely

Who is more likely to experience slowed breathing: A child who received Drug A or a child who received Drug B?

- Child who received Drug A
- Child who received Drug B

- They are equally likely

If a child was randomized to Drug B, which of the following is most likely?

- Experiencing pain after surgery
- Experiencing itching
- Experiencing slowed breathing

VERBATIM QUESTIONS

Based on the information given to you by the researcher, please answer the following questions:

If 100 children took Drug B, approximately how many would experience pain after surgery?

_____ children

If 100 children took Drug B, approximately how many would experience itching?

_____ children

If 100 children took Drug B, approximately how many would experience slowed breathing?

_____ children

Compared to children who take Drug A, approximately how many **fewer (more)** children would experience pain relief after surgery if they took Drug B?

_____ children

Compared to children who took Drug A, approximately how many fewer children would experience itching if they took Drug B?

_____ children

Compared to children who took Drug A, approximately how many **more (fewer)** children would remain pain free if they took Drug B?

_____ children

Compared to children who took Drug A, approximately how many fewer children would experience slowed breathing if they took Drug B?

_____ children

RISK/BENEFIT QUESTIONS

Based on the information that the researcher gave you with respect to the risks and benefits of the study:

If this was a *real* study, how likely would you be to allow your child to participate?

Not at all
likely

Extremely
likely

In making a decision about your child's participation in the study, how do the risks and benefits of the study compare?

The risks outweigh the benefits

The benefits outweigh the risks

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Figure 1.
Flow diagram of participant progress through the phases of the study

Table 1

Risk/Benefit Trade-offs in the Four Hypothetical Scenarios

Scenario	Risk/Benefit	Drug A (%)	Drug B (%)	Incremental change (%)
<i>No trade-off</i>	Pain relief	60	75	+15
	Itching	25	20	-5
	Slowed breathing	7	5	-2
<i>Risk 1</i>	Pain relief	60	55	-5
	Itching	25	20	-5
	Slowed breathing	7	5	-2
<i>Risk 2</i>	Pain relief	60	55	-5
	Itching	25	12	-13
	Slowed breathing	7	5	-2
<i>Risk 3</i>	Pain relief	60	55	-5
	Itching	25	20	-5
	Slowed breathing	7	3	-4

Table 2

Demographics by Risk/Benefit Trade-off Scenario

	No Trade-off (n = 1171)	Risk 1 (n = 1184)	Risk 2 (n = 1196)	Risk 3 (n = 1134)
Age (yrs, mean \pm SD)	38.9 \pm 7.9	39.3 \pm 8.1	38.9 \pm 7.9	39.3 \pm 7.7
Gender (F/M)%	56/44	57/43	59/41	58/41
Race/ethnicity (%):				
Caucasian	67.0	67.4	67.6	70.0
African American	12.2	13.3	11.8	10.7
Hispanic	13.1	12.0	13.0	12.7
Asian	4.9	3.7	4.2	3.5
Other	2.8	3.6	3.4	3.1
Level of Education (%):				
\leq High school graduate	18.9	18.0	19.3	19.7
Some college/trade school	32.3	31.6	31.7	32.3
Associate/Bachelor's	37.9	39.3	37.3	36.6
Degree	10.9	11.1	11.7	11.4
Graduate Degree				
Income Level (%):				
< \$10,000	2.2	2.1	2.0	1.9
\$10,000-49,999	35.8	34.4	35.8	34.9
\$50,000-89,999	40.2	39.1	39.3	41.7
\geq \$90,000	21.8	24.4	22.9	21.5
English as first language	94.0	95.8	94.5	94.6
Numeracy:				
High/Low (%)	55/45	53/47	52/48	49/51
NFC:				
High/Low (%)	58/42	57/42	59/41	57/43

Data are expressed as Mean \pm SD and %

Low numeracy = 0-35, High numeracy = 36-48 on the Subjective Numeracy Scale¹⁵

NFC = Need for Cognition: Low NFC = 0-21, High NFC = \geq 22

Table 3

Parents' Gist and Verbatim Understanding by Trade-off Scenario

Scenario	Gist Understanding (%)			Verbatim Understanding (%)		
	Pain Relief	Itching	Slowed Breathing	Pain Relief	Itching	Slowed Breathing
<i>No trade-off</i>	70.4	78.2	76.6	54.7	71.2	72.9
<i>Risk 1</i>	57.3*	70.9*	70.5*	29.5*	69.2	69.8
<i>Risk 2</i>	57.5*	76.7 [†]	73.3	27.4*	63.7* [†]	69.1
<i>Risk 3</i>	57.5*	70.2* [‡]	69.6*	27.5*	67.5	63.1* ^{‡‡}

* P<0.001 vs No trade-off

[†] P<0.01 vs Risk 1[‡] P<0.01 vs Risk 2

Table 4

Adequate Gist and Verbatim Understanding by Numeracy and Need for Cognition (%)

	Adequate Gist Understanding [‡]	OR (95% CI)	Adequate Verbatim Understanding [§]	OR (95% CI)
<i>Numeracy:</i>				
Low (R)	56.8	1.75 (1.55, 1.98)	41.4	2.75 (2.84, 3.21)
High	69.7*		66.7*	
<i>NFC:</i>				
Low (R)	61.8	1.12 (0.99, 1.27)	50.6	1.29 (1.15, 1.45)
High	64.5		56.9*	

(R) = Reference group. OR = Odds Ratio, CI = Confidence Interval

Low numeracy = 0-35, High numeracy = 36-48 on the Subjective Numeracy Scale¹⁵Low NFC (Need for Cognition) = 0-21, High NFC = ≥ 22

* P < 0.001 vs Reference group

[‡] Adequate gist knowledge = ≥ 3 correct answers out of 4[§] Adequate verbatim knowledge = ≥ 5 correct answers out of 7

Table 5

Adequate Gist and Verbatim Understanding by Socio-Demographics (%)

	Adequate Gist Understanding[‡]	OR (95% CI)	Adequate Verbatim Understanding[§]	OR (95% CI)
<i>Age (yrs)</i>				
25-34 (R)	64.3		53.1	
35-44	63.6	0.97 (0.84, 1.12)	54.5	1.06 (0.92, 1.21)
45-55	61.6	0.89 (0.76, 1.05)	54.3	1.05 (0.88, 1.22)
<i>Gender:</i>				
Male (R)	62.8		58.8	
Female	63.4	1.01 (0.97, 1.06)	50.5*	0.86 (0.81, 0.90)
<i>Race/ethnicity:</i>				
Caucasian (R)	67.3		60.1	
African American	52.4*	0.54 (0.45, 0.64)	34.2*	0.35 (0.29, 0.42)
Hispanic	56.5*	0.63 (0.53, 0.76)	41.0* [‡]	0.46 (0.39, 0.55)
<i>Education:</i>				
≤ High school (R)	54.7		40.7	
Some college	62.7*	1.39 (1.18, 1.64)	51.6*	1.49 (1.26, 1.77)
≥ Bachelor's Degree	68.1* [‡]	1.77 (1.49, 2.09)	63.4* [‡]	2.42 (2.05, 2.86)
<i>Prior Research subject</i>				
Yes (R)	65.9		58.0	
No	63.0	0.96 (0.89, 1.03)	53.6	0.92 (0.85, 1.01)
<i>English Language</i>				
Yes (R)	63.6		54.1	
No	56.5*	0.89 (0.79, 0.99)	49.0	0.90 (0.79, 1.03)

(R) = Reference group. OR = Odds Ratio, CI = Confidence Interval

* P < 0.05 vs Reference group, † P < 0.01 vs African American

‡ P < 0.01 vs some college/trade school

‡ Adequate gist knowledge = ≥ 3 correct answers out of 4

§ Adequate verbatim knowledge = ≥ 5 correct answers out of 7