



Basic Scientists’ Views about Potential Engagement Goals: Project Report

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v. 1/11/2024

This material is based upon work supported by the Kavli Foundation and the United State Department of Agriculture (M1CL02758). Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funders.

Cite as:

Besley, J.C. & Dudo, A. (2023). Basic Scientists’ Views about Potential Engagement Goals: Project Report <https://doi.org/10.17605/OSF.IO/R4AQ5>

Thank you to Samantha Hautea and River Terrell for their help on this project.



Photo by MSU Facility for Rare Isotope Beams (FRIB)

Key Findings

The primary project goal was to better understand scientists' audience-specific **behavioral goals** for their public engagement activities, including whether these goals and associated audiences varied by (1) degree of focus on basic science rather applied science, (2) field, and (3) demographics. Sampling centered on fields with a substantial focus on basic science.

Section 1: Priority Audience by Field (pp. 5-9)

- Scientists' most highly-rated audiences were internal leadership, youth, and policymakers. Values-based groups were rated lowest.

Section 2: Goals by Field (pp. 10-15)

- Scientists' most highly-rated goals were increasing the likelihood that people *consider* scientific evidence when making decisions and ensuring robust funding for science.

Section 3: Goals by Demographics (pp. 16-19)

- Demographics (age, gender, race) were not substantially associated with perceived goal importance.

Section 4: Goals by Focus on Basic Science (pp. 20-28)

- Scientists' degree of focus on basic science was not substantially associated with perceived goal importance.

Section 5: Where Goals Come From (pp. 29-30):

- In general, scientists say they choose goals based on their own interests rather than based on their organizations' goals.

Section 6: Views about Specific Goals (pp. 31-52)

- Scientists tended to agree (although not strongly) that they had previously considered most of the goals about which they were asked.
- Scientists tended to strongly agree that most goals about which they were asked were ethical and likely to benefit society.
- Scientists tended to agree that pursuing the various goals would be satisfying, but were slightly less positive about the degree to which they thought pursuing the goals would be enjoyable.
- Scientists were neutral on whether pursuing the various goals would benefit their career, and whether they believed they were expected by their colleagues to pursue any of the goals.
- Scientists tended to agree (although not strongly) that they had the personal skills needed to pursue all the potential goals.
- Scientists were often negative or neutral about whether they believed there were adequate resources to pursue the various goals.

Section 7: Communication Objectives by Field (pp. 53-54)

- Scientists were open to pursuing a wide range of cognitive or affective objectives in order to achieve their priority goals.

Section 8: Conclusions (pp. 55-56)

- Anyone helping scientists communicate should recognize that they have a range of potential audiences and behavioral goals; they may need help identifying priorities.

Project background

The primary project goal was to better understand scientists' audience-specific **behavioral goals** for their public engagement activities, including whether these goals and associated audiences varied by (1) degree of focus on basic science, (2) field, and (3) demographics.

- Goals were defined as behavior-like outcomes scientists want to occur as result of the time and money they put into communicating.
 - For example, some scientists want others to **do a behavior**. This might mean buying an electric car, getting a vaccination, or adopting a regulation.
- One type of behavior is when scientists want someone to **trust** them. Trust is often defined in the academic literature as the behavior of making oneself vulnerable to someone else (e.g., taking their advice).
- Ethically, an important potential engagement goal for scientists is to intentionally seek out information to help them decide if they should **change their own behavior**.
 - For example, scientists might consult with a group so that the scientists can ensure that they (the scientists) are making appropriate research choices and/or to see if they should collaborate with the group.
- The survey also included questions about scientists' potential communication objectives. These include potential direct outcomes of communication choices including changes to knowledge, various beliefs/perceptions, feelings, and frames.

Sections of the survey:

1. *Audiences* (open-ended question, followed by nine close-ended questions)
2. *Cognitive/affective engagement objectives* (open-ended question, followed by thirteen close-ended questions)*
3. *Behavioral goals* (open-ended question, followed by seven close-ended questions)
 - Initial goal question with two experimental conditions (“increase likelihood” vs. “advocate for” a behavior)
4. *Attitudes, norms, efficacy beliefs about specific goals* (seven versions of a thirteen-item question set)
 - Each respondent only responded to three question sets (randomly assigned)
5. *Goal origins* (four close-ended questions)
6. *Past engagement activity* (five close-ended questions)
7. *Attitudes, norms, efficacy beliefs about engagement participation* (twelve-question set)*
8. *Demographics*
 - Degree of focus on basic research
 - Career stage, gender identification, field, funding experience
 - Race and perceived experience of discrimination

*Shown to mutually exclusive half of respondents. Views about engagement not reported here.

The sample

The survey was sent by email during Fall 2022 (with three reminders) to listed authors of top-ranked journals in six different fields with a substantial focus on basic science (see table). For each field except nanoscience, we collected approximately 5K names and then removed duplicates.

The response rate for the survey was similar to other recent scientist surveys, although it also varied by field.

Data from the nanoscience group should be used with caution due to its smaller size.

*Excludes 361 duplicates, **Includes 200 emails sent as an earlier pretest, ***Filtered by people who also responded to other parts of survey. Reported results on subsequent pages may include additional responses.

	Astrophysics	Atmos. Sci.	Chemistry	Nanosci.	Neurosci.	Part. Physics	Total
Good Addresses	3,895	5,575	4,988	2,170	4,701	4,279	25,608
Response rate %	17%	12%	9%	7%	10%	12%	11%
Man	69%	68%	72%	69%	55%	83%	69%
Woman	22%	28%	20%	20%	40%	11%	24%
Prefer not to say	7.1%	3.4%	7.1%	8.9%	4.2%	4.8%	5.4%
Prefer to self-desc.	0.7%	0.2%	1.0%	1.1%	0.6%	1.0%	0.7%
Non-binary	1.6%	0.4%	0.0%	1.1%	0.3%	0.0%	0.6%
<i>n =</i>	<i>438</i>	<i>469</i>	<i>297</i>	<i>90</i>	<i>313</i>	<i>313</i>	<i>1,920</i>
White	68%	66%	62%	45%	68%	63%	65%
Black	1%	2%	2%	1%	1%	2%	1%
Hispanic	5%	3%	4%	1%	5%	7%	5%
Indian	5%	3%	4%	6%	4%	8%	5%
Asian	10%	13%	15%	20%	9%	9%	12%
Chinese	7%	8%	10%	16%	5%	4%	7%
<i>n =***</i>	<i>495</i>	<i>532</i>	<i>341</i>	<i>107</i>	<i>352</i>	<i>352</i>	<i>2,179</i>
Student	11%	4%	0%	3%	1%	12%	6%
Junior	31%	18%	12%	18%	24%	31%	23%
Mid-career	18%	24%	26%	25%	25%	12%	21%
Senior	33%	46%	57%	51%	46%	37%	44%
Retired/Emeritus	7%	8%	5%	3%	4%	9%	7%
<i>n =</i>	<i>441</i>	<i>467</i>	<i>298</i>	<i>89</i>	<i>313</i>	<i>311</i>	<i>1,919</i>

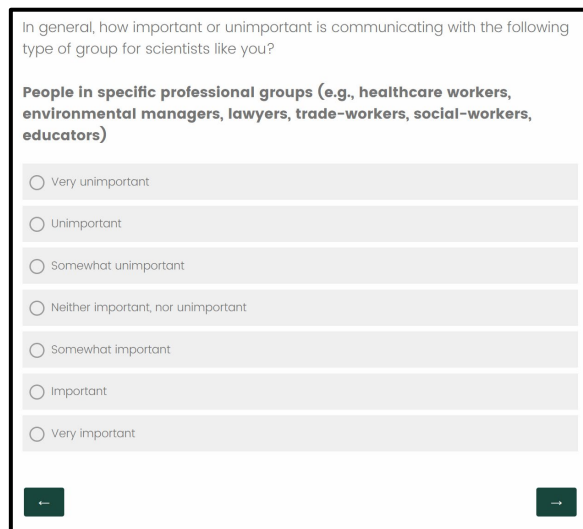
Section 1: Priority Audiences by Field

Included Audiences

Respondents were asked at the start of the survey to give a rating of how important they saw various audiences. Most of the groups were rated above the midpoint of the scale— suggesting that scientists see many potential audiences as important.

Internal leadership, youth, and policymakers were rated highest with astrophysicists being especially focused on youth audiences. The media and the ‘broader public’ were mid-rated.

Professional groups, the private sector, and values- and identity-based groups were rated as relatively less important groups. Chemists and neuroscientists—fields where there is more potential for application—tended to see professional groups and the private sector as relatively more importance compared to other groups, but the overall order of importance was similar across groups.



In general, how important or unimportant is communicating with the following type of group for scientists like you?

People in specific professional groups (e.g., healthcare workers, environmental managers, lawyers, trade-workers, social-workers, educators)

Very unimportant

Unimportant

Somewhat unimportant

Neither important, nor unimportant

Somewhat important

Important

Very important

What the questions looked like to respondents.

Question wording for audience questions:

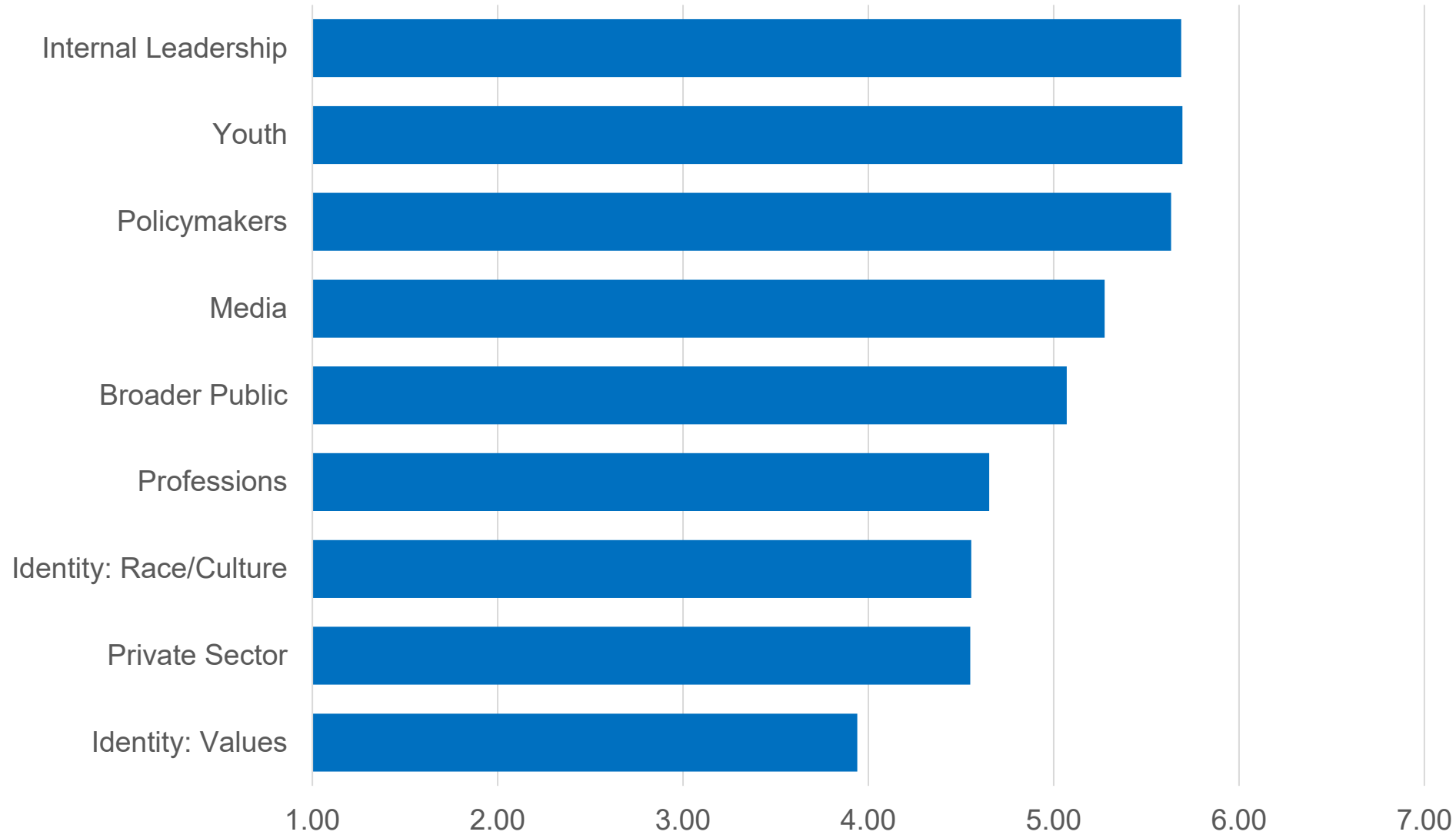
In general, how important or unimportant is communicating with the following type of group for scientists like you? (Very unimportant = 1, Very important = 7)*

1. Policymakers and others involved in public policy (e.g., politicians, government employees, lobbying/advocacy organizations)
2. For-profit businesses/people in the private sector (e.g., people who work for companies to develop, implement, and/or assess new products and services)
3. People in specific professional groups (e.g., healthcare workers, environmental managers, lawyers, trade-workers, social-workers, educators)
4. People from specific racial/cultural identity groups
5. People from specific values-focused identity groups (e.g., liberals, conservatives, evangelicals, environmentalists)
6. Individual adult society members in the broader public (e.g., museum visitors, news readers/viewers, social media users, consumers, voters)
7. Journalists and other media professionals (e.g., producers, film-makers)
8. Youth/students (e.g., school children, teens)
9. People who lead your institutions/organizations

*Presented in random order, one group per page

Basic Scientists' Priority Audiences (All Fields Combined)

(1 = Very low importance, 7 = Very high importance)



The highest priority audiences were typically internal leadership, youth, and policymakers.

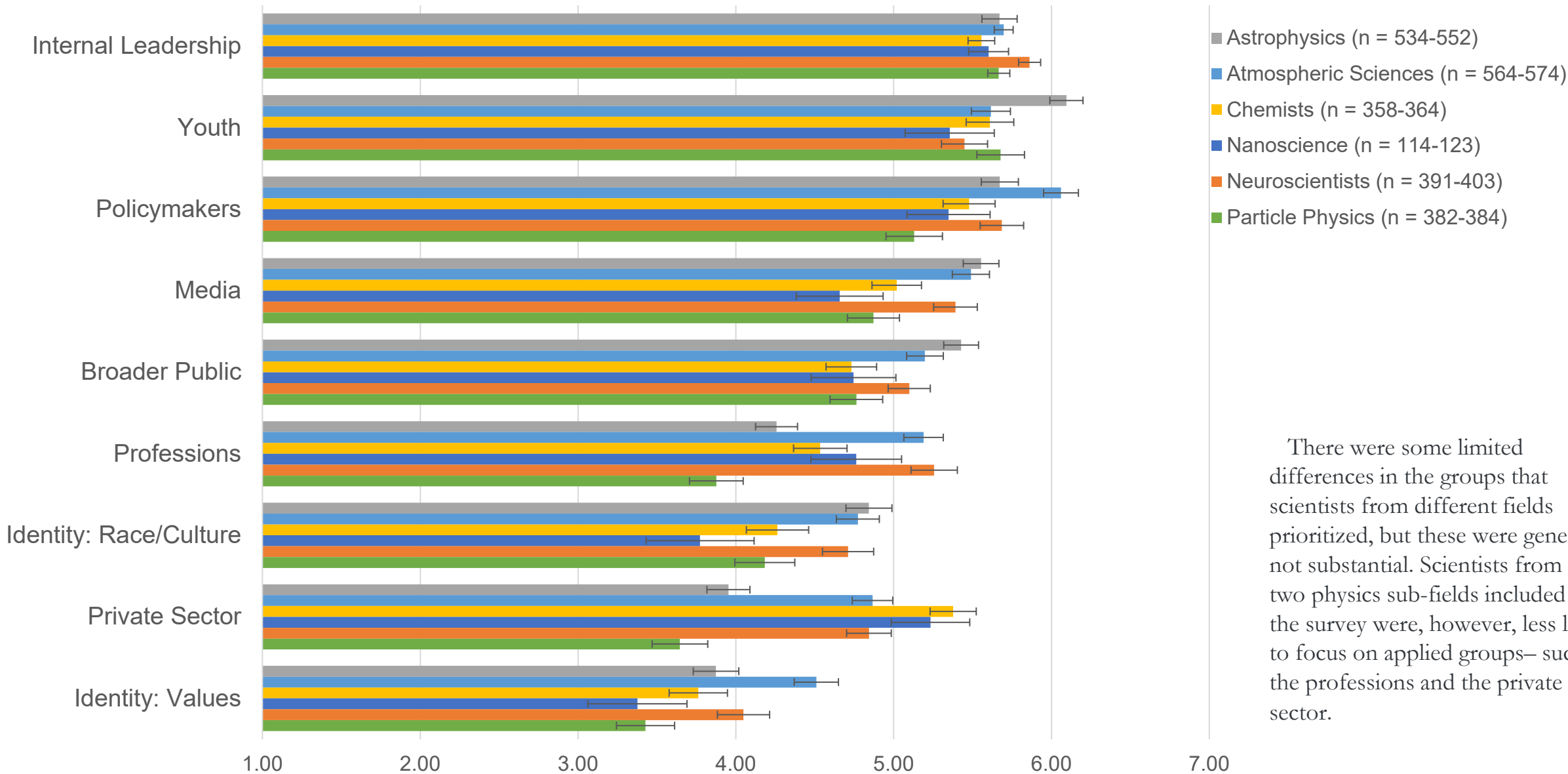
The media and the generic 'broader public' were rated as important but in the middle range of the available options.

The scientists gave groups associated with application (e.g., professions, the private sector) relatively low importance ratings, although these ratings were still above the midpoint of the available response options.

Identity-based groups, especially those focused on issues or causes, were rated as the least important group.

Priority Audiences by Field

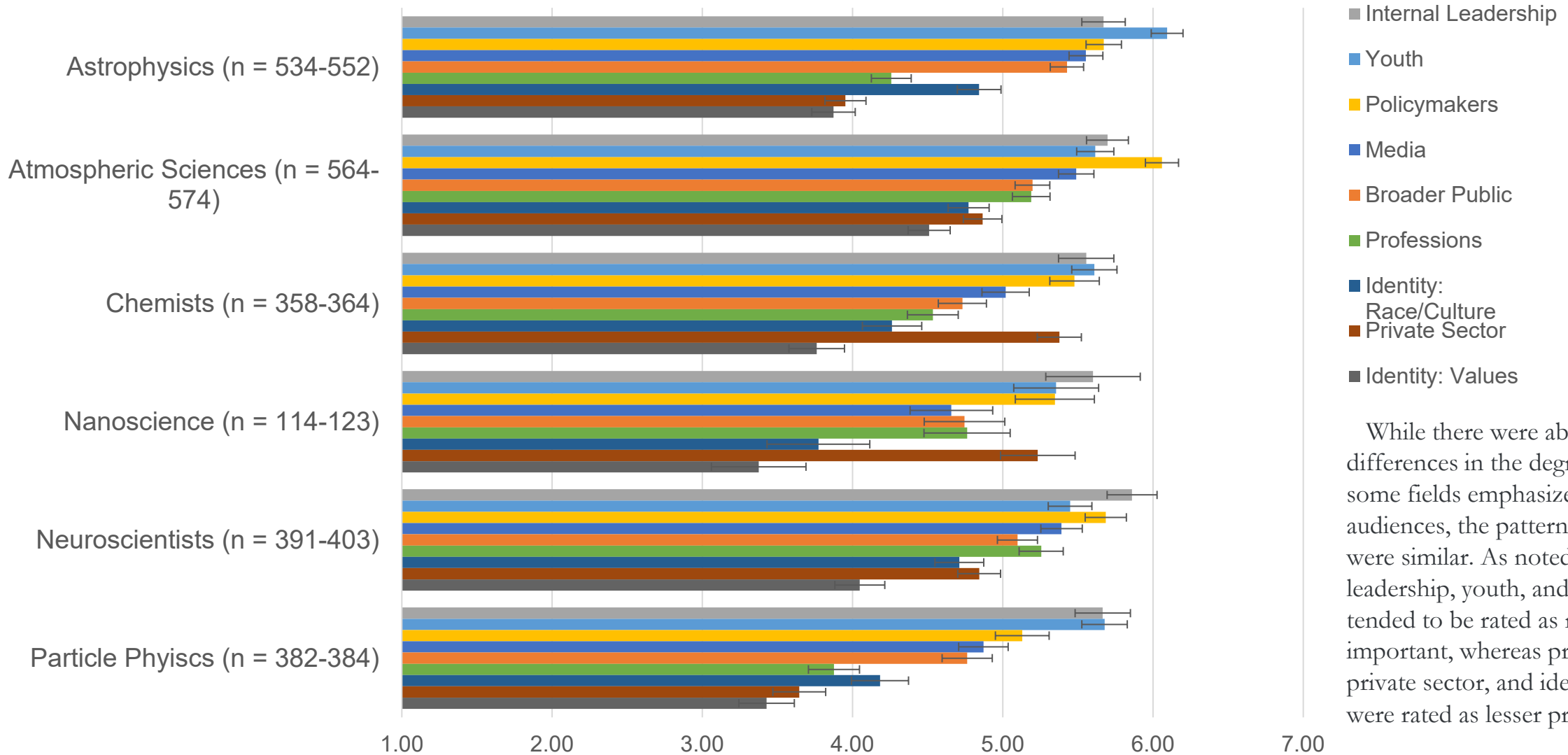
(1 = Very unimportant, 7 = Very important)



There were some limited differences in the groups that scientists from different fields prioritized, but these were generally not substantial. Scientists from the two physics sub-fields included in the survey were, however, less likely to focus on applied groups— such as the professions and the private sector.

Fields' Priority Audiences

(1 = Very unimportant, 7 = Very important)



While there were absolute differences in the degree to which some fields emphasized different audiences, the pattern of the ratings were similar. As noted, internal leadership, youth, and policymakers tended to be rated as relatively important, whereas professions, the private sector, and identity groups were rated as lesser priorities.

Section: 2 Goals by Field

Behavioral Goals

Respondents were asked to give a rating of how important they saw various behavioral goals. Each goal had a brief description with examples. The scientists scored all the goals above 5.00 on a 7-point scale suggesting that most saw all the goals as potentially important.

There were few substantive differences by field or demographics (see relevant sections of the report) .

In general, when choosing to communicate with your priority audience(s), how important or unimportant should the following type of goal be for scientists like you?

Trying to increase the likelihood that people will make decisions that are consistent with the available science

This could include trying to ensure someone from a priority audience **makes** health, environmental, or social/economic decisions that increase personal and/or societal well-being. This might include policymakers deciding to regulate a risk, parents deciding to vaccinate their children, consumers deciding to make environmentally responsible purchases, etc.

Very unimportant

Unimportant

Somewhat unimportant

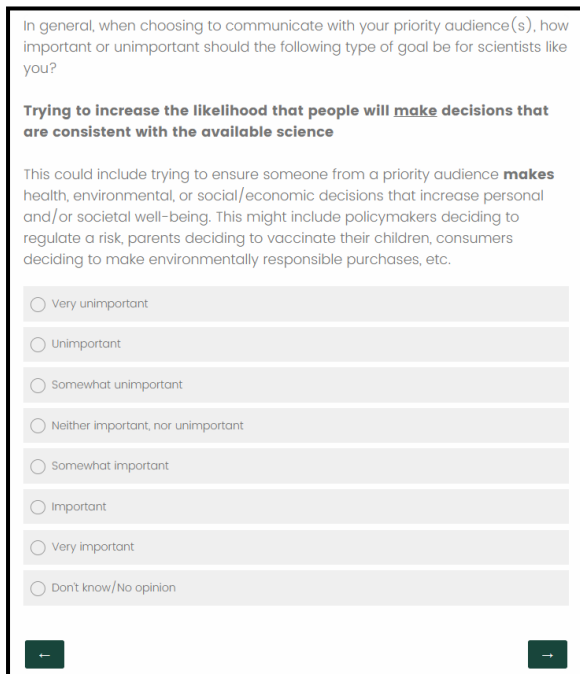
Neither important, nor unimportant

Somewhat important

Important

Very important

Don't know/No opinion



What the questions looked like to respondents.

Question wording for behavioral goals questions:

[W]hen choosing to communicate with your priority audience(s), how important or unimportant should the following type of goal be for scientists like you? (Very unimportant = 1, Very important = 7)*

- 1a. Trying to increase the likelihood that people will make decisions that are consistent with the available science*
- 1b. Advocating to increase the likelihood that people will make specific decisions that are consistent with the available science*
2. Trying to increase the likelihood that people consider scientific evidence when making decisions
3. Trying to ensure that relevant decision-makers provide robust funding for scientific research
4. Building trust in the form of strong relationships with priority audiences so that they are more likely to turn to the scientific community when faced with complex decisions
5. Ensuring that scientists like you make the best possible research decisions (e.g., public consultation on topics/methods)
6. Trying to increase the likelihood that youth from groups that are under-represented in science pursue scientific careers
7. Ensuring that the overall scientific community makes choices that move itself towards being more just, equitable, diverse, and inclusive

*Presented in random order, one group per page

**Respondents saw only of these two options as part of an embedded experiment discussed below.

Basic Scientists' Behavioral Goals

(1 = Very low importance, 7 = Very high importance)

Increase the likelihood that people consider scientific evidence (n = 2,179)

Ensure robust funding for scientific research (n = 2,195)

Build trust in the form of strong relationships with priority audiences (n = 2,174)

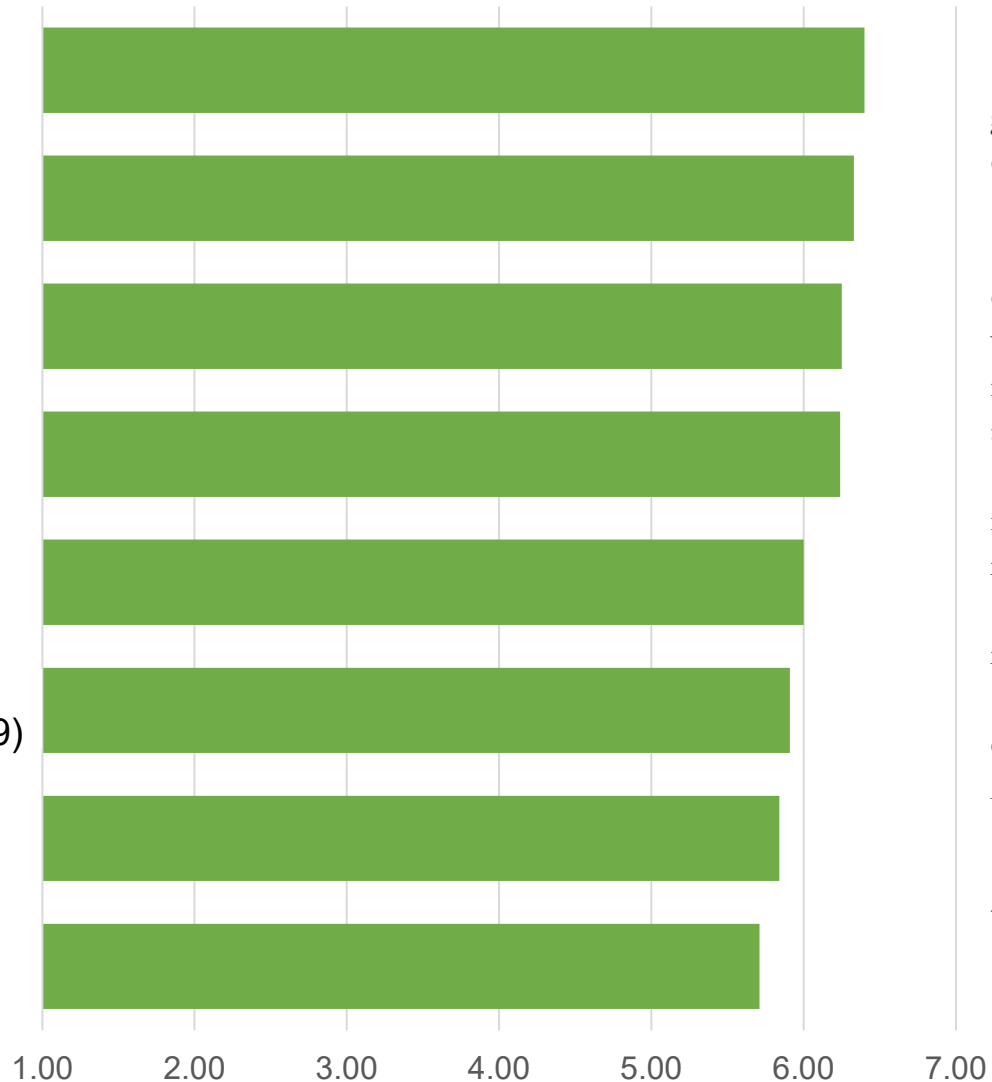
Increase the likelihood that people will make decisions (n = 2,174)*

Increase likelihood under-represented youth pursue science careers (n = 1,124)

Ensure scientific community moves towards being more just, equitable, diverse, and inclusive (n = 2,179)

Advocate to increase likelihood that people will make specific decisions (n = 1,082)*

Ensure scientists like you make the best possible research decisions (n = 2,163)



The highest priority goals involved getting people to ‘consider’ scientific evidence, fund science, and trust the scientific community.

The goals most associated with equity and inclusion had scores that were somewhat lower than the top-rated goals but still high, in an absolute sense (i.e., well-above the scale midpoint, suggesting respondents saw the goals as fairly important).

The only scientist-directed goal included in the survey—ensuring scientists make better research decisions—scored the lowest of all. Again, however, the absolute score suggests that the responding scientists still reported that they believed it was important.

Priority Goals by Field

(1 = Very unimportant, 7 = Very important)

Increase the likelihood that people consider scientific evidence

Ensure robust funding for scientific research

Build trust in the form of strong relationships with priority audiences

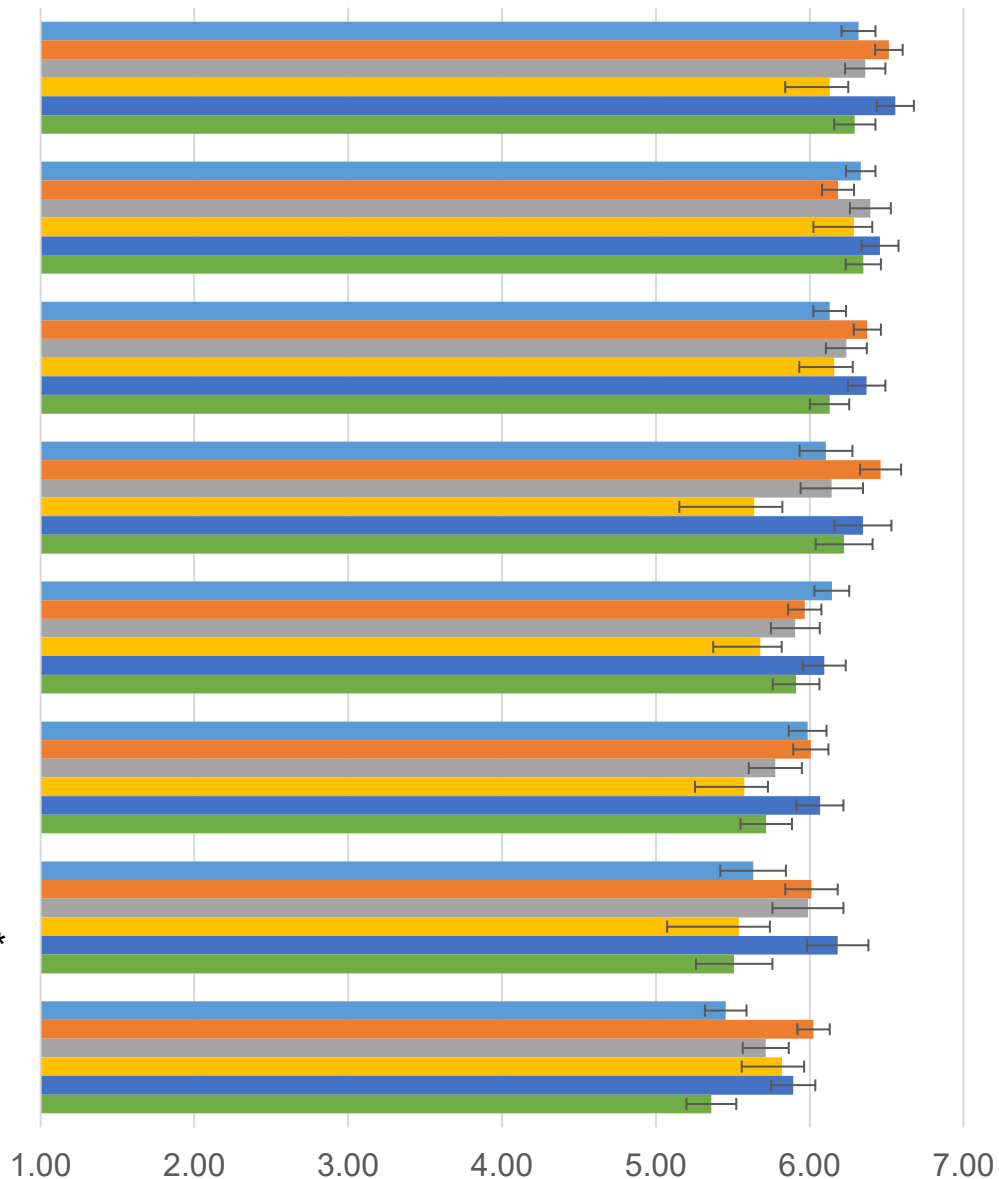
Increase the likelihood that people will make decisions*

Increase likelihood under-represented youth pursue science careers

Ensure scientific community moves towards being more just, equitable, diverse, and inclusive

Advocate to increase likelihood that people will make specific decisions (n = 1,082)*

Ensure scientists like you make the best possible research decisions (n = 2,163)



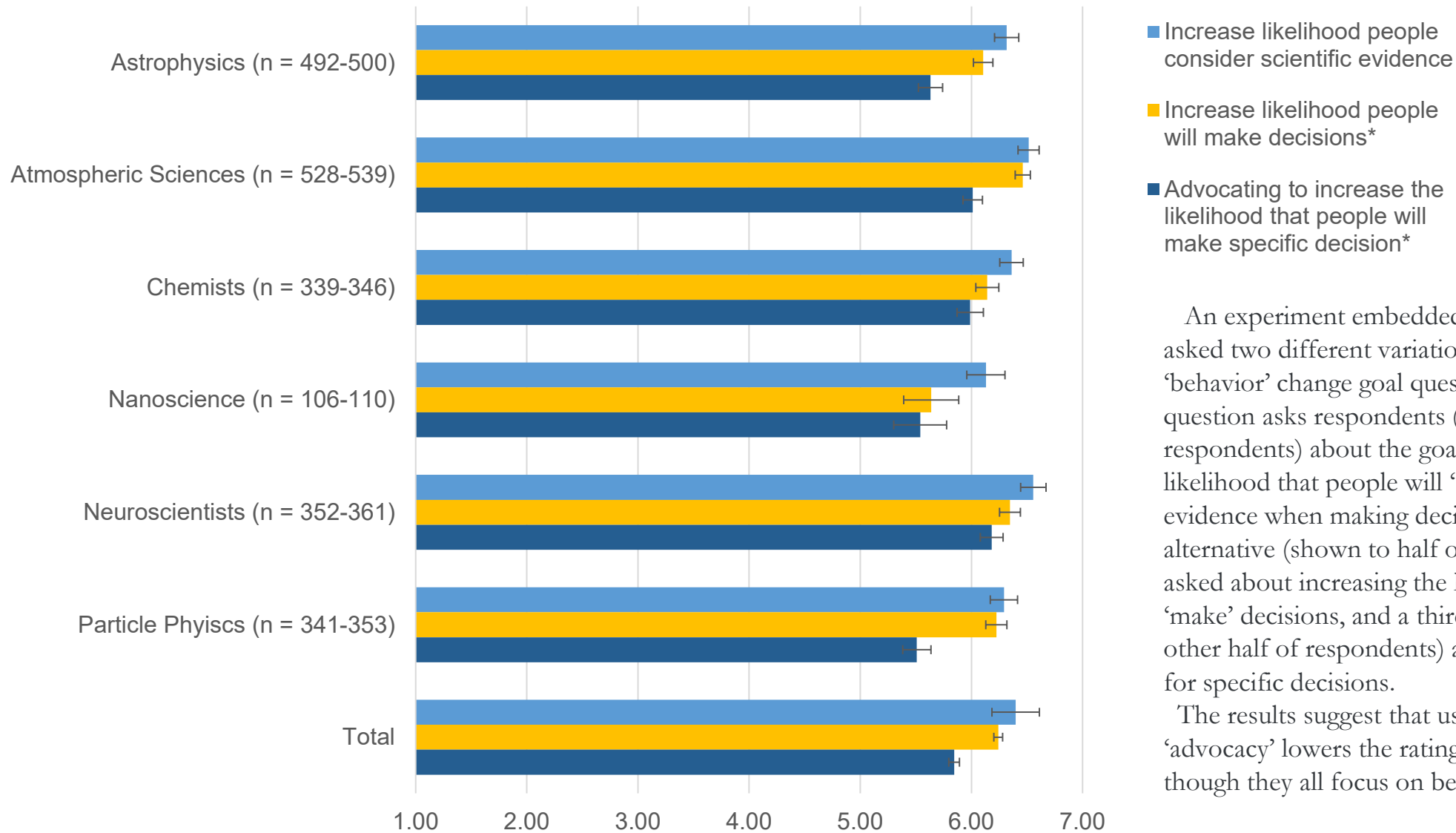
- Astrophysics (n = 492-500)
- Atmospheric Sciences (n = 528-539)
- Chemists (n = 339-346)
- Nanoscience (n = 106-110)
- Neuroscientists (n = 352-361)
- Particle Physics (n = 341-353)

The differences between fields was relatively small, although the two physics sub-fields included in the survey appeared to view the goal of assessing their own research through engagement as relatively less important.

*Each of these goals was only shown to a random half of respondents.

Fields' Priority Goals: An Experiment with the Word 'Advocacy'

(1 = Very unimportant, 7 = Very important)



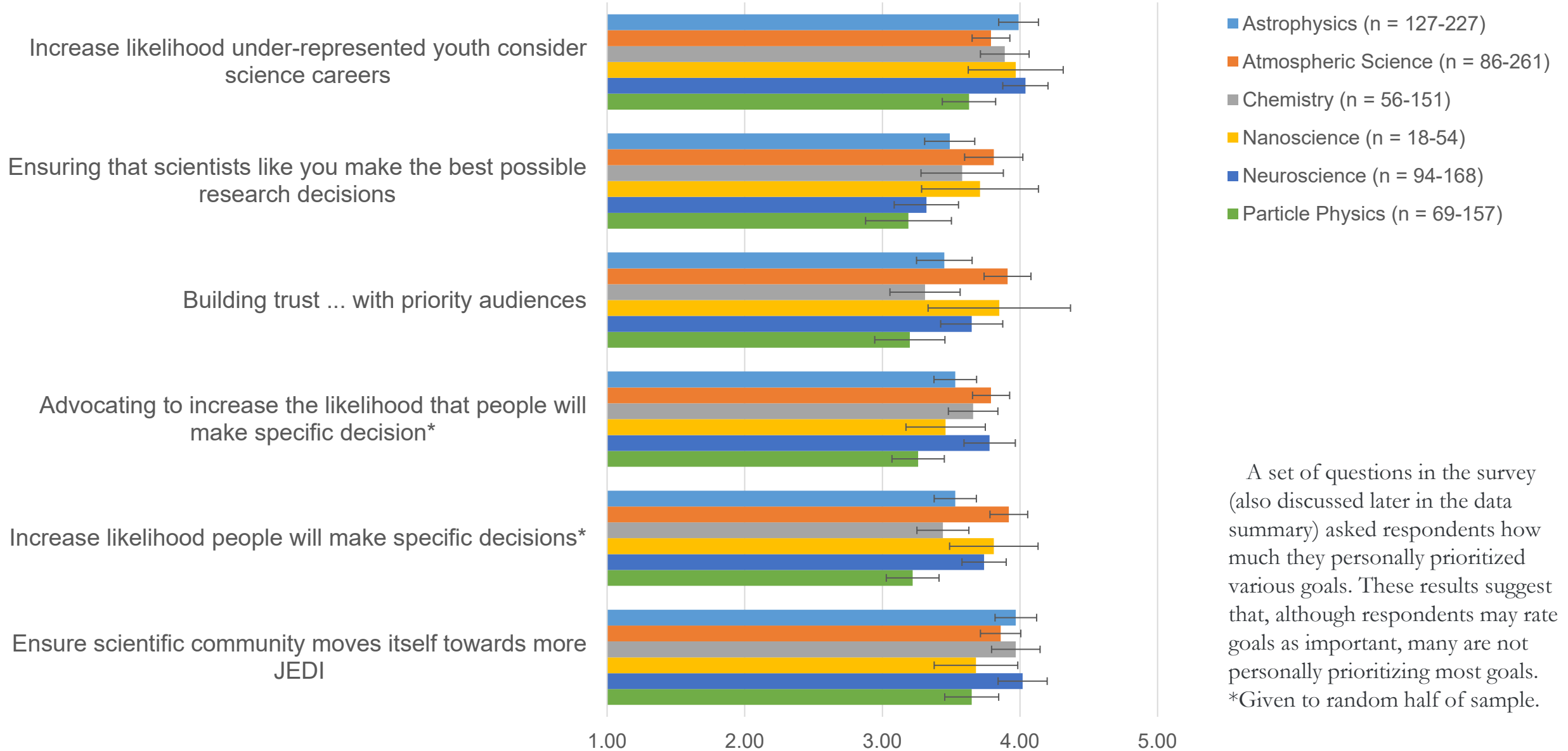
An experiment embedded in the goals questions asked two different variations of a direct 'behavior' change goal question. The standard question asks respondents (asked to all respondents) about the goal of increasing the likelihood that people will 'consider' scientific evidence when making decisions, whereas one alternative (shown to half of the respondents) asked about increasing the likelihood that people 'make' decisions, and a third goal (shown to the other half of respondents) asked about advocating for specific decisions.

The results suggest that using the term 'advocacy' lowers the rating of the goal, even though they all focus on behavior change.

*Shown to a random half of respondents

Personal Prioritization of Goals by Field

(1 = Strongly Disagree, 5 = Strongly Agree)

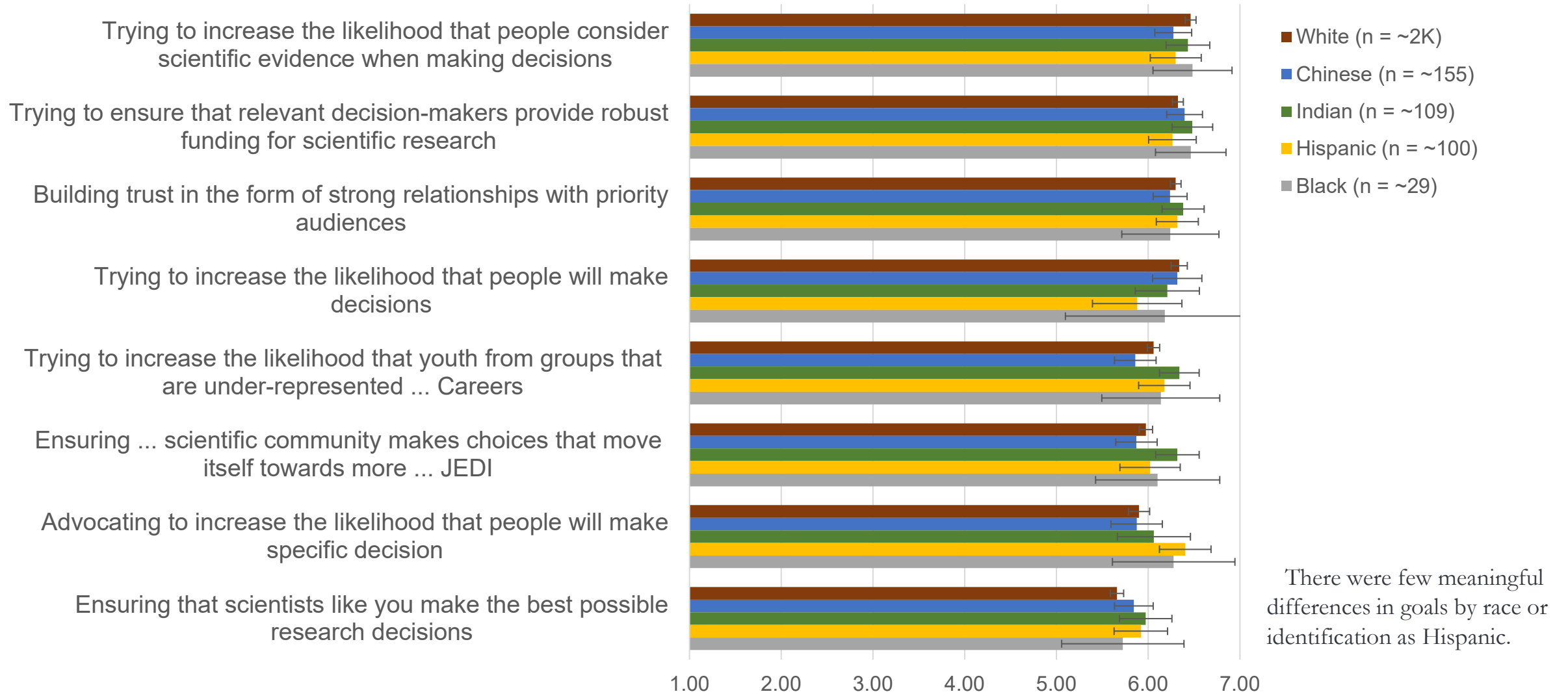


A set of questions in the survey (also discussed later in the data summary) asked respondents how much they personally prioritized various goals. These results suggest that, although respondents may rate goals as important, many are not personally prioritizing most goals. *Given to random half of sample.

Section 3: Goals by Demographics

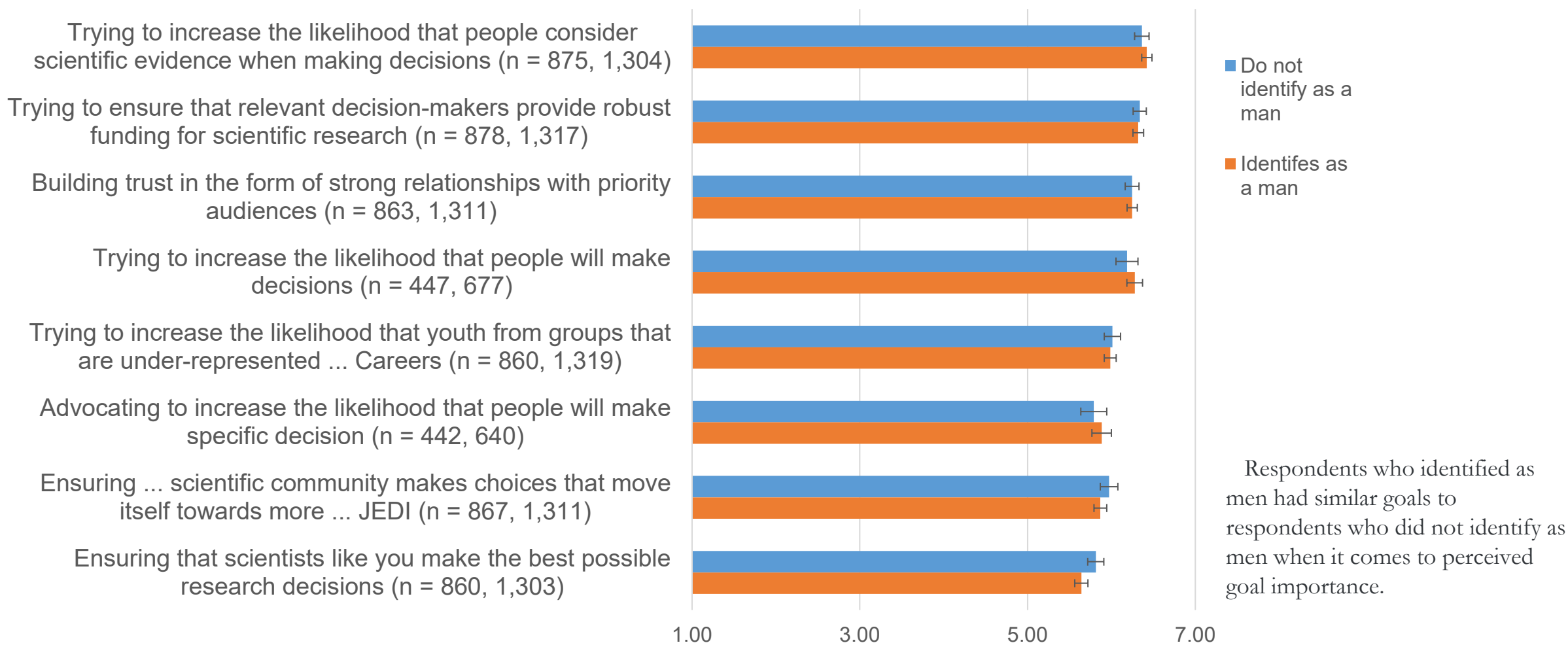
Goals by Race/Cultural Identification

(1 = Very unimportant, 7 = Very important)



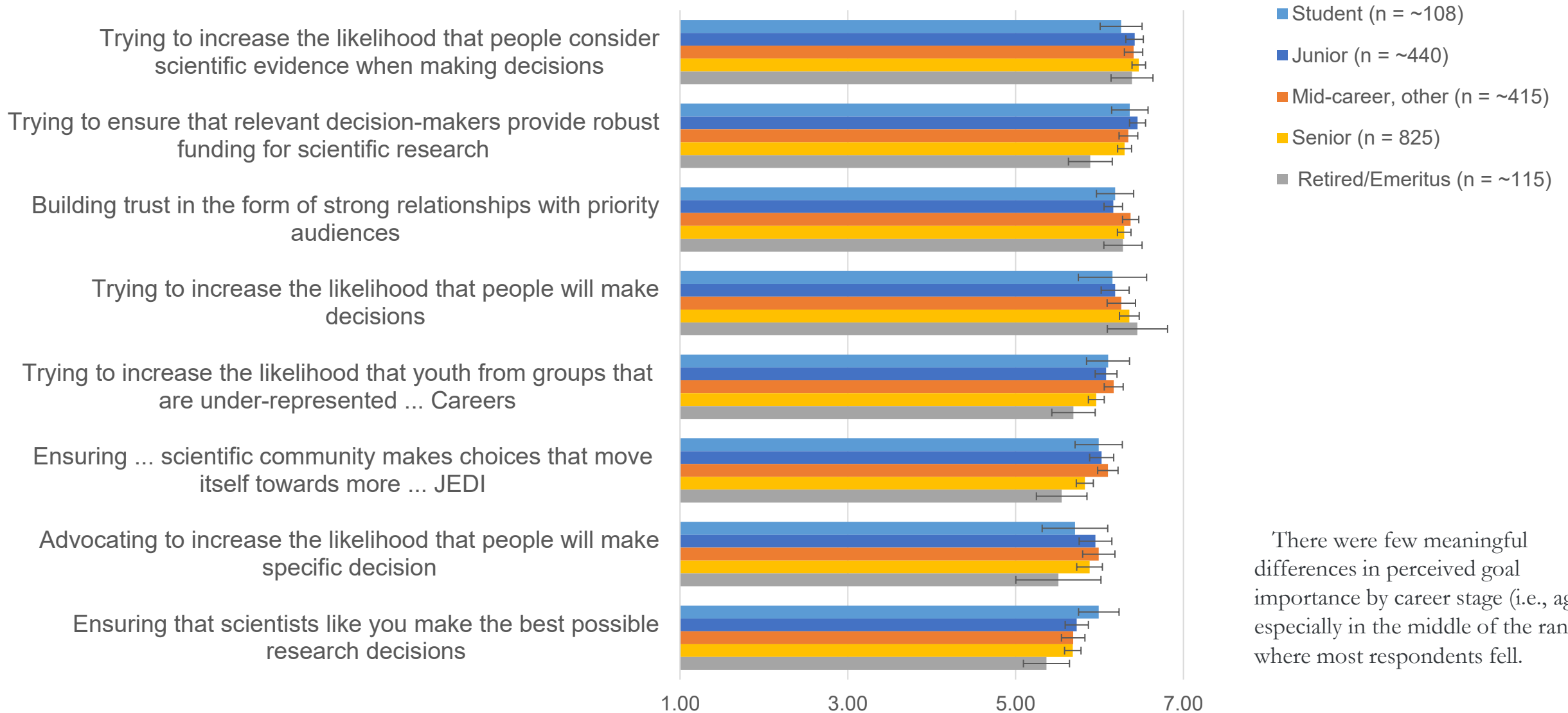
Goals by Identification as a 'Man'

(1 = Very unimportant, 7 = Very important)



Goals by Career Level

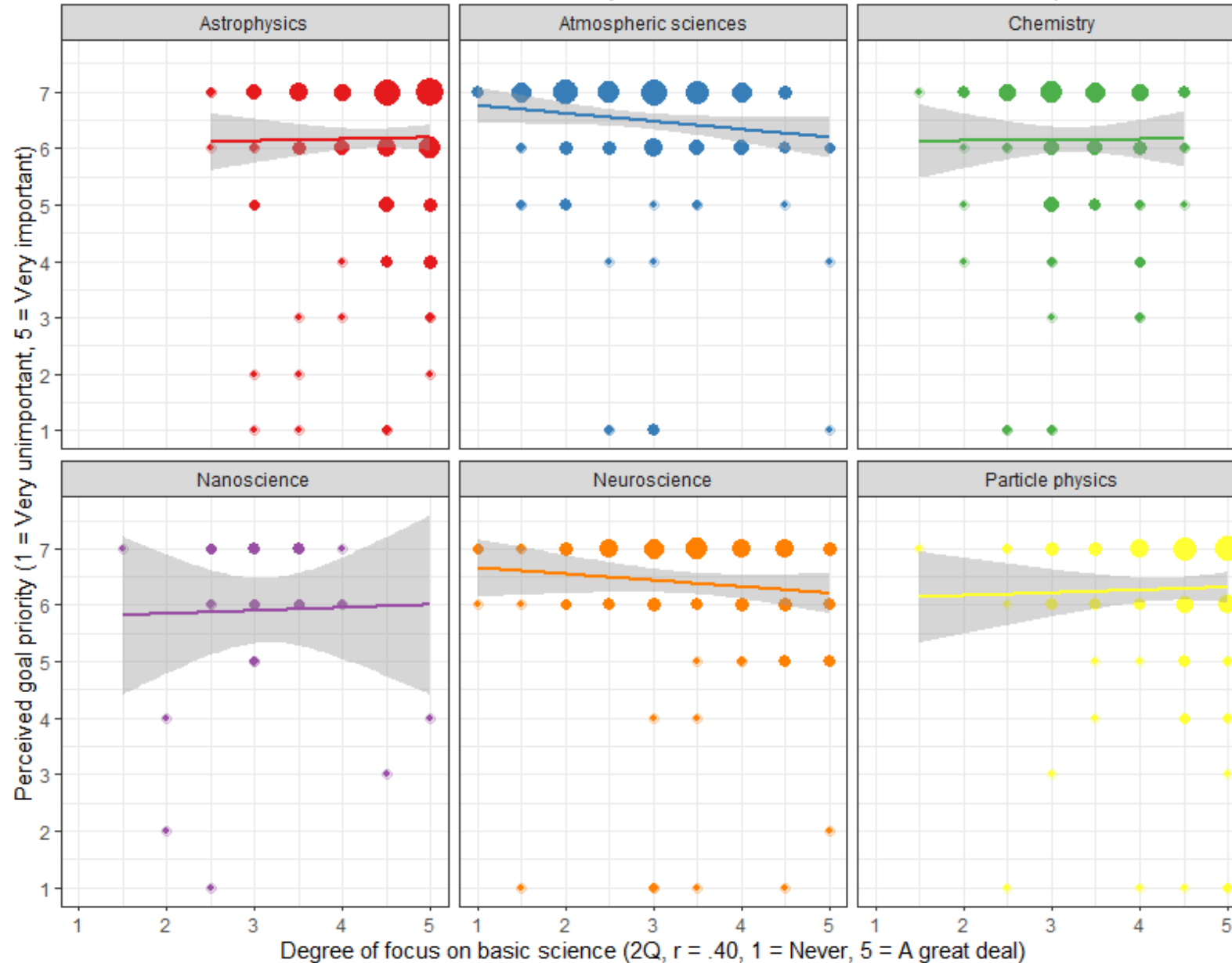
(1 = Very unimportant, 7 = Very important)



There were few meaningful differences in perceived goal importance by career stage (i.e., age), especially in the middle of the range where most respondents fell.

Section 4: Goals by Degree of Focus on Basic Science

Relationship between goal of “*Increase the likelihood that people consider scientific evidence*” and scientists’ degree of focus on basic science by field



A series of analyses were conducted to assess the extent to which the degree of focus on basic science was associated with goal prioritization. In general, few such patterns were found.*

This suggests that degree of focus on basic science, at least within these fields, is largely unrelated to goal prioritization. The next slides report these results for each of the other goals that were measured.

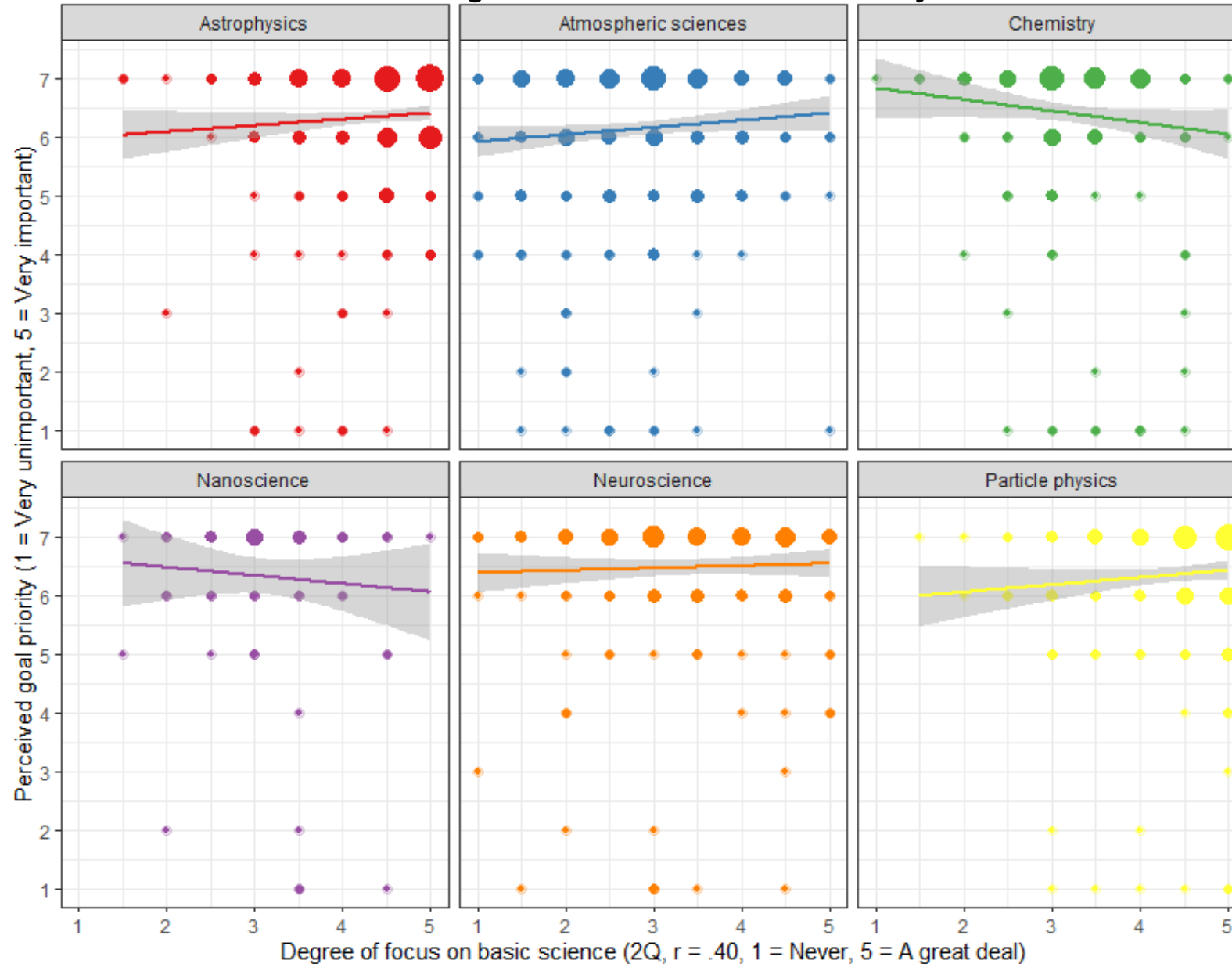
Scientist Sample

- Astrophysics
- Atmospheric sciences
- Chemistry
- Nanoscience
- Neuroscience
- Particle physics

***How to read ...**

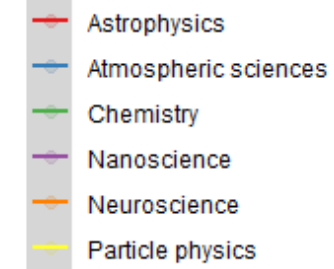
A relationship between degree of focus on basic science and goal prioritization would be indicated by a line sloping substantively upwards (positive relationship) or downwards (negative relationship) whereas a lack of slope suggests no relationship between degree of focus on basic science and goal prioritization. For these graphics, the larger dots represent higher numbers of respondents.

Relationship between goal of “Ensure robust funding for scientific research” and scientists’ degree of focus on basic science by field



The degree of focus on basic science does not seem to be related to views about the importance of this goal. In this regard, the plotted lines are not substantively sloped upwards or downwards.*

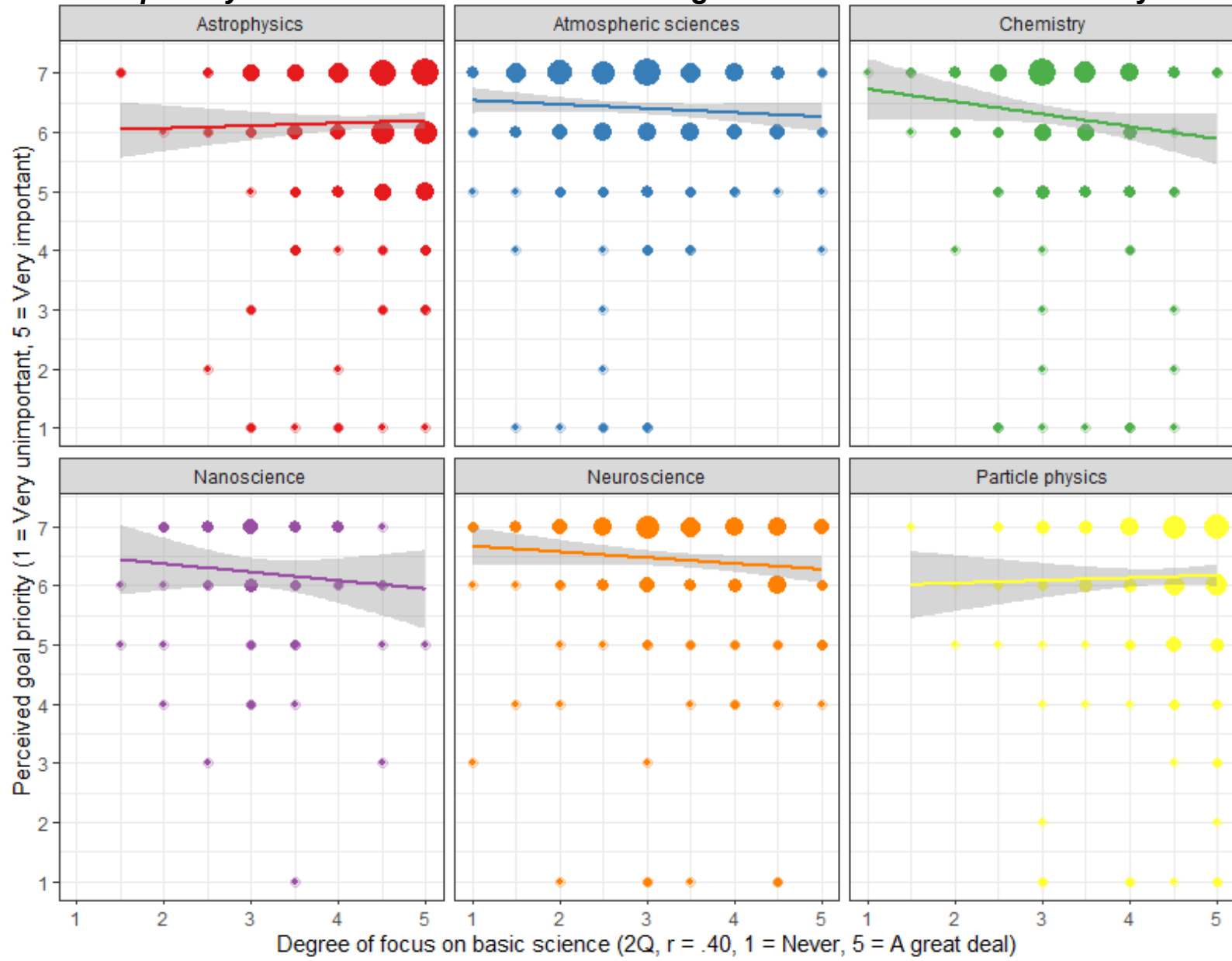
Scientist Sample



*How to read ...

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Relationship between goal of “Build trust in the form of strong relationships with priority audiences ...” and scientists’ degree of focus on basic science by field

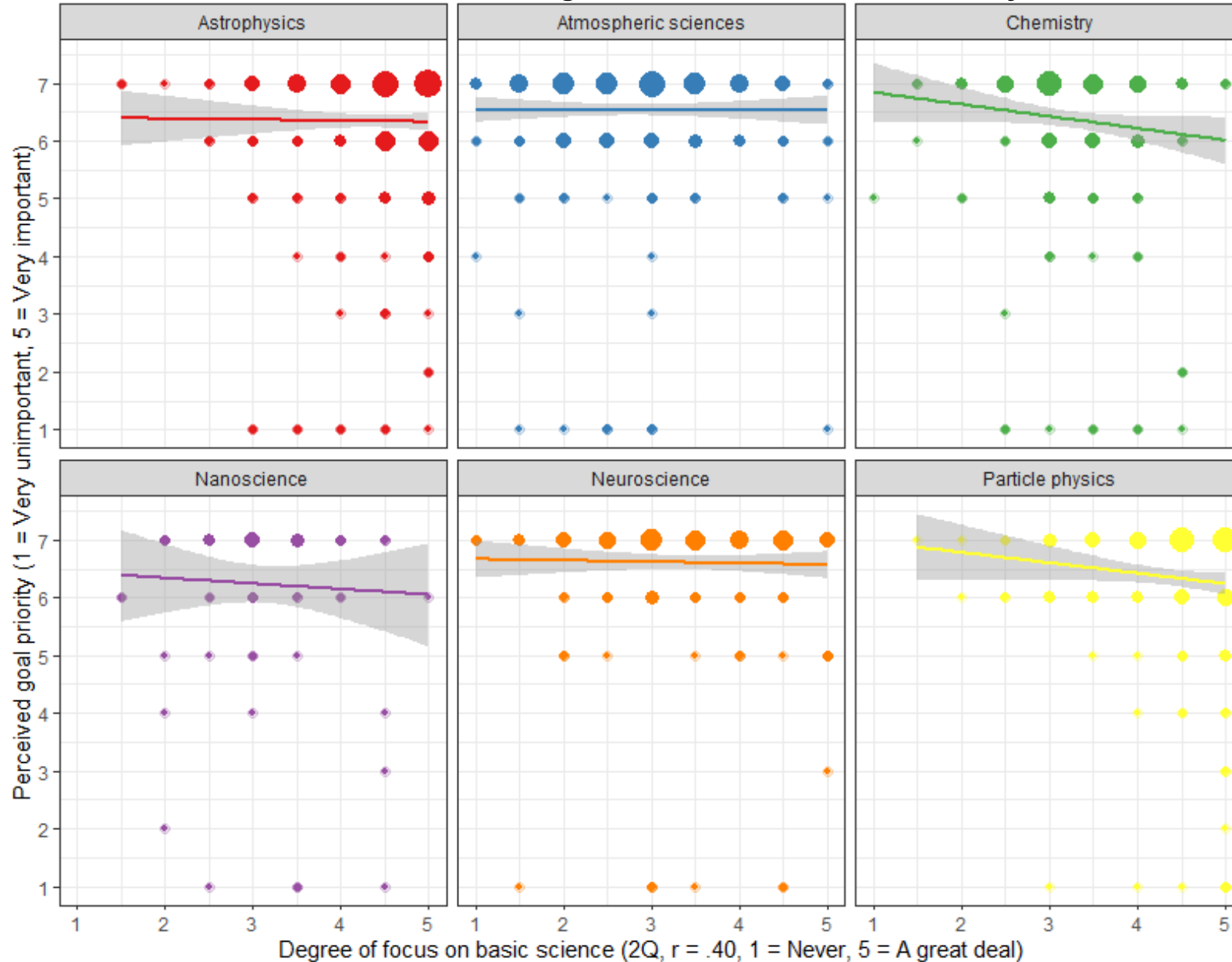


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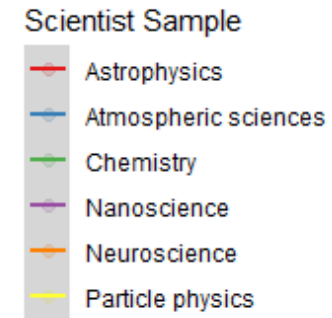


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Relationship between goal of “Increase the likelihood that people will make decisions” and scientists’ degree of focus on basic science by field



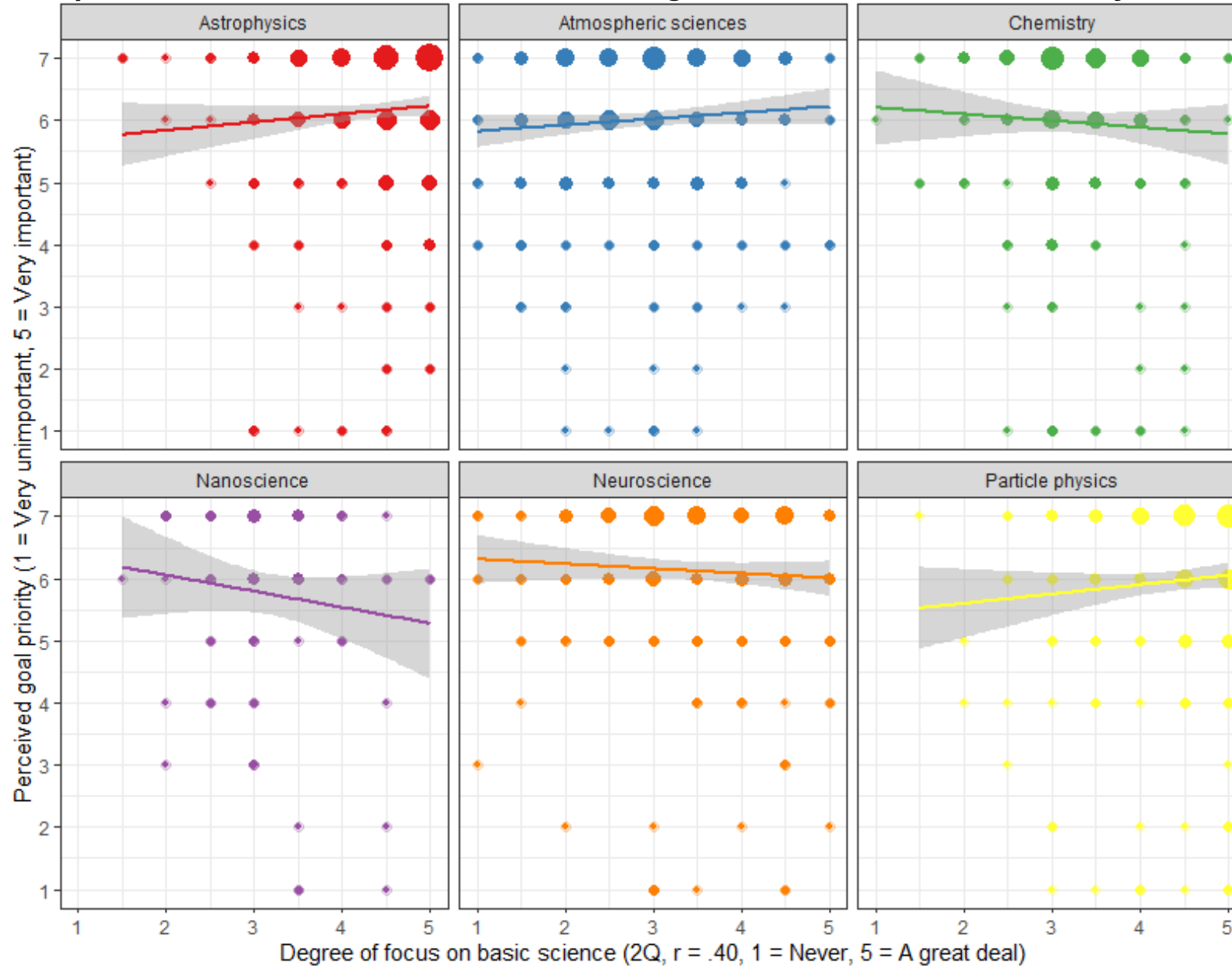
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Relationship between goal of “*Increase likelihood under-represented youth pursue science careers*” and scientists’ degree of focus on basic science by field

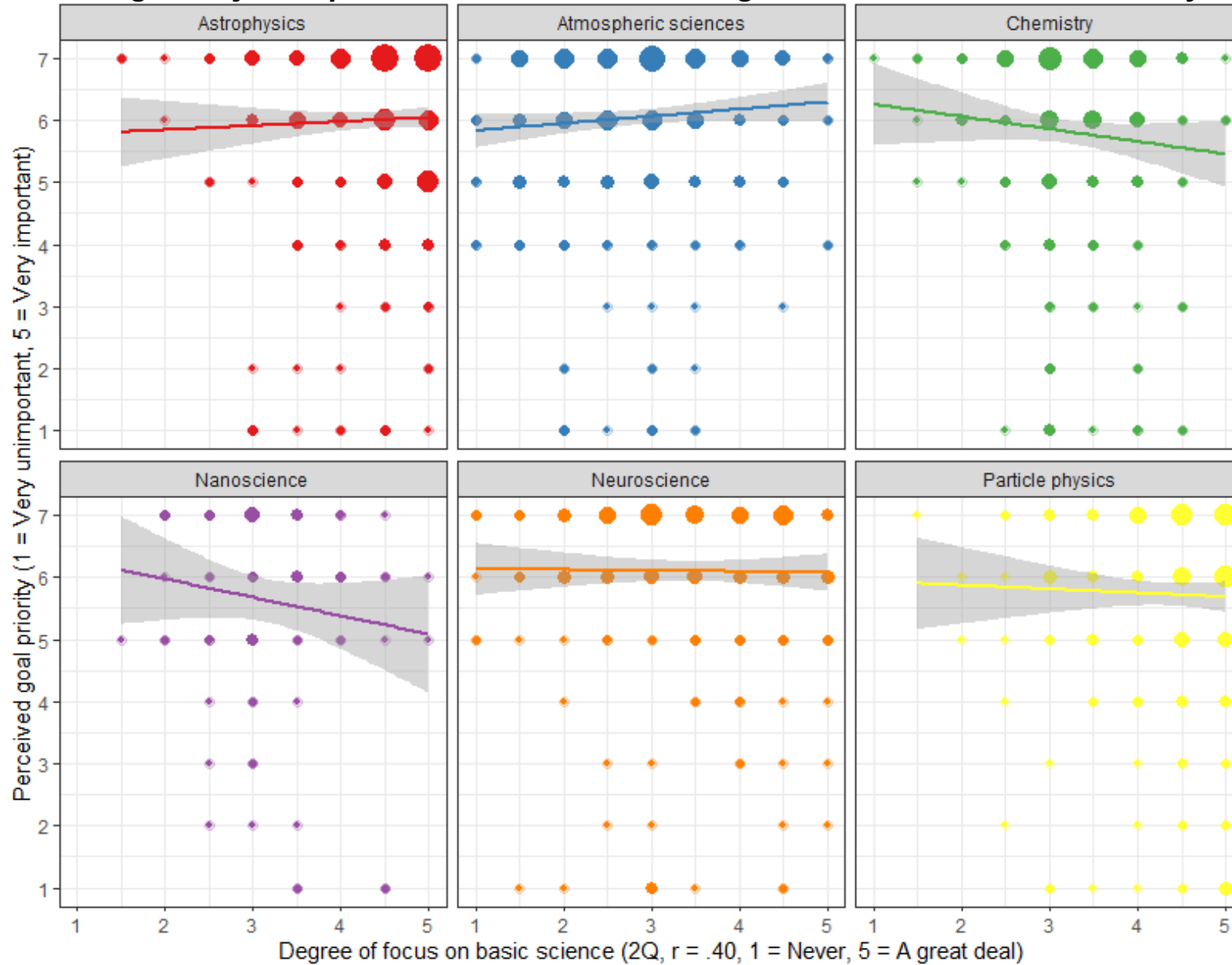


The degree of focus on basic science does not seem to be related to views about the importance of this goal. In this regard, the plotted lines are not substantively sloped upwards or downwards.*

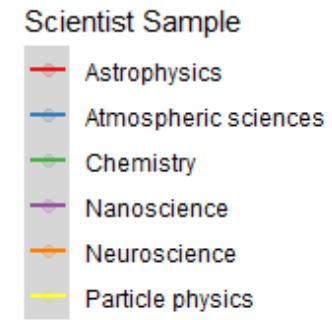
*How to read ...

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Relationship between goal of “Ensure scientific community moves towards being more just, equitable ...” and scientists’ degree of focus on basic science by field



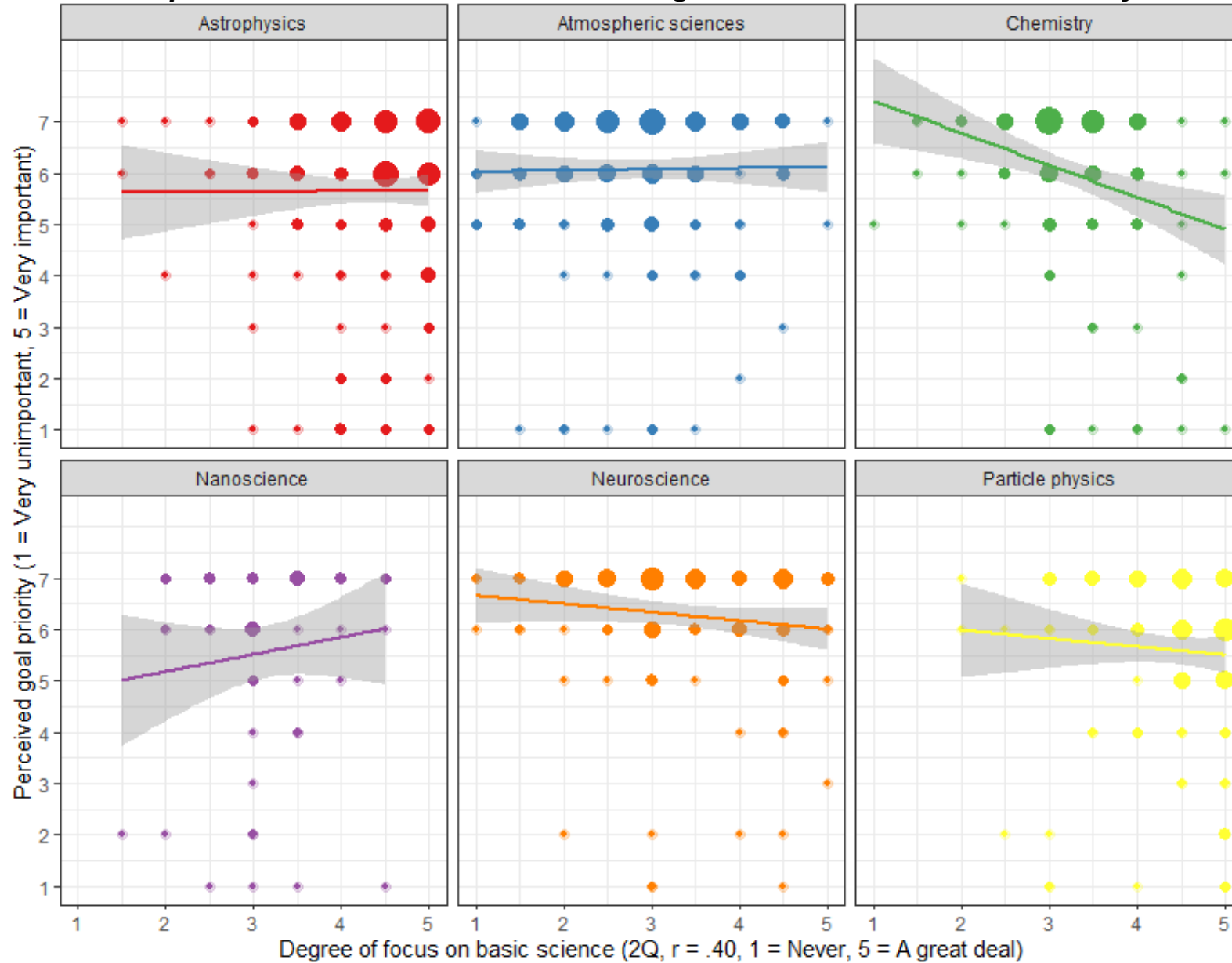
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Relationship between goal of “*Advocate to increase likelihood that people will make specific decisions*” and scientists’ degree of focus on basic science by field



There is some evidence that chemists with more focus on basic science tend to prioritize this goal. It is also, however, important to look for overall patterns and try not to over-interpret results from within specific fields without additional investigation.*

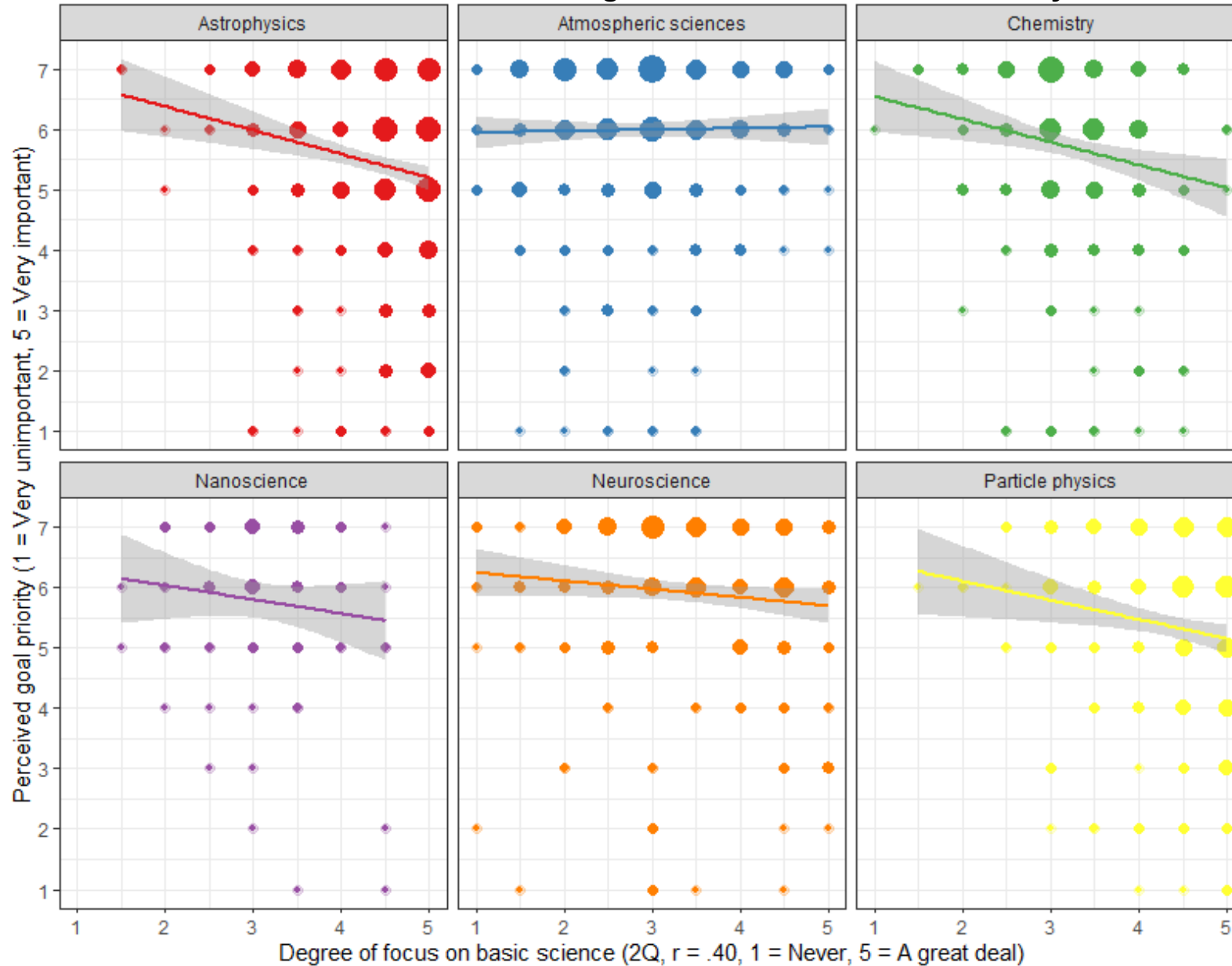
Scientist Sample

- Astrophysics
- Atmospheric sciences
- Chemistry
- Nanoscience
- Neuroscience
- Particle physics

***How to read ...**

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Relationship between goal of “Ensure scientists like you make the best possible research decisions” and scientists’ degree of focus on basic science by field



There is some evidence that astrophysicists and chemists with more focus on basic science tend to prioritize this goal less (i.e., the downward sloping lines).*

Scientist Sample

- Astrophysics
- Atmospheric sciences
- Chemistry
- Nanoscience
- Neuroscience
- Particle physics

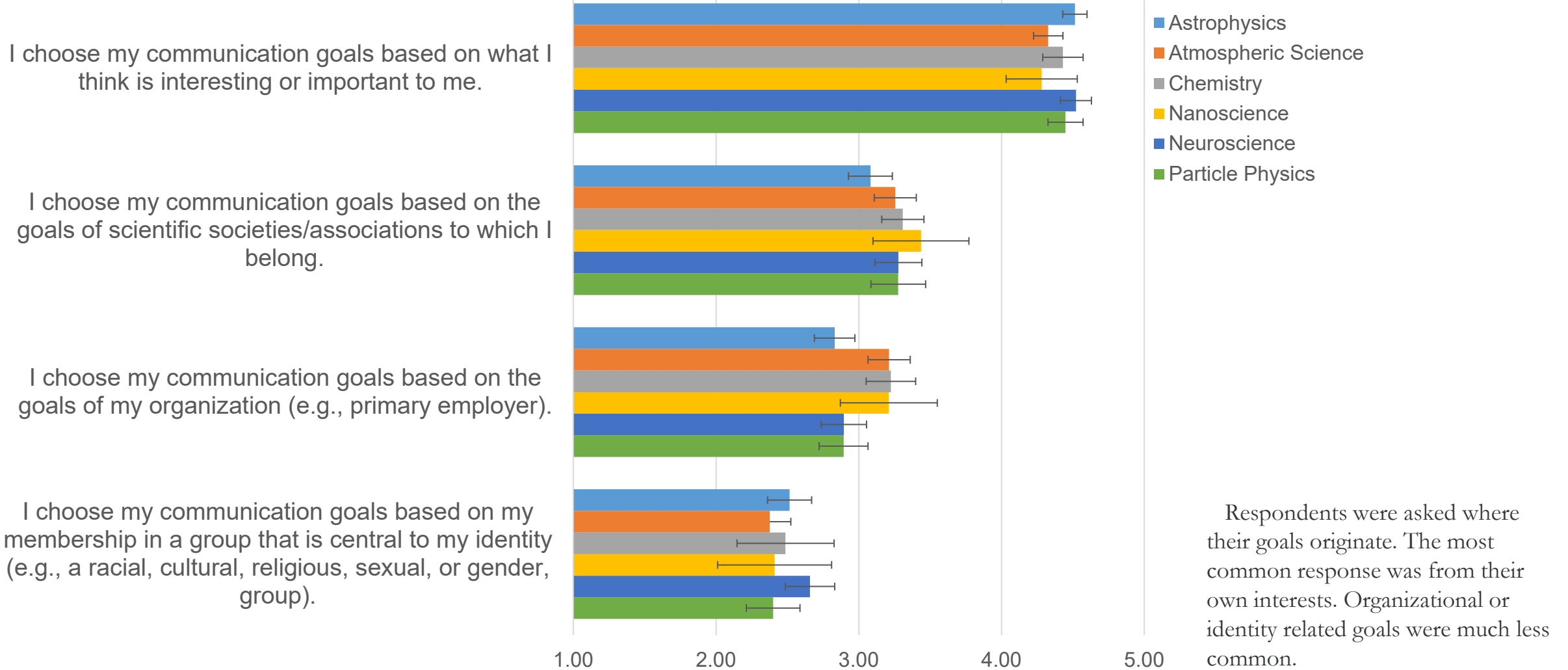
***How to read ...**

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Section 5: Where Goals Come From

Goal Origin by Field

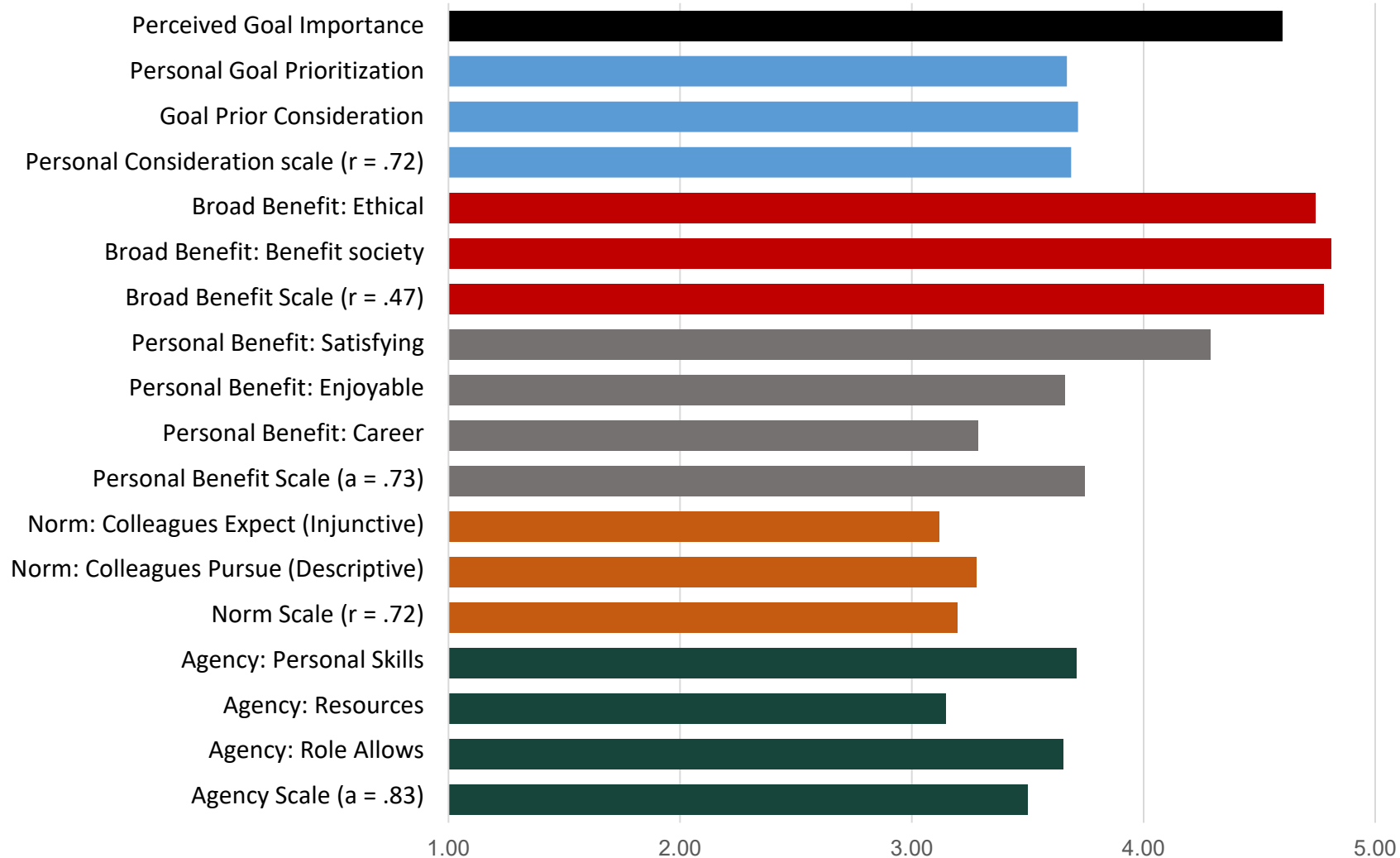
(1 = Strongly Disagree, 5 = Strongly Agree)



Section 6: Views about Specific Goals

Views about the goal of "Trying to increase the likelihood that people consider scientific evidence when making decisions"

(Asked to subset of full sample, n = 263-283)



Respondents rated this goal as the most important, overall, but many had not given it substantial prior consideration.*

They believed pursuing the goal would benefit society but would not be especially beneficial to themselves. There was some sense that the scientists thought pursuing the goal would be satisfying and, to a lesser extent, useful to their own careers.

The scientists did not believe that the goal was especially expected or common.

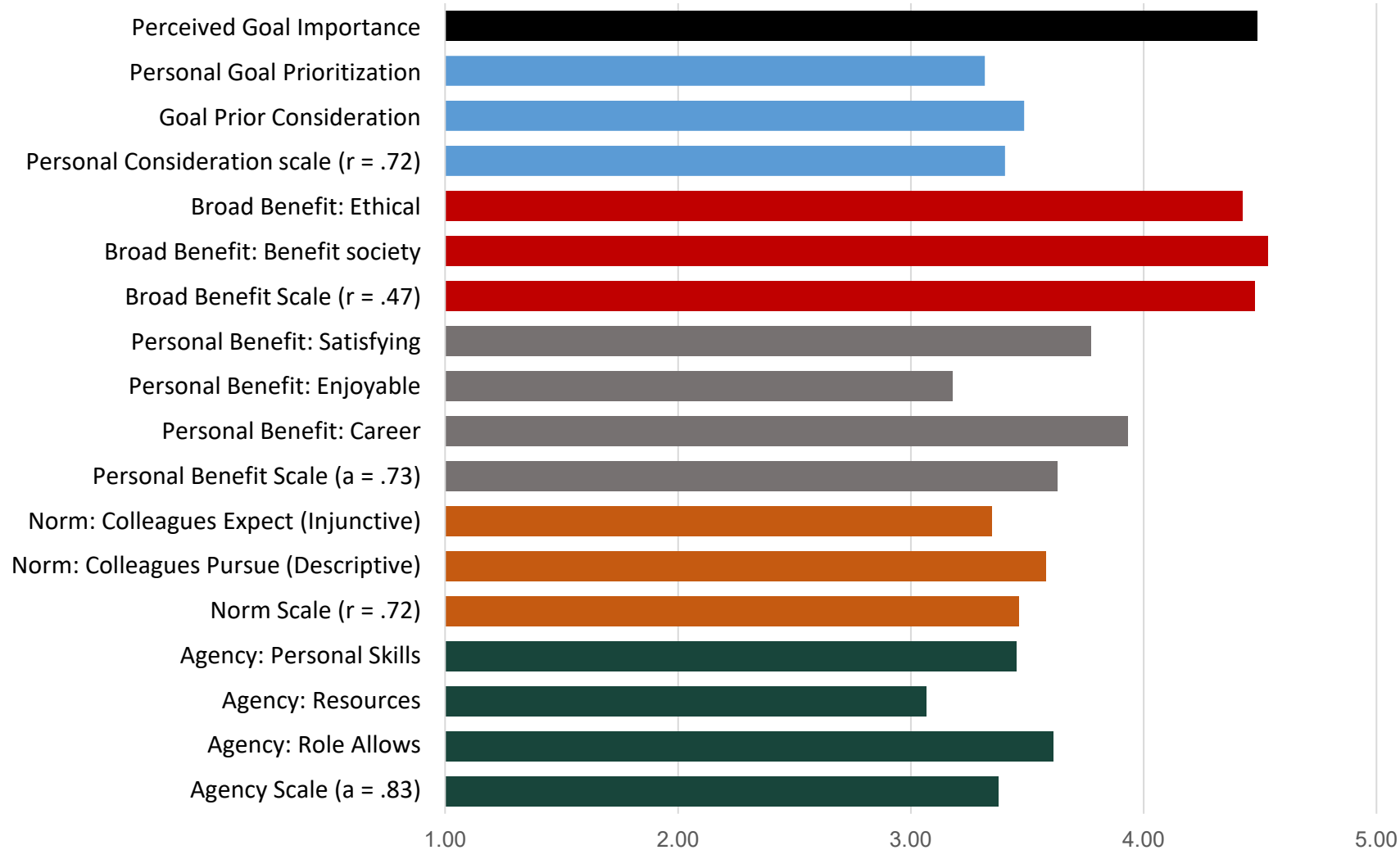
The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal.

They were especially pessimistic about access to resources to pursue the goal.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see. p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above).

Views about the goal of "Trying to ensure that relevant decision-makers provide robust funding for scientific research"

(Asked to subset of full sample, n = 490-512)



Respondents also rated this goal as quite important, overall, but most had not given it substantial prior consideration.

They appeared to believe pursuing the goal would benefit society but would not be especially beneficial to themselves. There was some sense that the scientists thought pursuing the goal would be satisfying and useful to their own careers.

The scientists did not believe that the goal was especially expected or common.

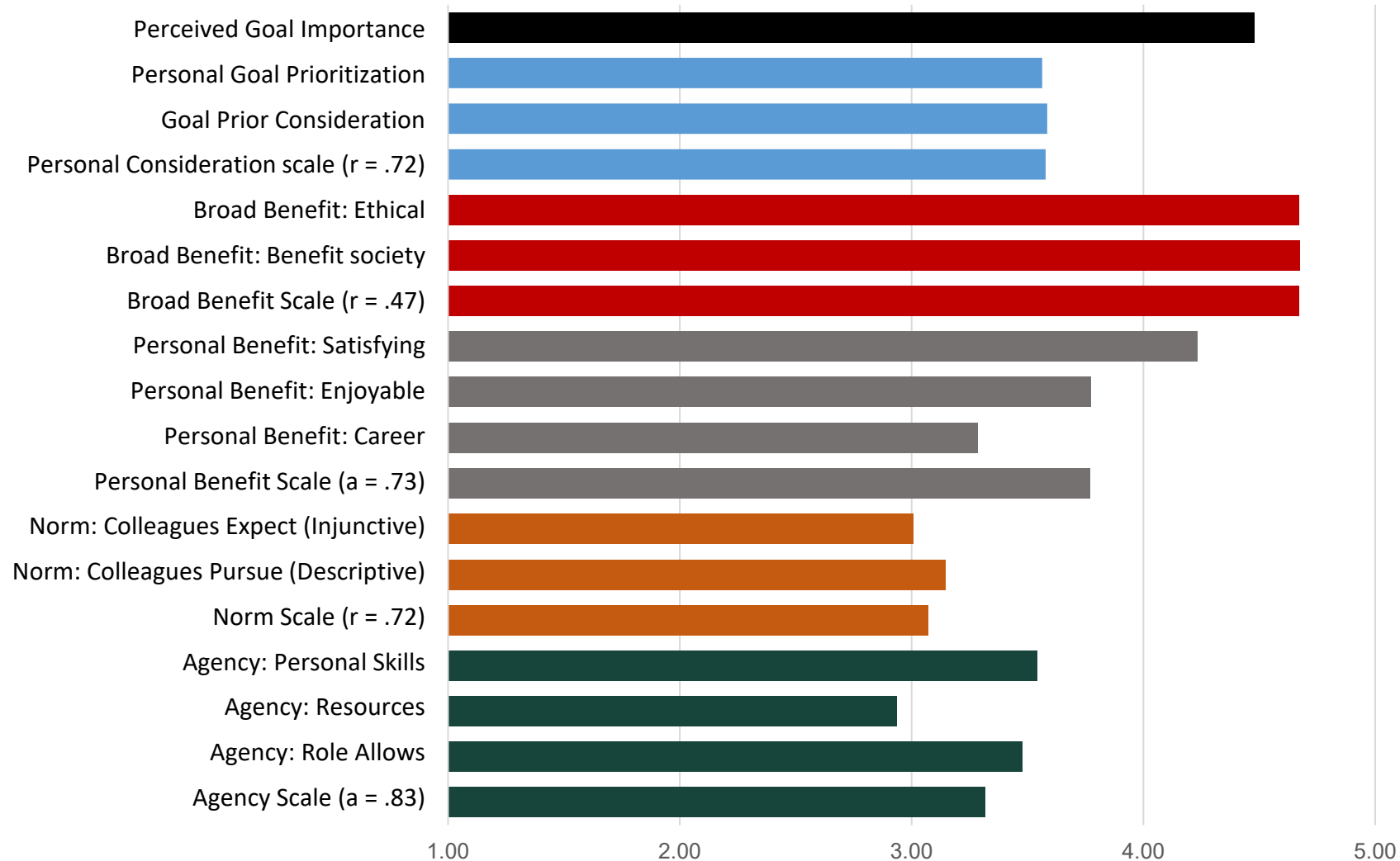
The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal.

Like all the goals, they were especially pessimistic about access to resources for pursuing this goal.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see. p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above).

Views about the goal of building trust in the form of strong relationships with priority audiences

(Asked to subset of full sample, n = 508-544)



Similar to the previous goals, respondents rated this goal as quite important, overall, but most had not given it substantial prior consideration.

They also believed pursuing the goal would benefit society but would not be especially beneficial to themselves. There was again some sense that the scientists thought pursuing the goal would be satisfying and useful to their own careers.

The scientists did not believe that the goal was especially expected or common.

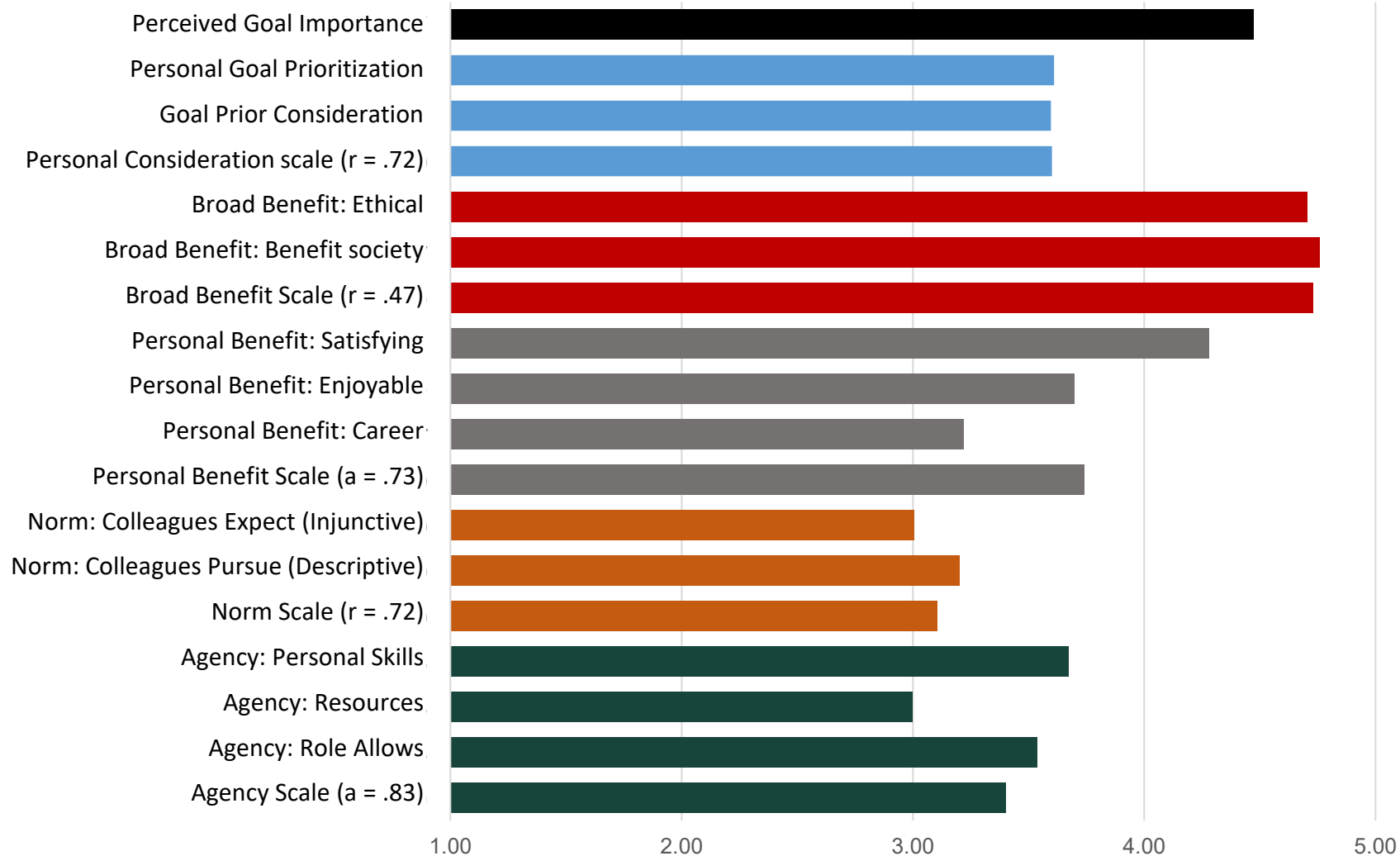
The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal.

They were, once again, especially pessimistic about access to the resources they believed they would need to pursue this goal.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see. p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above).

Views about the goal of "Trying to increase the likelihood that people make decisions that are consistent with the available evidence"

(Asked to subset of full sample, n = 965-1,026)



Similar to the previous goals, respondents rated this goal as quite important, overall, but many had not given it substantial prior consideration.*

They also believed pursuing the goal would benefit society but would not be especially beneficial themselves. There was some sense that the scientists thought pursuing the goal would be satisfying and enjoyable, but they were somewhat less likely to agree that it would be beneficial to their own careers.

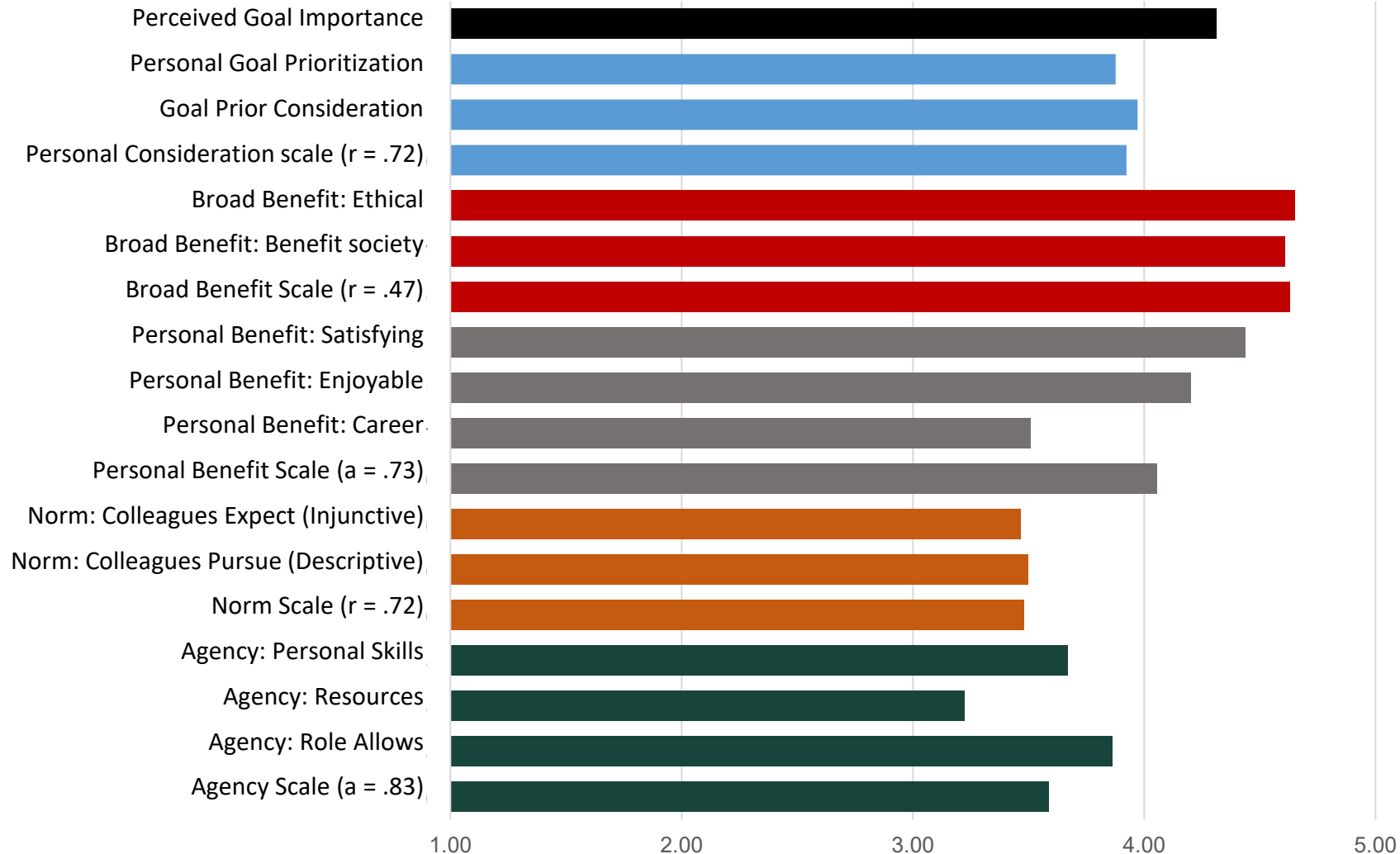
The scientists did not believe that the goal was especially expected or common.

The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal. They were especially pessimistic about access to resources.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above').

Views about the goal of “Increase likelihood under-represented youth pursue science careers”

(Asked to subset of full sample, n = 838-876)



The scientists rated this goal as fairly important and, relative to other goals, something they themselves had prioritized and considered.*

They also believed pursuing the goal would benefit society but would not be especially beneficial to themselves. There was some sense that the scientists thought pursuing the goal would be satisfying and enjoyable, but they were somewhat less likely to agree that it would be beneficial to their own careers.

The scientists did not believe that the goal was especially expected or common.

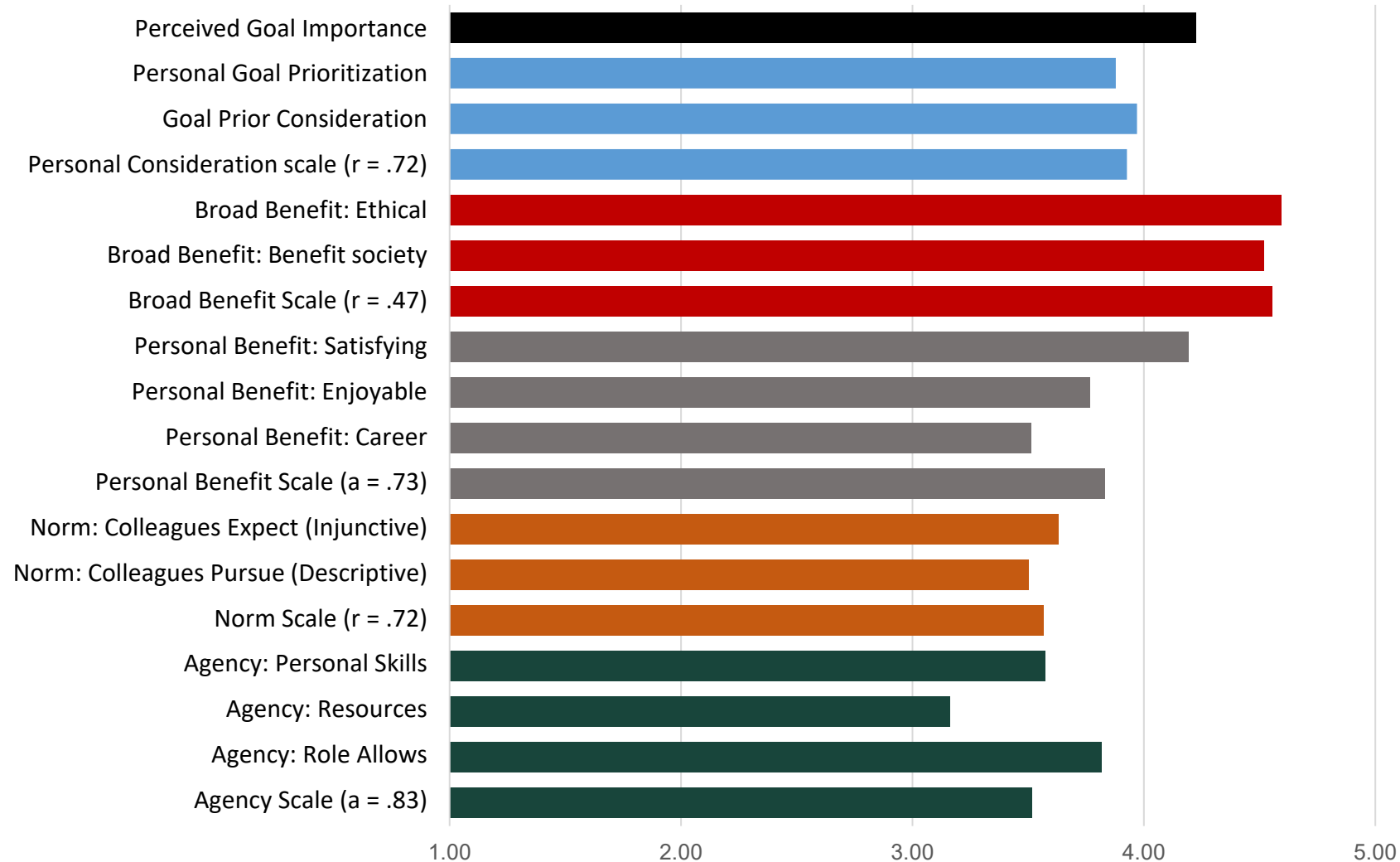
The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal.

They were especially pessimistic about access to resources needed to achieve this goal.

*All scores are reported here using a 5-point response scales where ‘1’ typically suggests strong disagreement with the underlying statement and ‘5’ suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as ‘scales, above).

Views about the goal of "Ensure scientific community moves towards being more just, equitable ..."

(Asked to subset of full sample, n = 874-916)



The scientists also rated this goal as fairly important and, relative to other goals, something they themselves had prioritized and considered.*

They also believed pursuing the goal would benefit society. There was some sense that the scientists thought pursuing the goal would be satisfying and enjoyable, but they were somewhat less likely to agree that it would be beneficial to their own careers.

The scientists did not believe that the goal was especially expected or common.

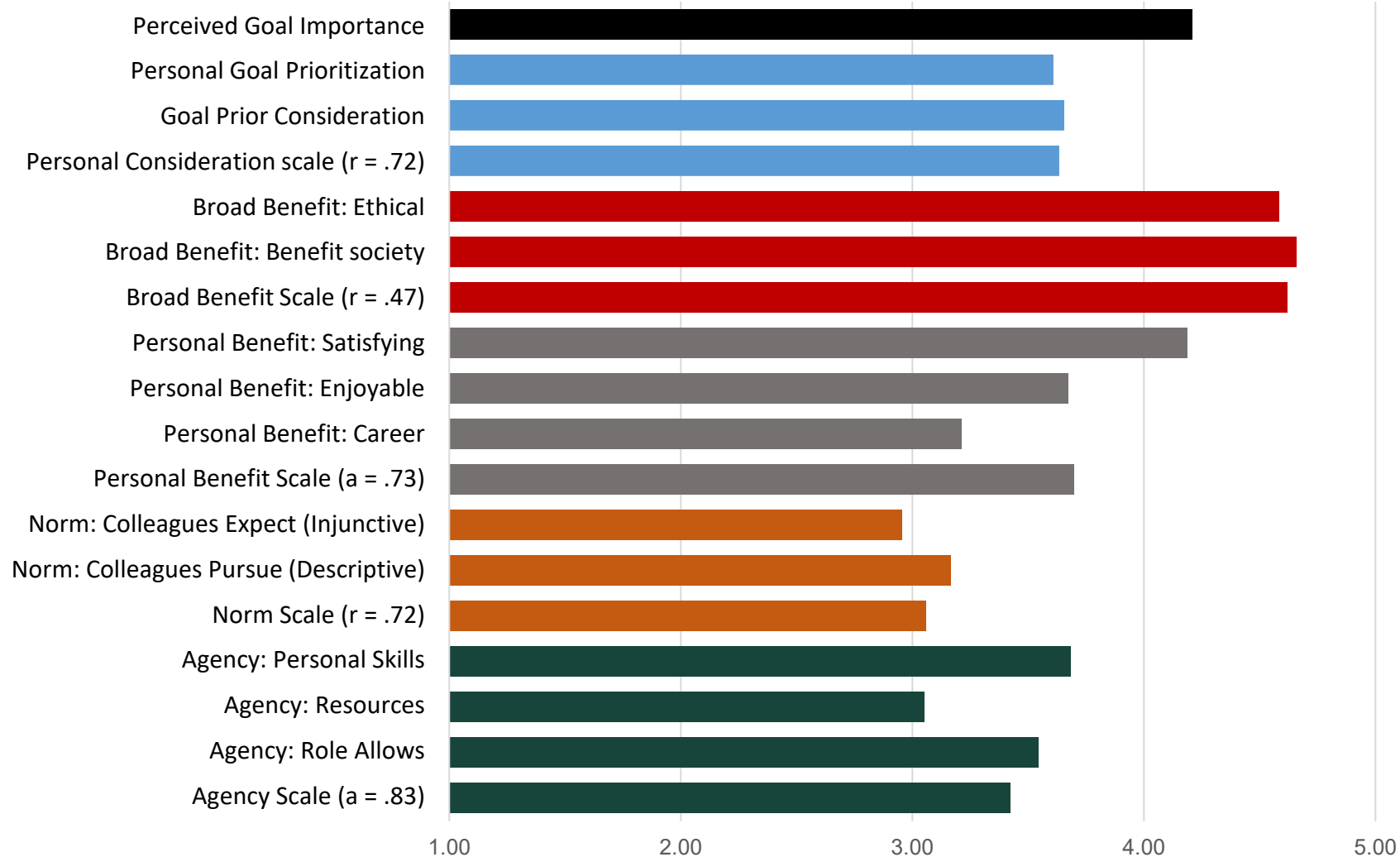
The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal.

They were especially pessimistic about access to resources needed to achieve this goal.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above').

Views about the goal of "Advocate to increase likelihood that people will make specific decisions"

(Asked to subset of full sample, n = 930-991)



Although one of the lower rated goals, overall, the absolute importance score is still well above the midpoint of the measure. The scientists were less likely, however, to say they personally prioritized this goal.”

They still believed pursuing the goal would, however, benefit society. There was some sense that the scientists thought pursuing the goal would be satisfying, but they were somewhat less likely to agree that it would be beneficial to their own careers.

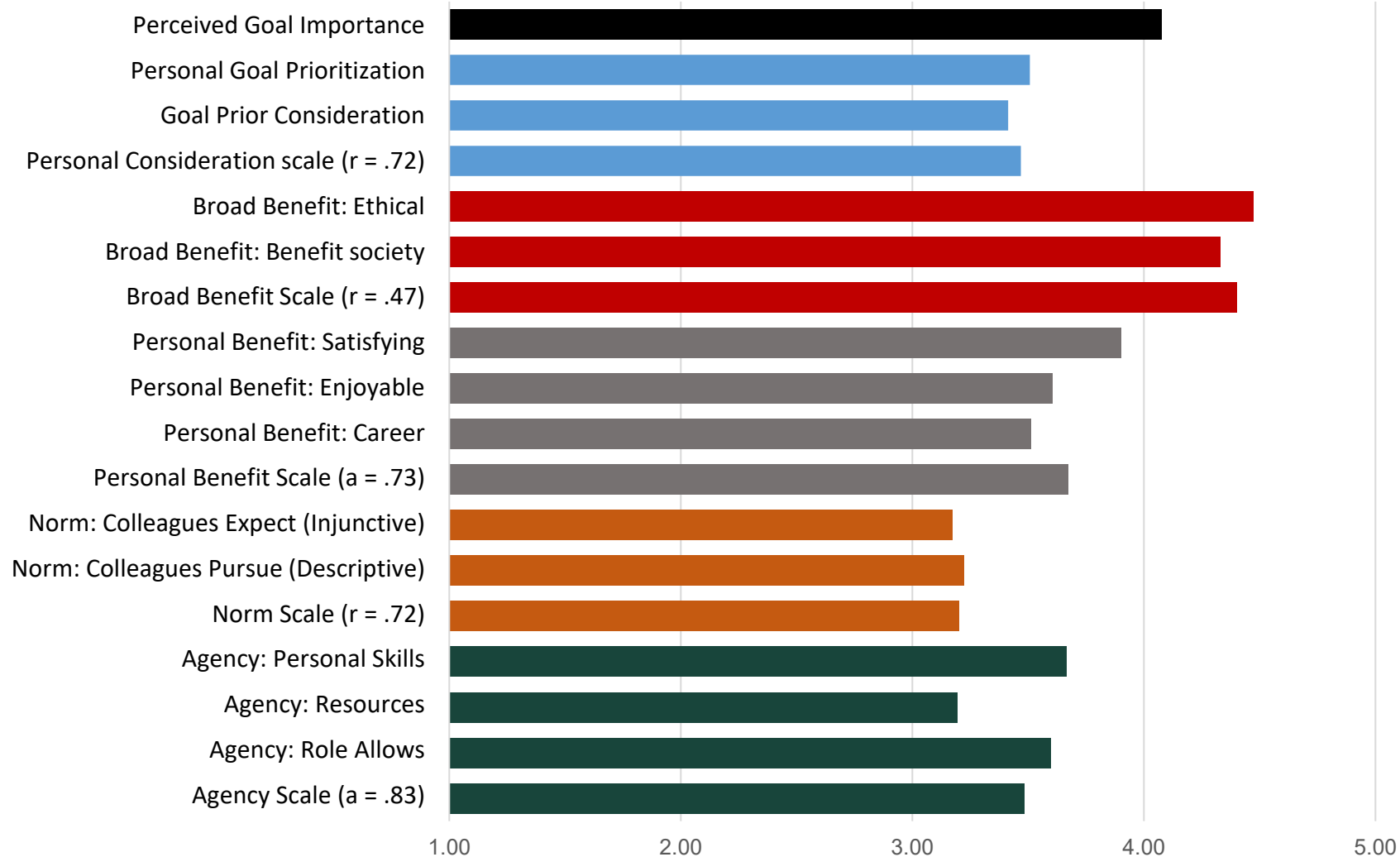
The scientists did not believe that the goal was expected or common.

The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal. As with all the goals, they were especially pessimistic about access to the resources.

*All scores are reported here using a 5-point response scales where ‘1’ typically suggests strong disagreement with the underlying statement and ‘5’ suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see. p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as ‘scales, above).

Views about the goal "Ensuring that scientists like you make the best possible research decisions"

(Asked to subset of the full sample, n = 475-500)



Although one of the lowest rated goals, overall, the absolute importance score is still well above the midpoint of the measure. The scientists were less likely, however, to say they personally prioritized this goal.*

They still believed pursuing the goal would, however, benefit society. There was some sense that the scientists thought pursuing the goal would be satisfying, but they were somewhat less likely to agree that it would be beneficial to their own careers.

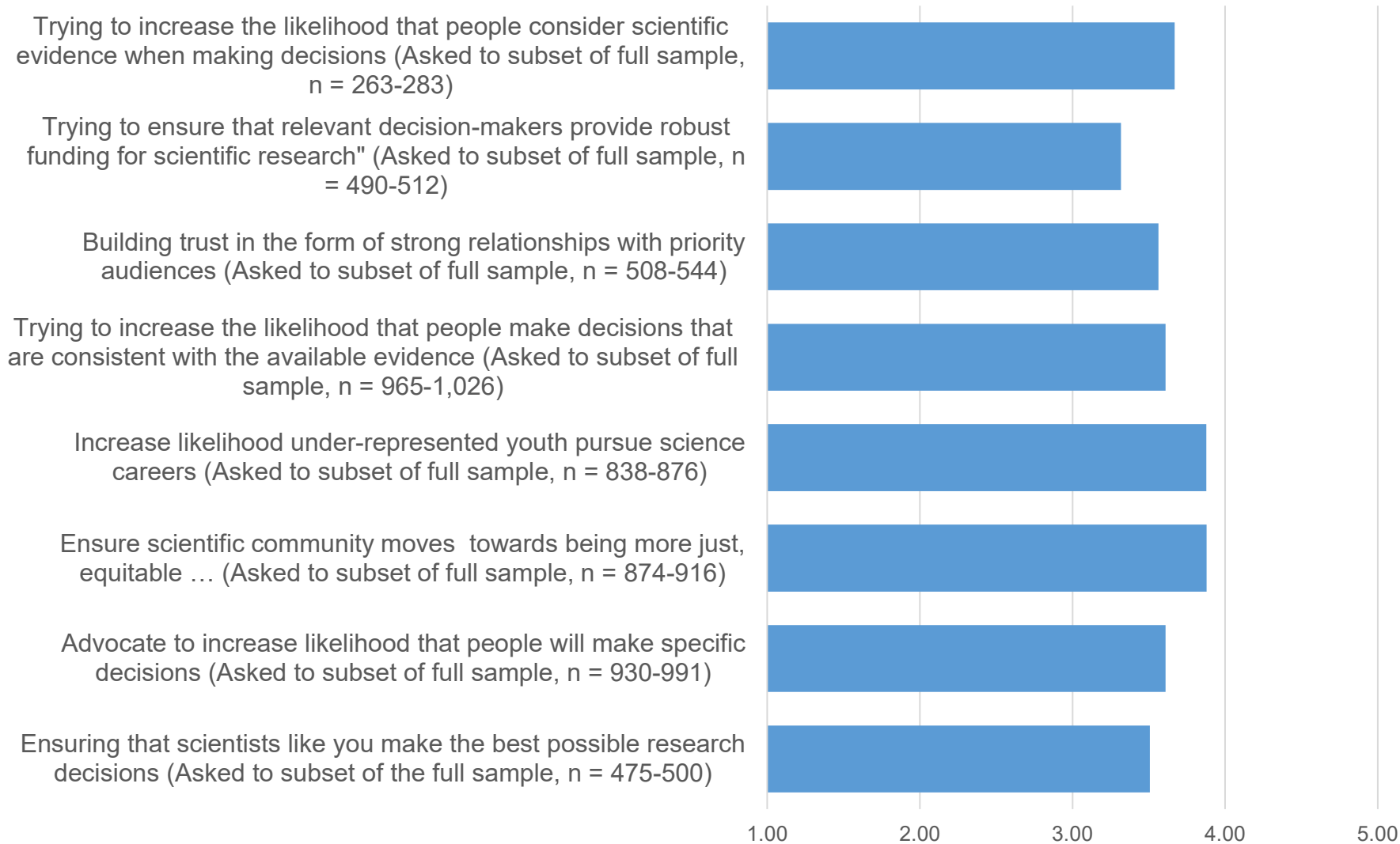
The scientists did not believe that the goal was expected or common.

The scientists also did not especially believe that they had the skills, resources, or agency to pursue the goal. As with all the goals, they were especially pessimistic about access to the resources.

*All scores are reported here using a 5-point response scales where '1' typically suggests strong disagreement with the underlying statement and '5' suggests strong agreement (see p. 32, and pp. 41-52). However, perceived goal importance was initially measured on a 7-point scale (see. p. 11) but was rescaled to a 5-point scale here for the purposes of comparison. The color groupings represent measures that are combined (i.e., averaged) into composite measurement scales (labeled as 'scales, above).

Degree to Which Scientist Personally Prioritizes Specific Goals

(1 = Strongly Disagree, 5 = Strongly Agree)



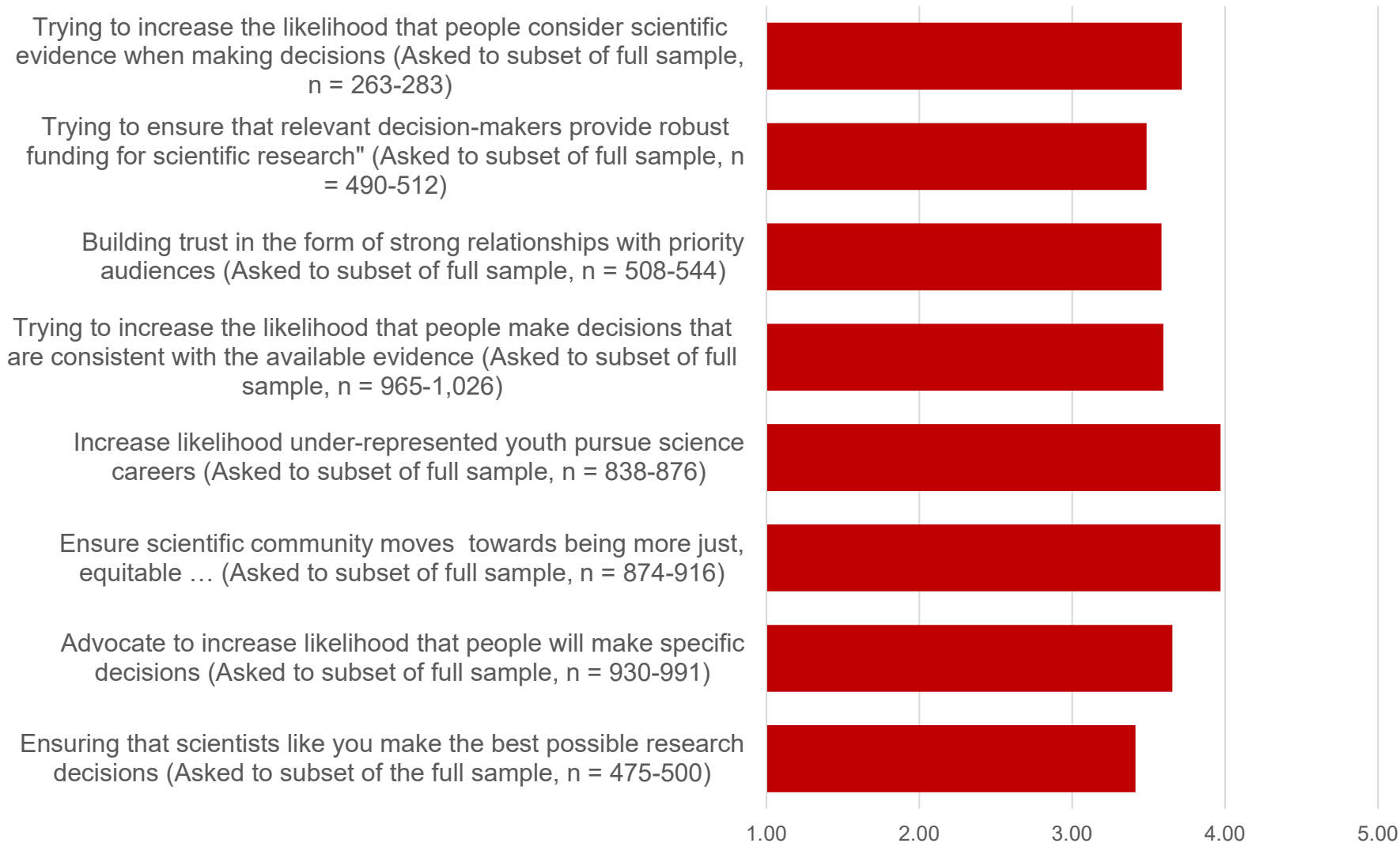
The content from slides 33-40 can also be organized by goal. From this perspective, although scientists said that the most important goals were ensuring people consider scientific evidence, ensuring funding, and building trust, the goals scientists said they personally prioritized focused on youth careers and science community justice, diversity, equity, and inclusion.

In contrast, funding was one of the goals scientists said they were least likely to have personally prioritized.

Also, it is noteworthy that the goals associated with getting people to make better decisions (whether framed in terms of information consideration, decision-making, or advocacy) all scored similarly.

(Ordered by degree of reported “importance” from slide 12)

Degree to which Scientists Has Previously Considered Goal (1 = Strongly Disagree, 5 = Strongly Agree)



The goals the scientists were most likely to have personally considered are those associated with youth careers for under-represented groups and diversity.

The goals the scientists were least likely to have personally considered were using engagement to consider their own research and trying to ensure robust funding.

(Ordered by degree of reported “importance” from slide 12)

Belief about Whether it is Ethical to Pursue Goal

(1 = Strongly Disagree, 5 = Strongly Agree)

Trying to increase the likelihood that people consider scientific evidence when making decisions (Asked to subset of full sample, n = 263-283)



Trying to ensure that relevant decision-makers provide robust funding for scientific research" (Asked to subset of full sample, n = 490-512)



Building trust in the form of strong relationships with priority audiences (Asked to subset of full sample, n = 508-544)



Trying to increase the likelihood that people make decisions that are consistent with the available evidence (Asked to subset of full sample, n = 965-1,026)



Increase likelihood under-represented youth pursue science careers (Asked to subset of full sample, n = 838-876)



Ensure scientific community moves towards being more just, equitable ... (Asked to subset of full sample, n = 874-916)



Advocate to increase likelihood that people will make specific decisions (Asked to subset of full sample, n = 930-991)



Ensuring that scientists like you make the best possible research decisions (Asked to subset of the full sample, n = 475-500)

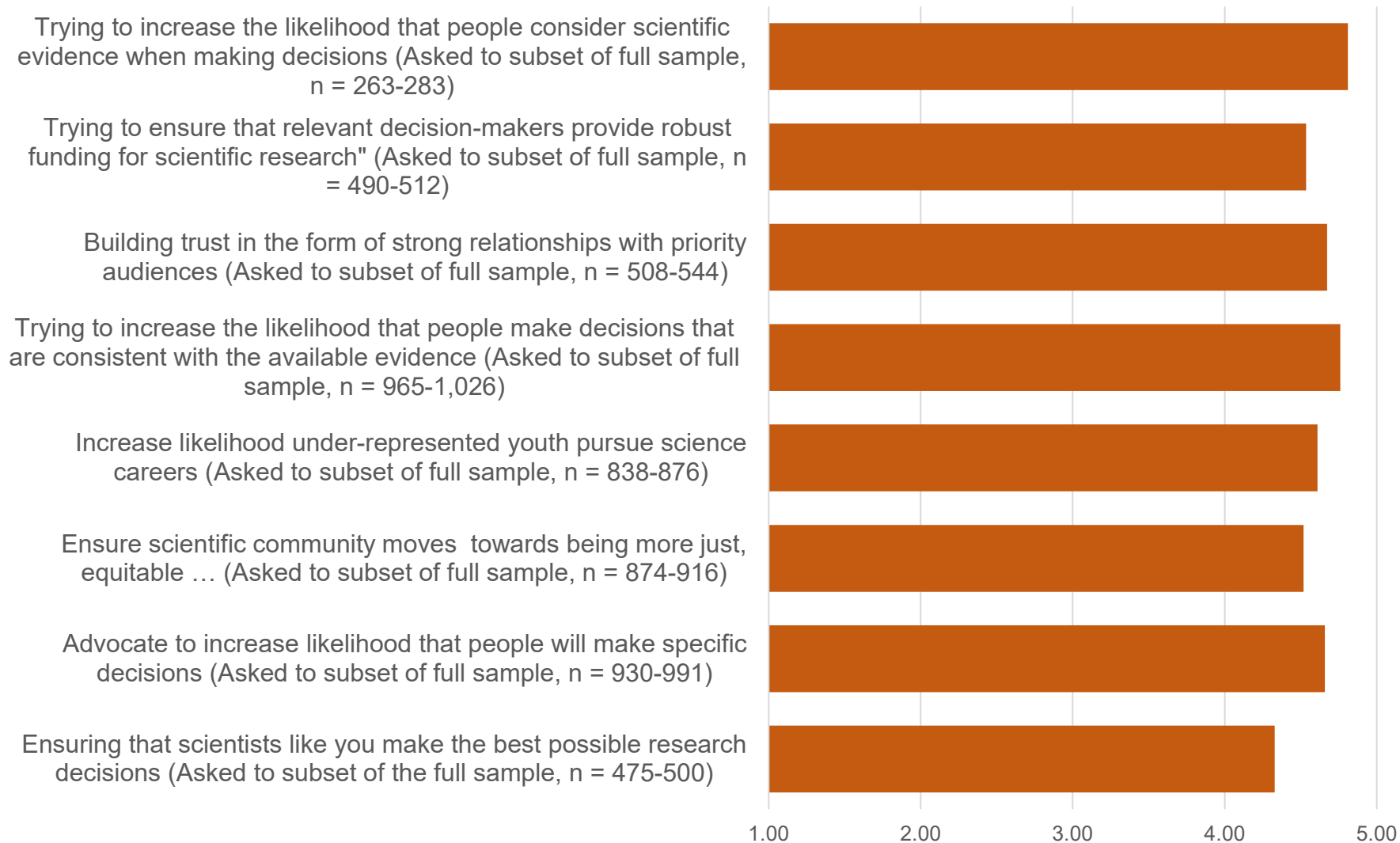
1.00 2.00 3.00 4.00 5.00

Scientists agreed that all the goals were ethical to pursue. The goals of seeking to ensure robust funding and trying to use engagement to make better research choices were seen in slightly less positive light.

(Ordered by degree of reported "importance" from slide 12)

Belief about Whether Pursuing Goal Would Benefit society

(1 = Strongly Disagree, 5 = Strongly Agree)

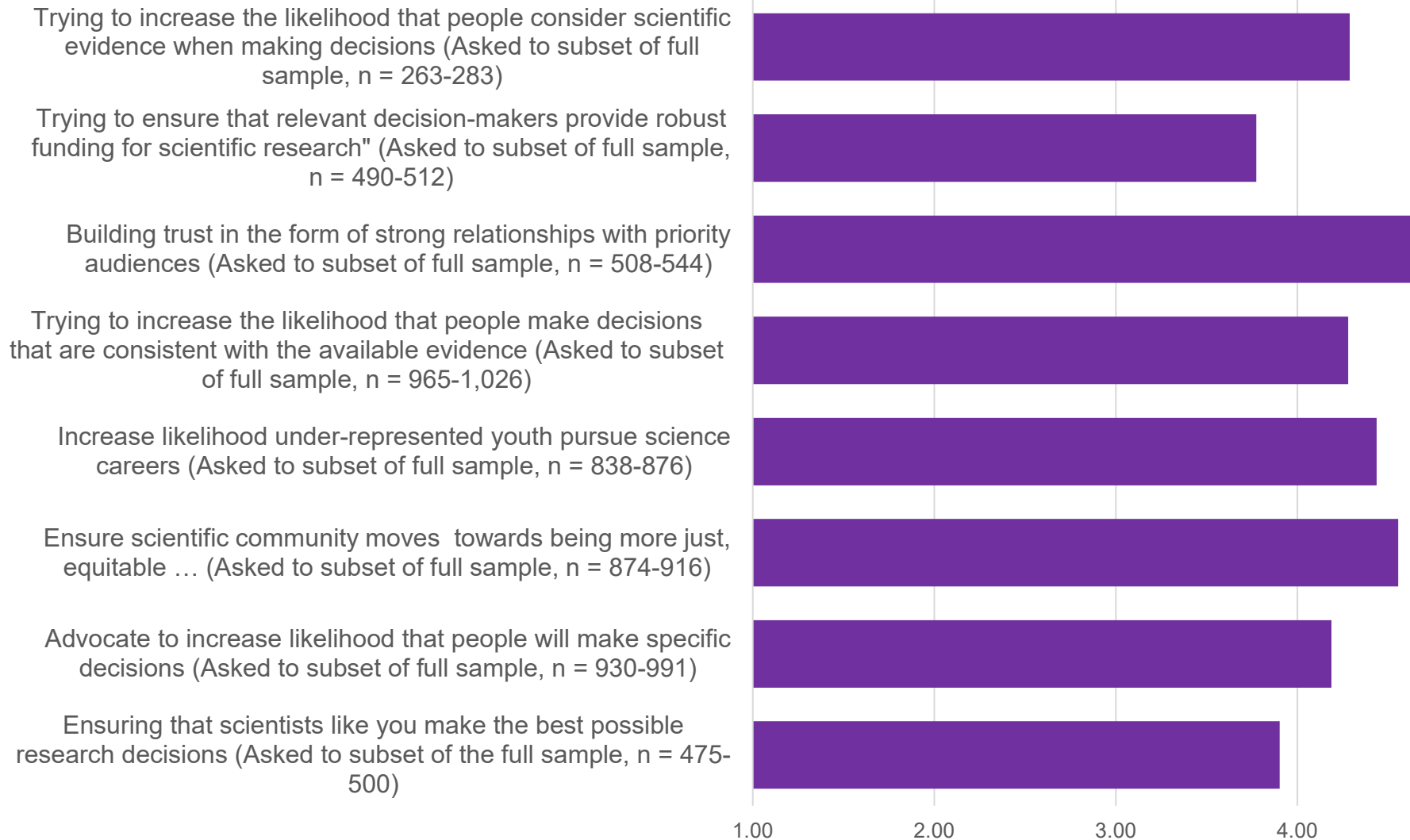


Scientists agreed that pursuing all of the goals could benefit society. There were, again, some minor variations with seeking to ensure robust funding and trying to use engagement to make better research choices being seen in a slightly less positive light.

(Ordered by degree of reported “importance” from slide 12)

Belief about Whether Pursuing Goal Would be Satisfying

(1 = Strongly Disagree, 5 = Strongly Agree)

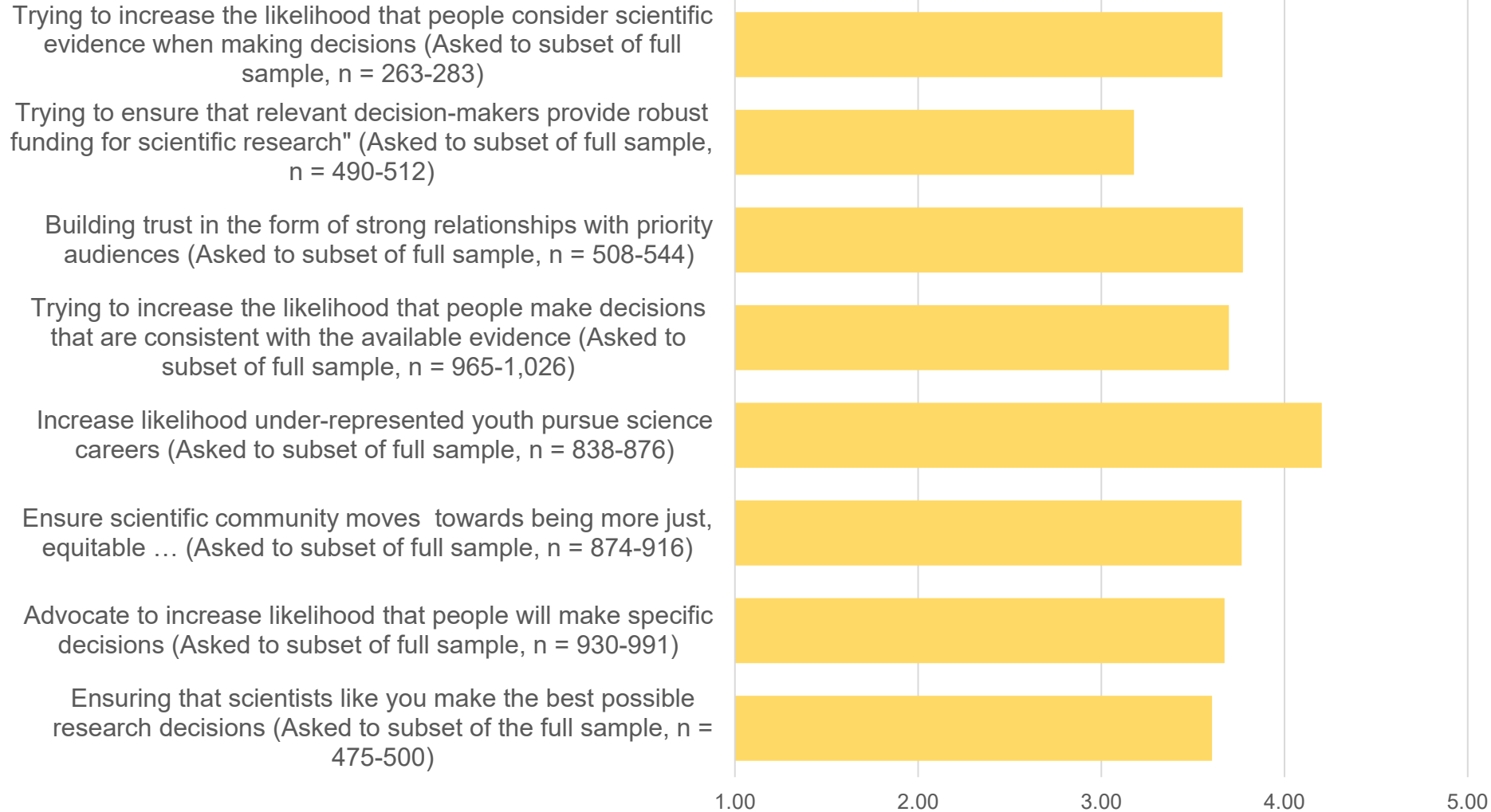


Scientists generally agreed that most of the goals would be satisfying to pursue (i.e., most averages above 4) but gave somewhat lower ratings to the goal focused on ensuring funding and ensuring that the research is informed by public perspectives.

(Ordered by degree of reported importance from slide 12)

Belief about Whether Pursuing Goal Would be Enjoyable

(1 = Strongly Disagree, 5 = Strongly Agree)



Scientists were somewhat neutral to positive as to whether pursuing most of the goals would be enjoyable (i.e., averages between 3 and 4).

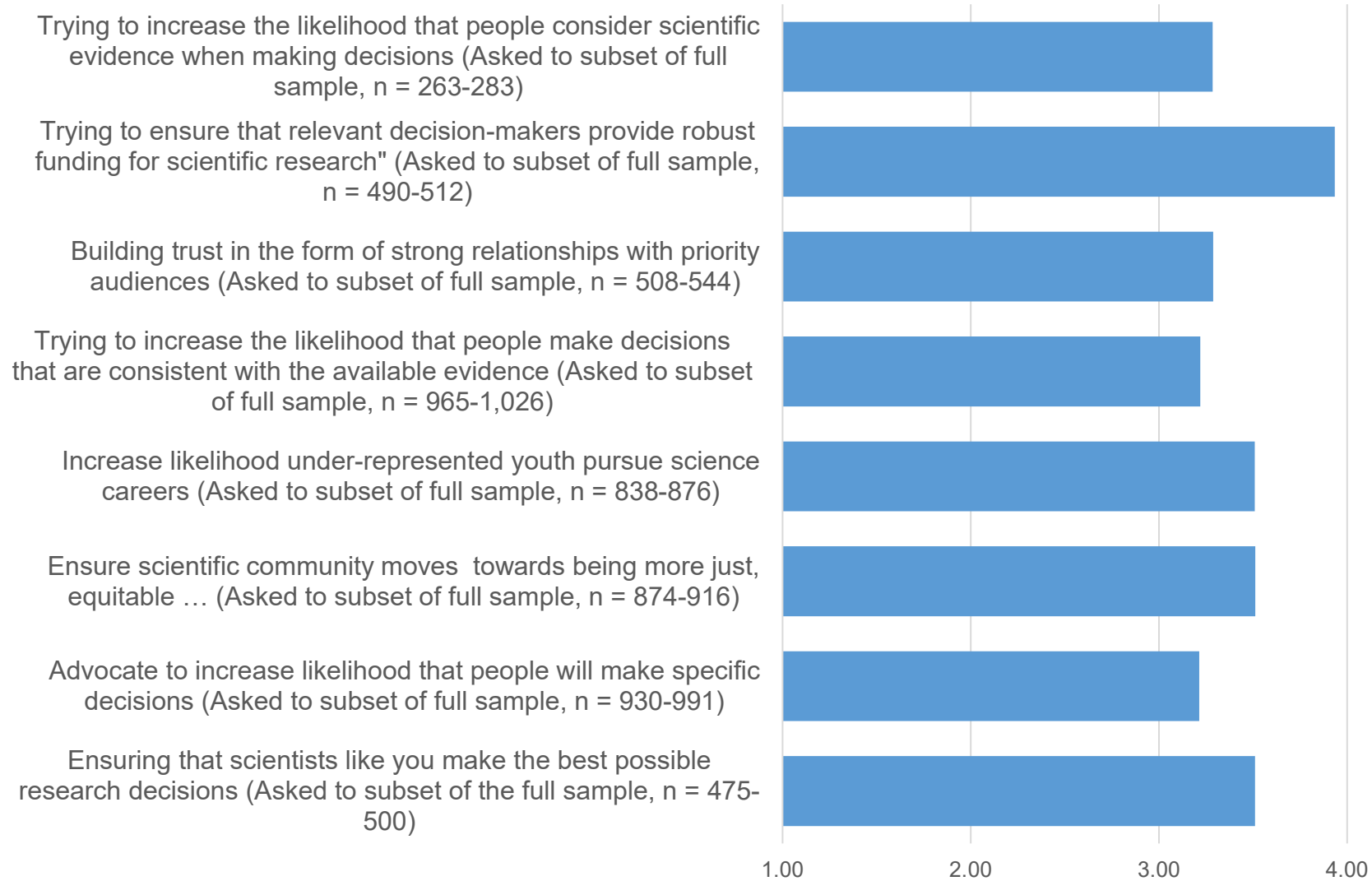
They were most positive about the degree to which they would enjoy trying to increase the number of youth from under-represented groups who chose science careers.

They were least likely to agree that pursuing robust funding for science would be enjoyable.

(Ordered by degree of reported “importance” from slide 12)

Belief about Whether Pursuing Goal Would Benefit Career

(1 = Strongly Disagree, 5 = Strongly Agree)



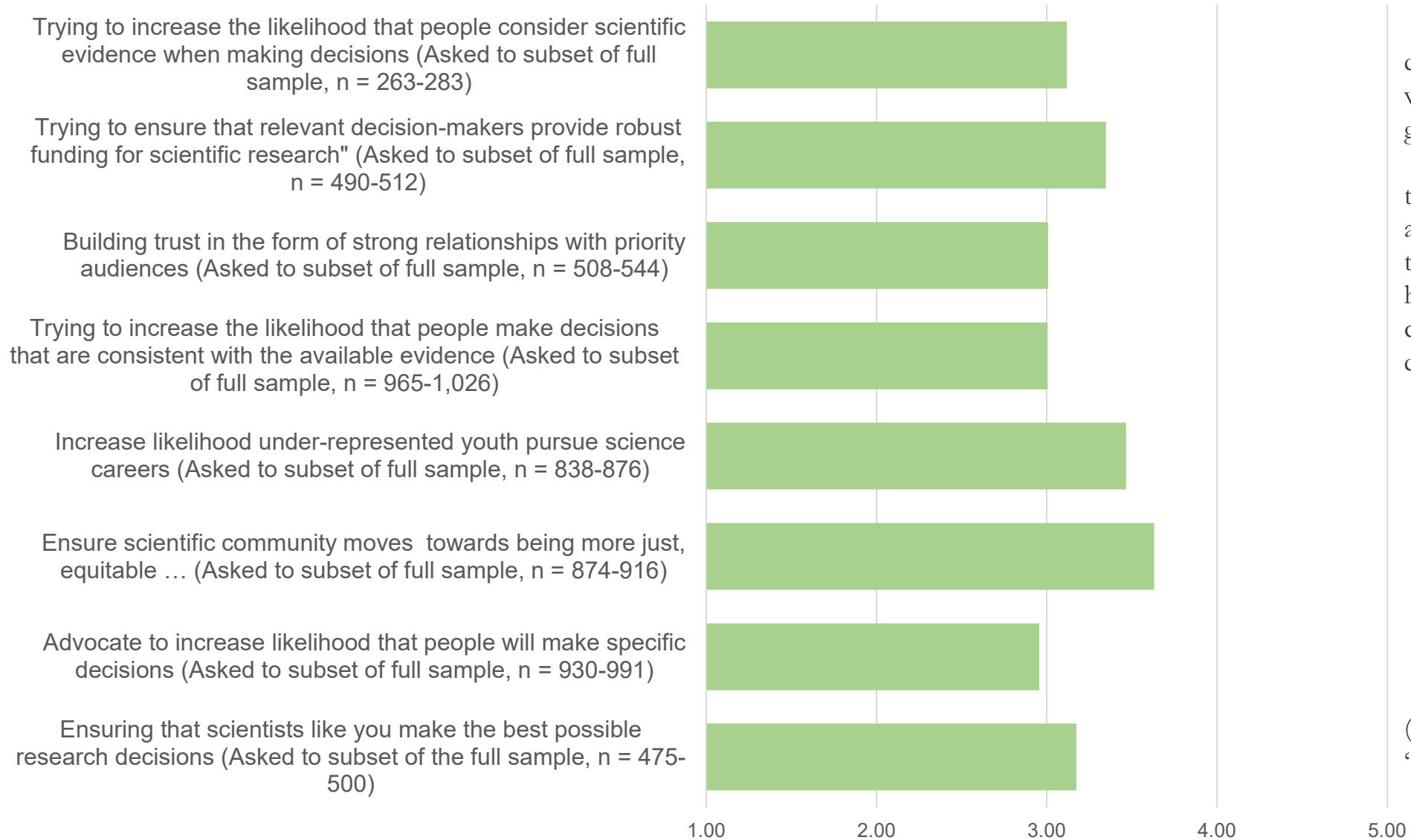
Scientists were also fairly neutral about the degree to which pursuing various goals would be good for their own careers (i.e., averages generally closer to 3 than 4).

The only goal where there was substantial agreement was the goal associated with seeking to ensure robust scientific funding.

(Ordered by degree of reported importance from slide 12)

Belief that Pursuing Goal is Expected by Peers (Injunctive Norm)

(1 = Strongly Disagree, 5= Strongly Agree)



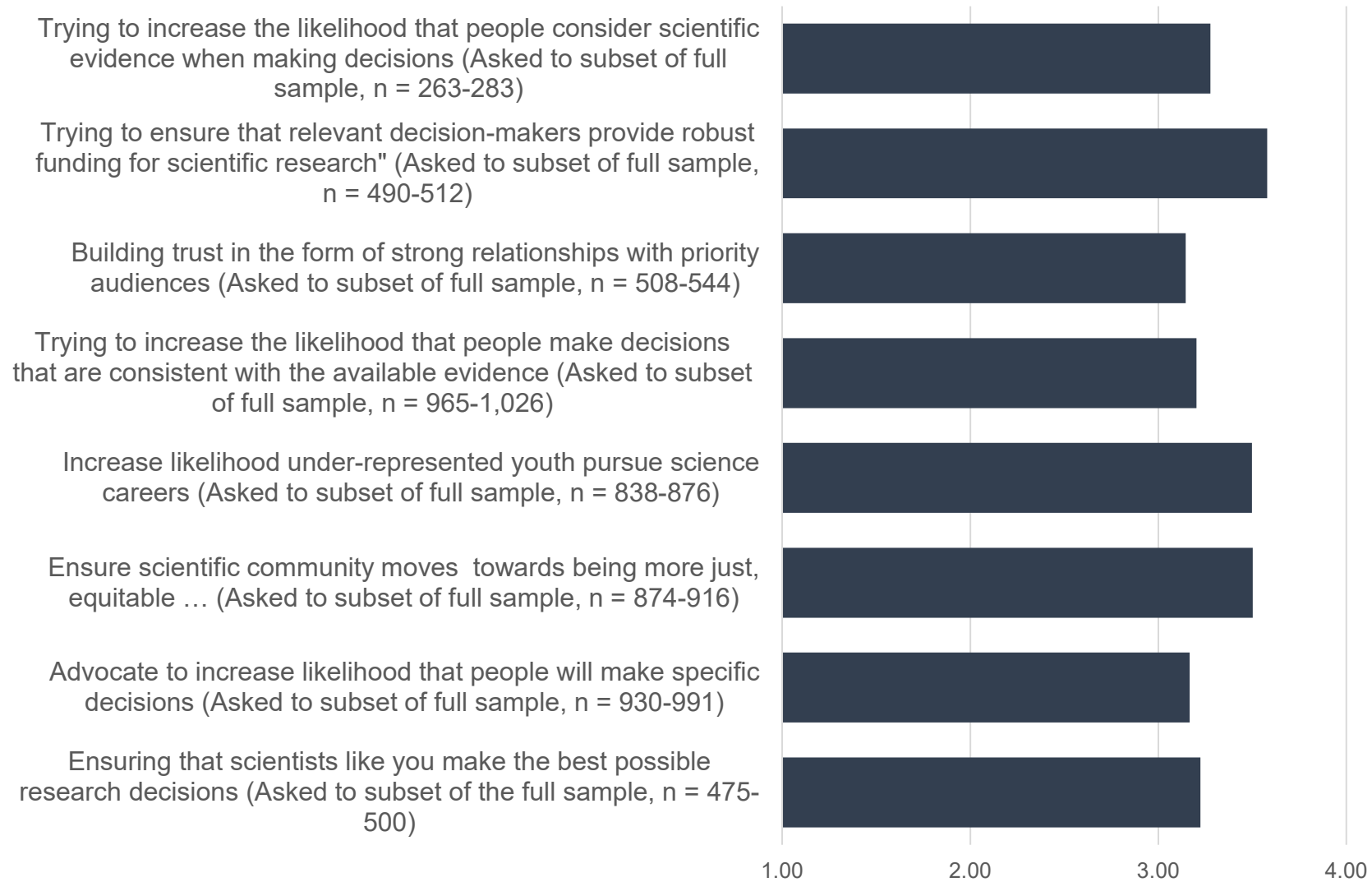
Scientists were also neutral on the degree to which they believed they were expected to pursue any of the goals.

The only goals where there seemed to be expectations were the goals associated with increasing diversity through recruiting and through helping to move the scientific community towards justice, equity, diversity, and inclusion.

(Ordered by degree of reported “importance” from slide 12)

Belief that Pursuing Goal is Common Among Peers (Descriptive Norm)

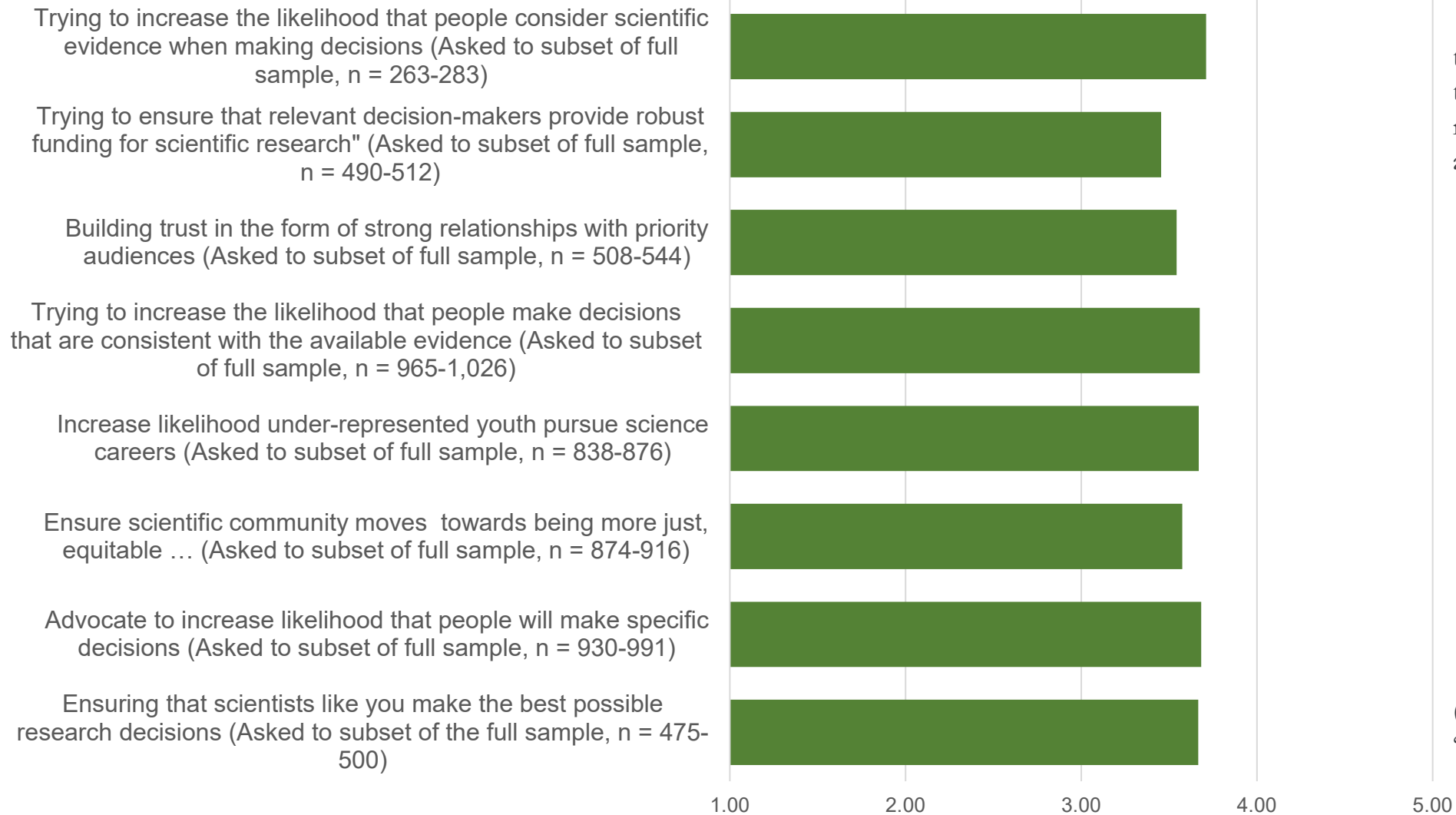
(1 = Strongly Disagree, 5 = Strongly Agree)



Scientists were somewhat neutral on the degree to which they believed pursuing most of the goals would be common among their peers (i.e., averages close to 3).

(Ordered by degree of reported "importance" from slide 12)

Belief in Personal Ability to Pursue Goal (1 = Strongly Disagree, 5= Strongly Agree)

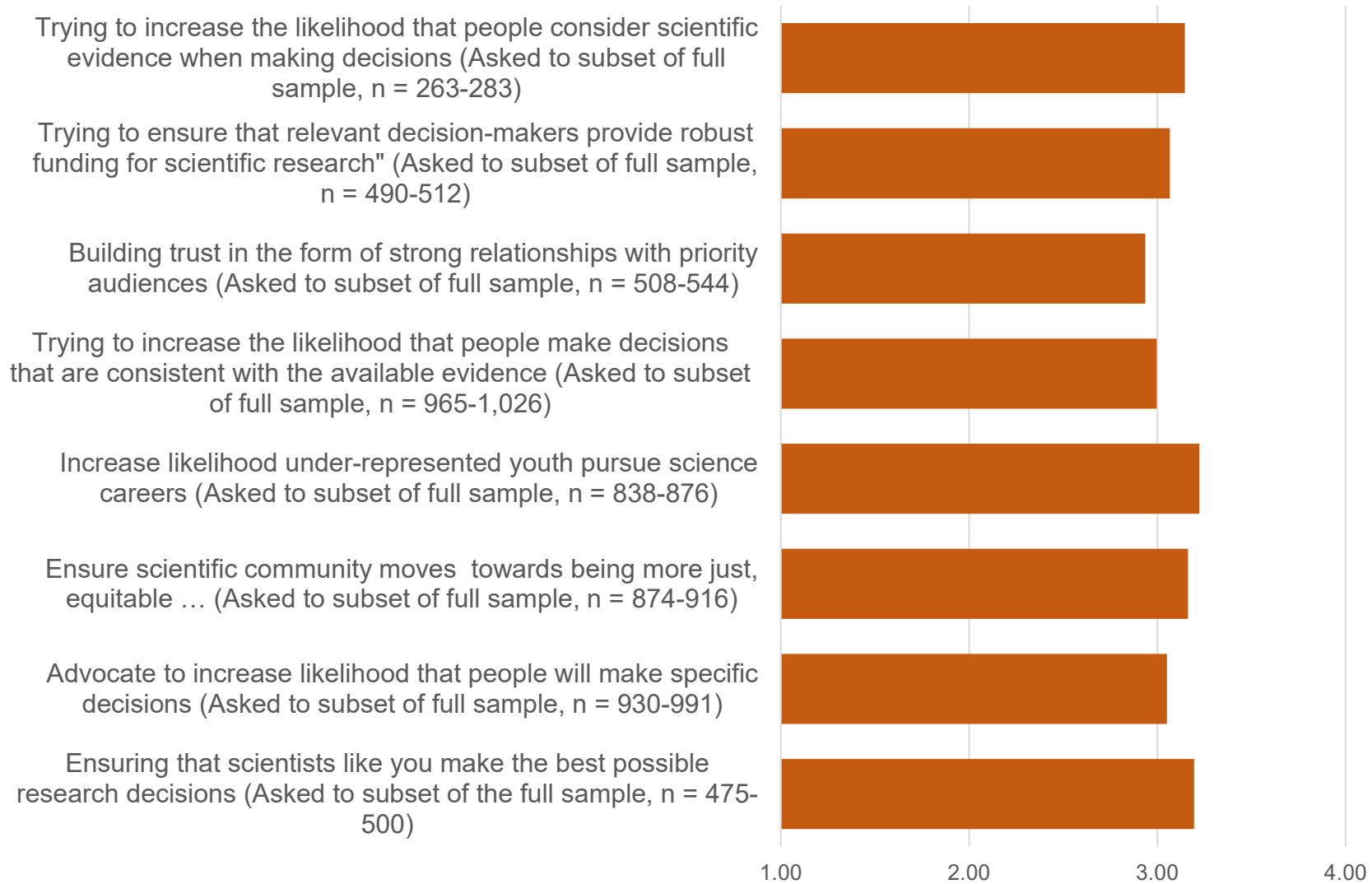


Scientists generally agreed that they had the personal ability (skills) to pursue all of the goals. In this regard, the scores are somewhat above the midpoint of the scale.

(Ordered by degree of reported “importance” from slide 12)

Belief about Access to Resources Needed to Pursue Goal

(1 = Strongly Disagree, 5= Strongly Agree)

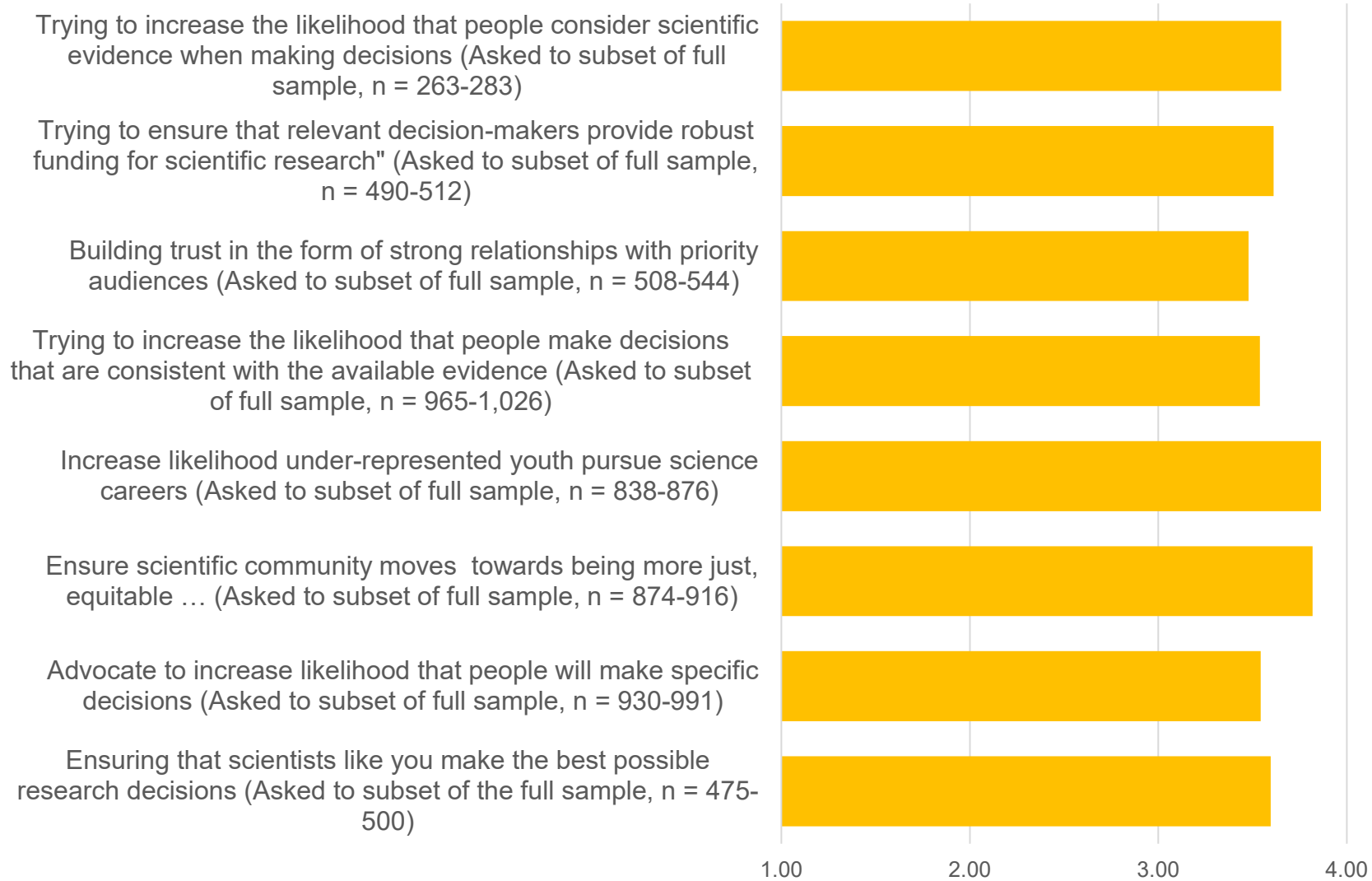


Scientists were about equally likely to agree, disagree, or be neutral in the degree to which they believed they had the resources needed to pursue the various goals (i.e., averages were close to 3).

(Ordered by degree of reported importance from slide 12)

Belief that You have Authority to Pursue Goal

(1 = Strongly Disagree, 5= Strongly Agree)



Scientists generally agreed, though not strongly, that they have the authority to pursue any of the goals they might choose (i.e., averages were about midway between 3 and 4).

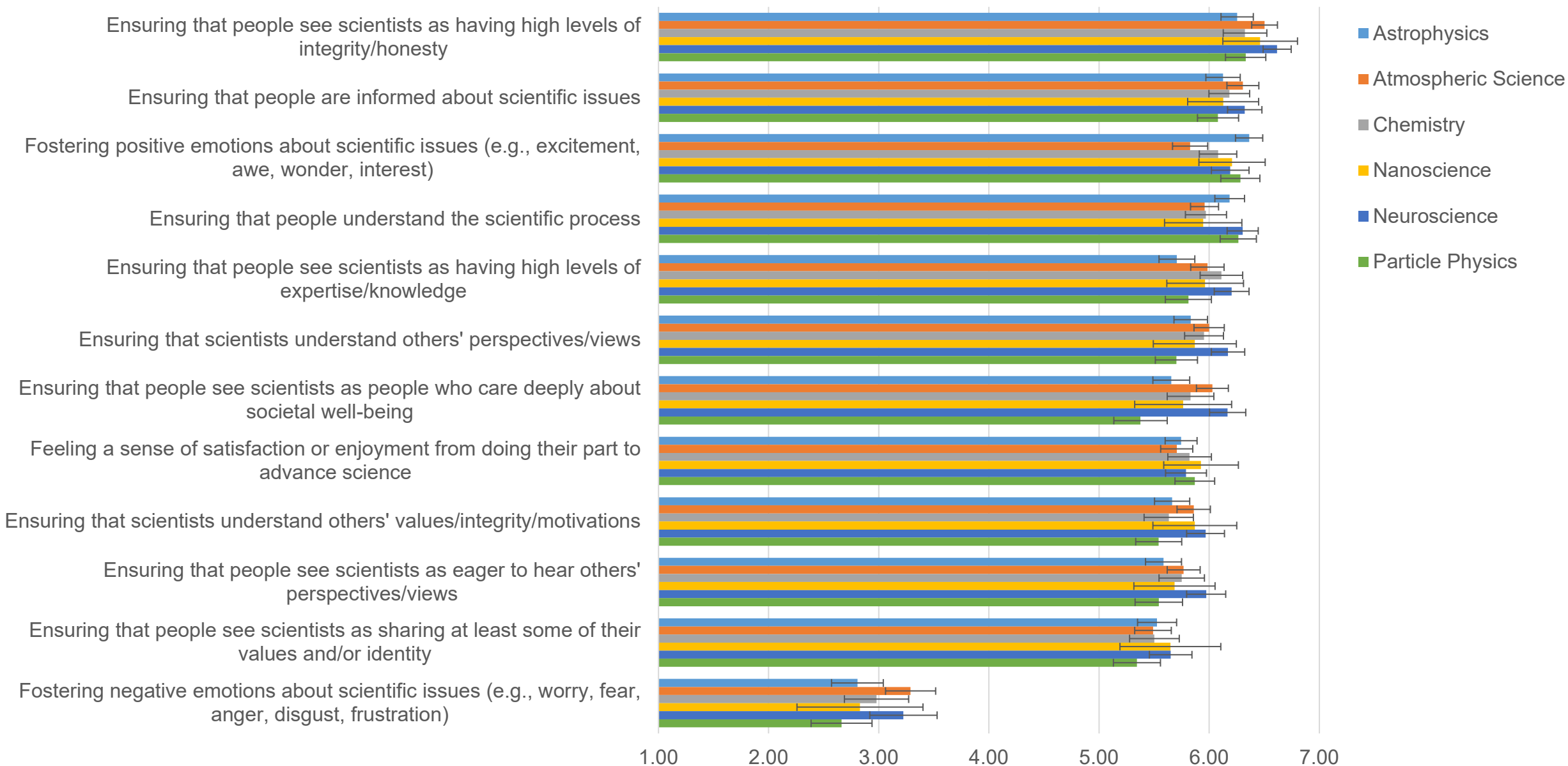
They were especially likely to agree that they had the authority to pursue goals associated with justice, equity, diversity, and inclusion.

5.00 (Ordered by degree of reported “importance” from slide 12)

Section 7: Communication Objectives by Field

Priority Engagement Cognitive and Affective Communication Objectives by Field

(1 = Very unimportant, 7 = Very important)



Error bars are provided for reference. Such bars would be appropriate if the data were based on a sample, rather than an attempted census.

Section 8: Conclusions

Conclusions

Several conclusions seem possible given the project goal of better understanding scientists' audience-specific **behavioral goals** for potential public engagement activities, including whether these goals and associated audiences vary by degree of focus on basic science rather than applied science, field, and demographics.

1. The absence of consistent differences in goals (and audiences) by degree of focus on basic science, field, and demographics suggests that anyone seeking to help scientists communicate effectively needs to work with scientists to identify and prioritize audience-specific goals.
 - A scientists' scientific or personal background is rarely going to be an adequate predictor of their priority goals. Further, the responses suggest that many of the scientists surveyed have (understandably) not thought extensively about the full range of potential behavioral goals and thus may benefit from support.
2. A desire to see science being used is not limited to applied scientists. Scientists in fields with substantial focus on basic science still want to see other people in society (e.g., youth, policymakers) consider scientific evidence when making decisions.
 - Future research might explore whether basic scientists' priority audiences and behavioral goals may be broader given that they may not be as likely as applied researchers to have non-academics specifically focused on their research (i.e., enhance trust within society, rather than within a specific local/professional group).
3. The relatively low ranking of the goal focused on public consultation on topics/methods suggests that anyone who wants scientist to put more effort into listening to societal voices may need to help scientists see the benefits, normative value, and feasibility of pursuing this goal.
 - Future research might explore ways to encourage scientists to prioritize listening and how to best provide scientists with tools to listen respectfully and effectively.
4. There is a substantial opportunity for those interested in increasing scientists' willingness to consider specific goals to communicate the degree to which a specific goal would be beneficial, normatively common and acceptable, and feasible given available skills and resources.
 - The scientists surveyed were relatively pessimistic regarding their perceived access to adequate resources available to pursue specific behavioral goals. Additional effort could focus on finding ways to ensure scientists have access to such resources as well the tools needed to find and use these resources.

Journals from which sample was drawn

<p>Astronomy – Web of Science Journal Citation Report Category: Astronomy and Astrophysics</p> <ul style="list-style-type: none"> · Annual Review of Astronomy and Astrophysics · Astronomy and Astrophysics Review · Living Reviews in Solar Physics* · Annual Review of Earth and Planetary Sciences* · Nature Astronomy · Astrophysical Journal Supplement Series · Space Science Reviews* · Astrophysical Journal Letters · New Astronomy Reviews · Journal of Cosmology and Astroparticle Physics · Publications of the Astronomical Society Of Australia · Astronomy & Astrophysics · Publications of the Astronomical Society of The Pacific · Astrophysical Journal 	<p>Chemistry – Web of Science Journal Citation Report Category: Chemistry, Multidisciplinary</p> <ul style="list-style-type: none"> · Chemical Reviews · Chemical & Society Reviews · Energy & Environmental Science · Nature Reviews Chemistry · Advanced Materials · Chem · Accounts of Chemical Research · Nature Chemistry · Trends in Chemistry · Advanced Functional Materials · Nano Today · ACS Central Science · ACS Nano
<p>Particle Physics – Web of Science Journal Citation Report Category: Physics, Particles & Fields</p> <ul style="list-style-type: none"> · Living Reviews in Relativity* · Annual Review of Nuclear and Particle Science · Progress in Particle and Nuclear Physics · Progress of Theoretical and Experimental Physics · Journal of Cosmology and Astroparticle Physics · Journal of High Energy Physics · Physical Review D · Physics Letters B · Classical and Quantum Gravity · Nuclear Physics B · General Relativity and Gravitation 	<p>Nanoscience – Web of Science Journal Citation Report Category: Nanoscience and Nanotechnology</p> <ul style="list-style-type: none"> · Nature Reviews Materials · Nature Nanotechnology · Advanced Materials · ACS Energy Letters · Nano-Micro Letters · Carbon Energy · Energy Storage Materials · Advanced Functional Materials · Nano Energy · Nano Today · ACS Nano · Advanced Science · Small Methods · Small · Materials Today Nano · Biosensors & Bioelectronics · Nano Letters · Advanced Composites and Hybrid Materials · Nanoscale Horizons · Small Structures
<p>Atmospheric Sciences – Web of Science Journal Citation Report Category: Meteorology & Atmospheric Sciences</p> <ul style="list-style-type: none"> · Agricultural and Forest Meteorology · Atmosphere · Atmospheric Chemistry and Physics · Atmospheric Environment · Atmospheric Measurement Techniques · Bulletin of the American Meteorological Society · Climate Dynamics · Environmental Research Letters · Earth System Science Data · EOS · Global Biogeochemical Cycles · Journal of Advances in Modeling Earth Systems 	<p>Neuroscience – Web of Science Journal Citation Report Category: Neurosciences</p> <ul style="list-style-type: none"> · Nature Neuroscience · Nature Reviews Neuroscience · Neuron · Brain · Molecular Psychiatry · Journal Of Pineal Research* · Brain Behavior and Immunity · Molecular Neurodegeneration · Biological Psychiatry* · Annals of Neurology · Trends in Cognitive Sciences · Neurology-Neuroimmunology & Neuroinflammation

Full question text for goals

Perceived Goal Importance: In general, when choosing to communicate with your priority audience(s), how important or unimportant should the following type of goal be for scientists like you? [1 = Very unimportant, 2 = Unimportant, 3 = Somewhat unimportant, 4 = Somewhat important, 5 = Important, 6 = Very important]

- ¹[MAKE] Trying to increase the likelihood that people will make decisions that are consistent with the available science.

This could include trying to ensure someone from a priority audience makes health, environmental, or social/economic decisions that increase personal and/or societal well-being. This might include policymakers deciding to regulate a risk, parents deciding to vaccinate their children, consumers deciding to make environmentally responsible purchases, etc.
- ¹[ADVOCATE] Advocating to increase the likelihood that people will make specific decisions that are consistent with the available science.

This could include trying to advocate to a priority audience to try to ensure they make health, environmental, or social/economic decisions that increase personal and/or societal well-being. This might include policymakers deciding to regulate a risk, parents deciding to vaccinate their children, consumers deciding to make environmentally responsible purchases, etc.
- [CONSIDER] Trying to increase the likelihood that people consider scientific evidence when making decisions.

This could include trying to ensure someone from a priority audience considers evidence underlying health, environmental, or social/economic behaviors that increase personal and/or societal well-being. This might include policymakers considering evidence related to regulating a risk, parents considering evidence related to vaccination of children, consumers considering evidence related to environmentally responsible purchases, etc.
- [FUNDING] Trying to ensure that relevant decision-makers provide robust funding for scientific research.

This could include trying to ensure people from a priority audience support providing scientific researchers with strong financial support.
- [TRUST] Building trust in the form of strong relationships with priority audiences so that they are more likely to turn to the scientific community when faced with complex decisions.

This might be understood as people from across society (e.g., marginalized groups, policymakers) trusting science and seeing decisions made using scientific evidence as legitimate.
- [RESEARCH] Ensuring that scientists like you make the best possible research decisions (e.g., public consultation on topics/methods).

This could also include ensuring strong dialogue between the scientific community and others in society to help ensure scientists are able to make community-informed decisions.
- [YOUTH] Trying to increase the likelihood that youth from groups that are under-represented in science pursue scientific careers.

This could include trying to ensure such youth choose science-focused education programs and careers, as well as persist in such endeavors.