THE LINUX FOUNDATION | Research

Diversity, Equity, and Inclusion in Open Source 2021

Key Survey Findings

In partnership with:

aws   CHAOSS   COMCAST   FUJITSU   GitHub   GitLab   HITACHI Inspire the Next   HUAWEI   intel   NEC   Panasonic   Red Hat   RENESAS   vmware

and   KALEIDO INSIGHTS
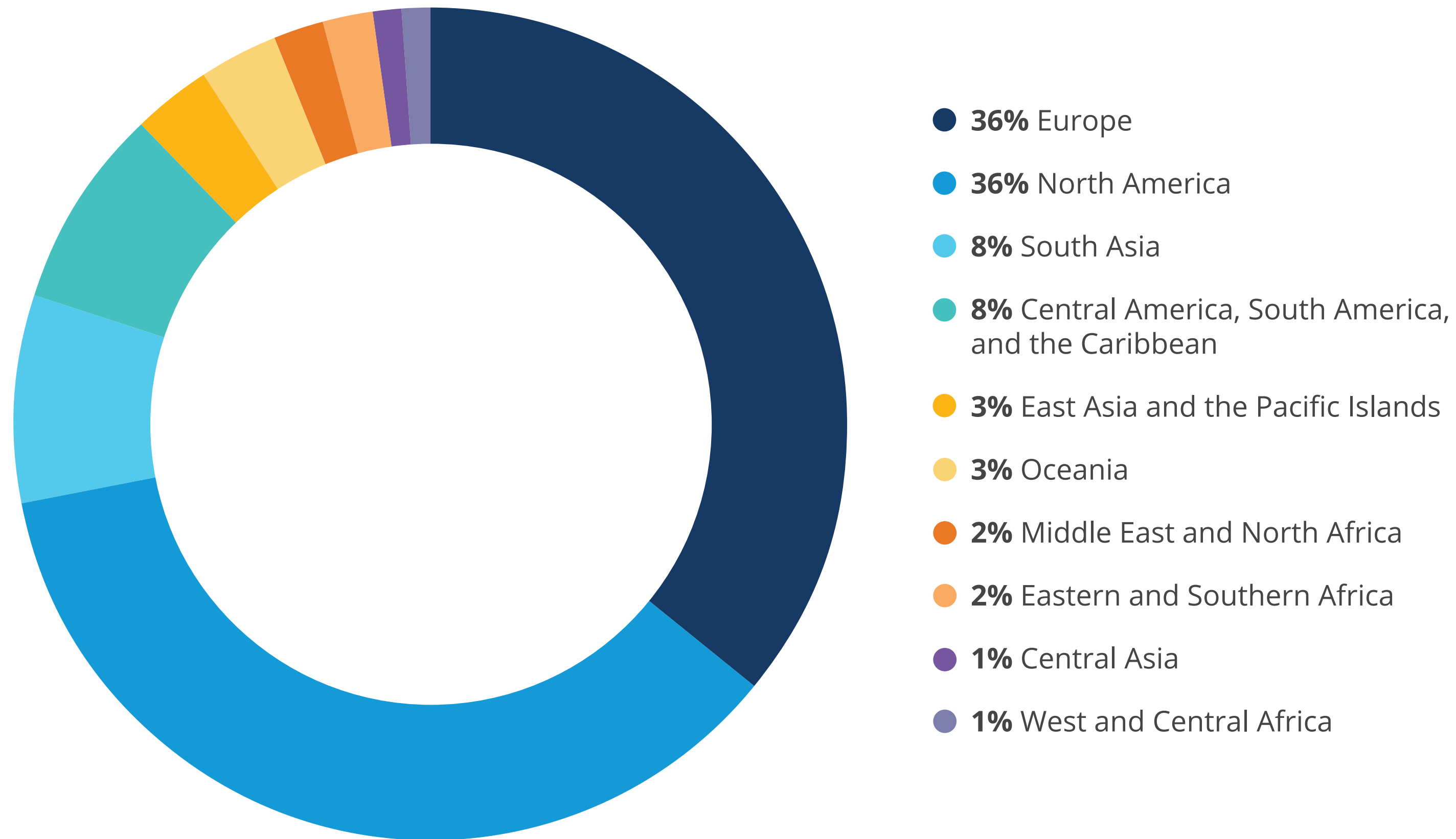
Contents

Methodology

Methodology

Sample

- Survey fielded: July 2021

- Population investigated: Anyone who uses, contributes to, or thinks about open source software and is over 17 years old.

- Scope: Worldwide, with translated versions in Arabic, Chinese (simplified), French, German, Hindi, Japanese, Korean, Portuguese, Russian, and Spanish. 89% of the usable responses came from the English questionnaires, 5% from the Spanish, and 3% from the German.

- Usable sample: 2,350. Overall, 3,192 participants answered 2 of the 3 initial questions, which included an age-related screening question. Cases with high levels of non-response were ultimately excluded from the sample.
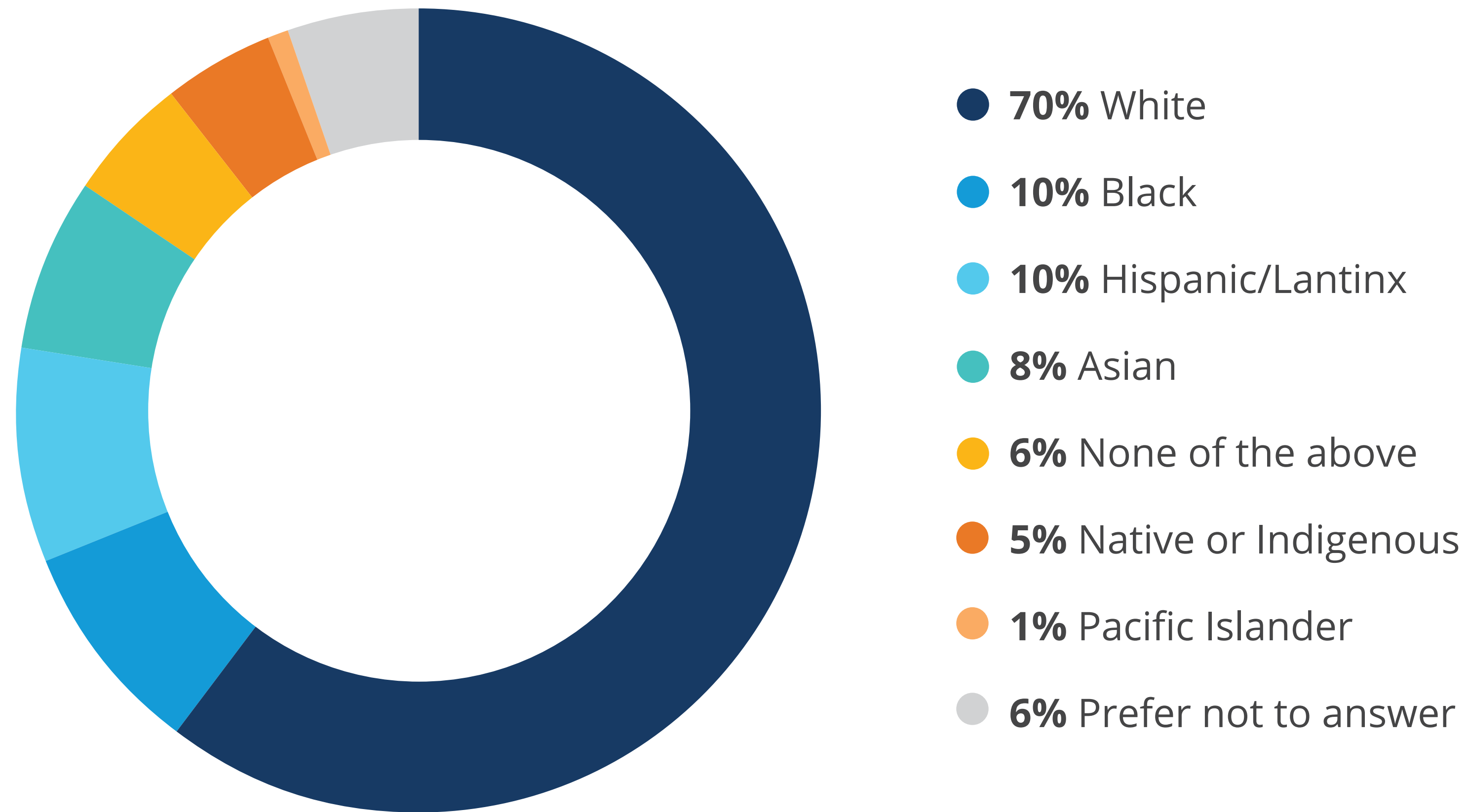
Margin of Error (MoE) is +/- 3.1% with 90% confidence and +/- 2.6% with 95% confidence (N=2,350)

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Demographics

What best describes your location?

- **36%** Europe
- **36%** North America
- **8%** South Asia
- **8%** Central America, South America, and the Caribbean
- **3%** East Asia and the Pacific Islands
- **3%** Oceania
- **2%** Middle East and North Africa
- **2%** Eastern and Southern Africa
- **1%** Central Asia
- **1%** West and Central Africa

Sample Size = 2,344

With which racial background(s) do you identify? If multiracial, check all that apply.

- **70%** White
- **10%** Black
- **10%** Hispanic/Lantinx
- **8%** Asian
- **6%** None of the above
- **5%** Native or Indigenous
- **1%** Pacific Islander
- **6%** Prefer not to answer

Note that race categorizations were only asked of North American respondents | Sample Size = 844, Total Mentions = 981
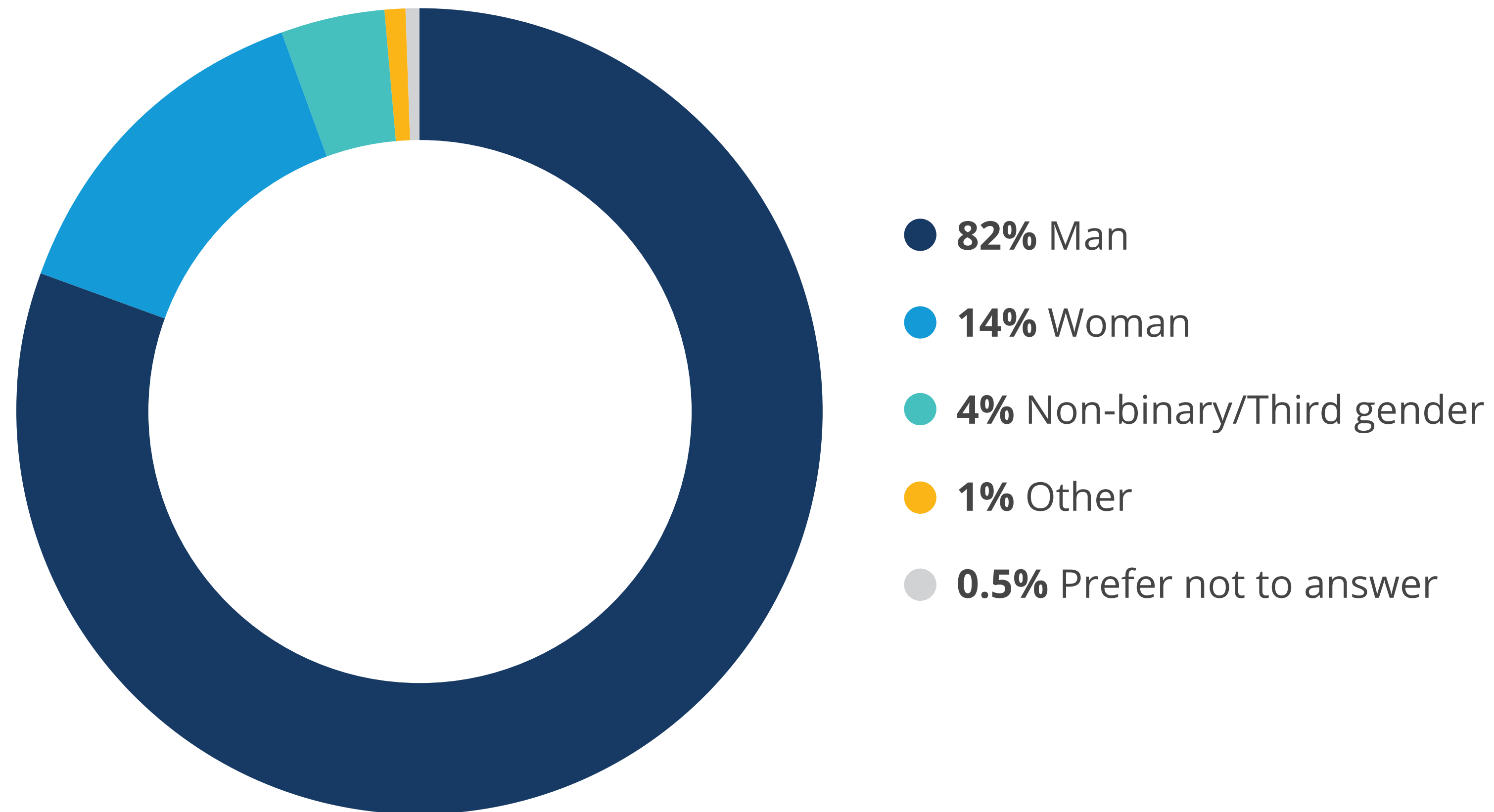
What is the highest level of formal education that you have completed?
What is the highest level of formal education that either of your parents completed?

Legend:
- ● Education completed
- ● Parents' education completed

Categories (top to bottom):
- Less than secondary (high) school
- Secondary (high) school graduate or equivalent
- Some college, no-degree vocational/trade program or apprenticeship
- Bachelor's degree
- Master's degree, Doctorate (Ph.D.) or other advanced degree (e.g. M.D., J.D.)
- Prefer not to answer

X-axis: 0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%

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Which word best describes the area where you live?
Which word best describes the area where you work?
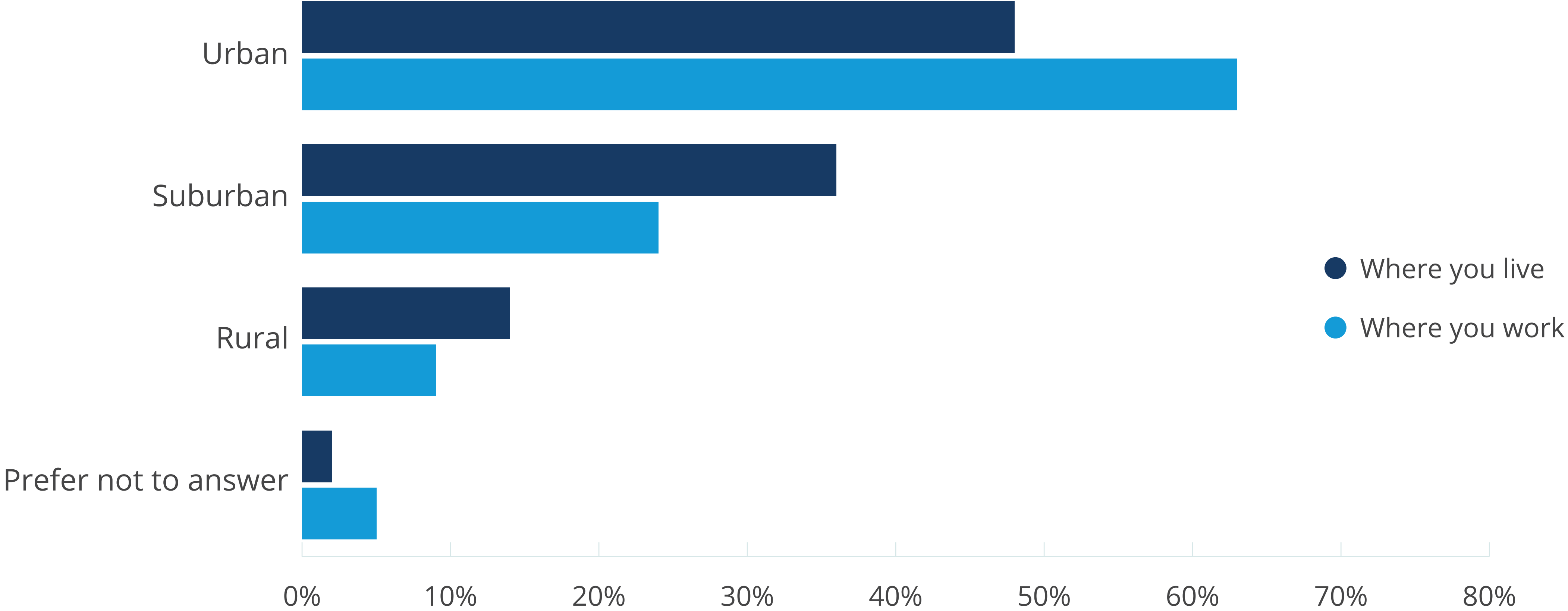
Sample Size: Where you live (n=2,346), Where you work (n=2,319)

What is your gender?

- **82%** Man
- **14%** Woman
- **4%** Non-binary/Third gender
- **1%** Other
- **0.5%** Prefer not to answer

Sample Size = 2,344, Total Mentions = 2,378

Do you consider yourself to be gender non-conforming, gender diverse, gender variant, or gender expansive?

- **78%** No
- **10%** Yes
- **3%** Questioning
- **8%** Prefer not to answer

Sample Size = 2,326
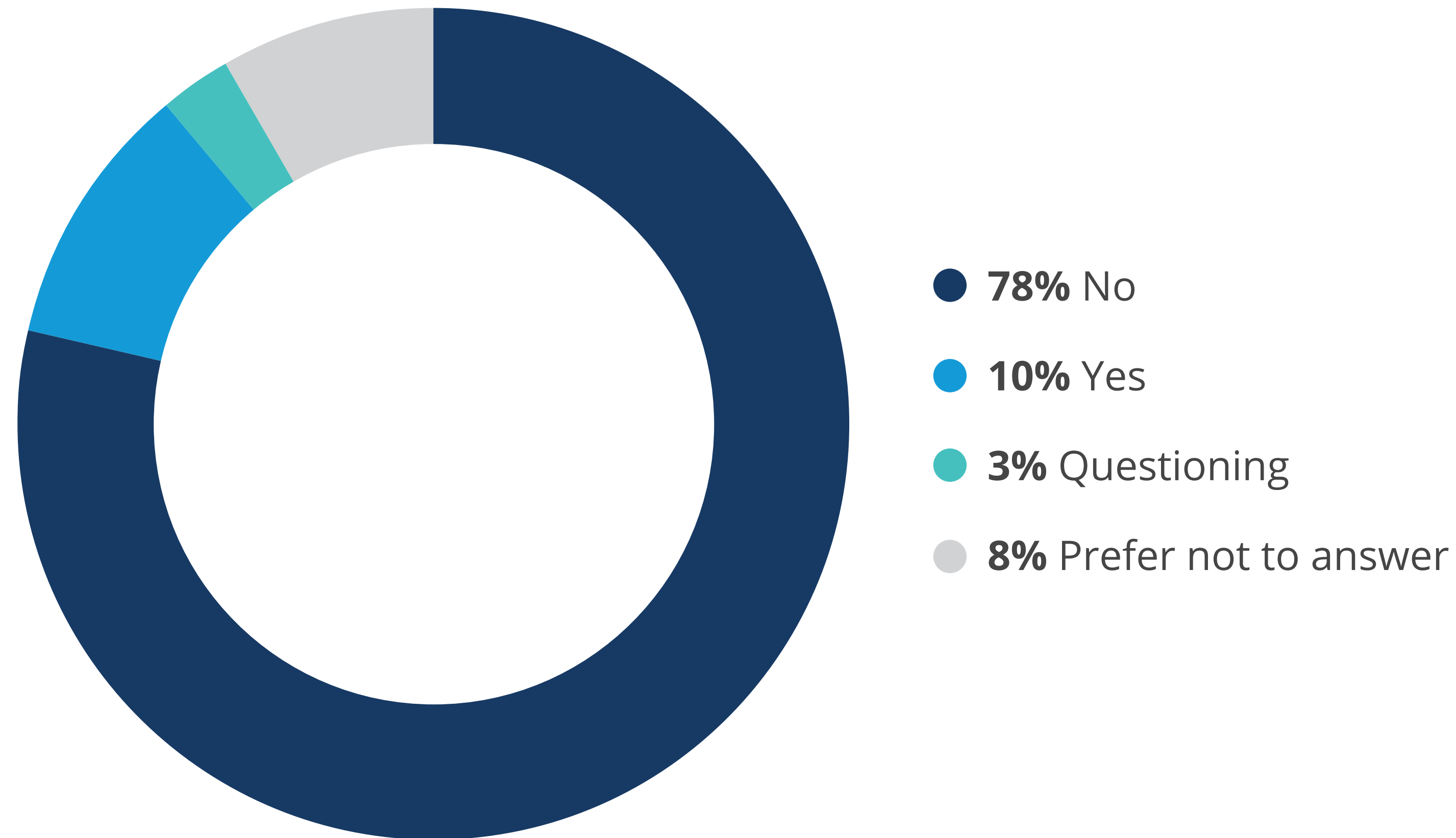
Do you consider yourself to be transgender?

- **93%** No
- **4%** Yes
- **1%** Questioning
- **2%** Prefer not to answer

Sample Size = 2,331
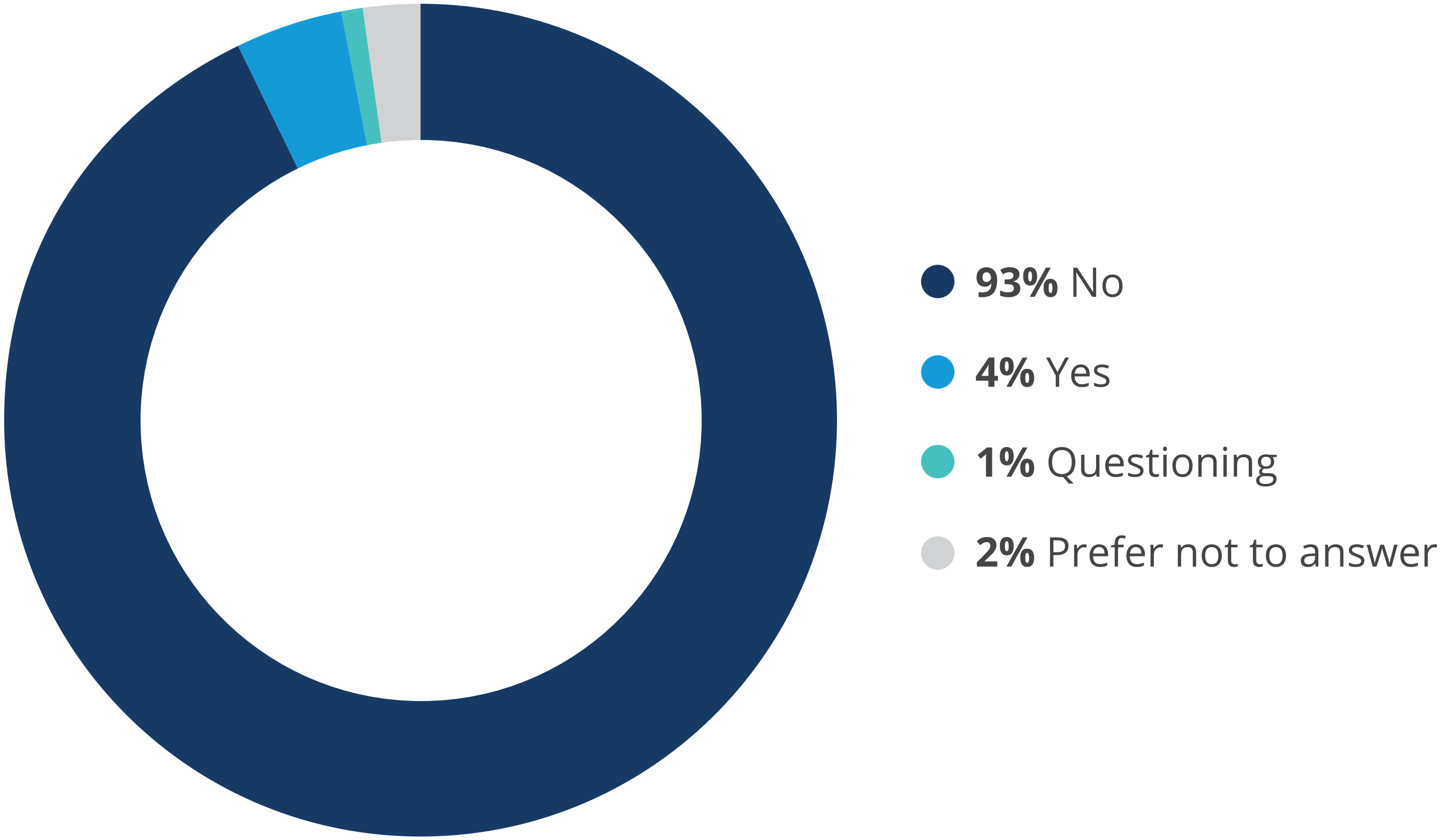
What is your sexual orientation? (check all that apply)

- **74%** Heterosexual or straight
- **8%** Bisexual
- **6%** Asexual
- **4%** Queer
- **3%** Pansexual
- **3%** Gay
- **2%** None of the above
- **2%** Questioning
- **2%** Lesbian
- **10%** Prefer not to answer

Sample Size = 2,300, Total Mentions = 2,598

What is your age?

- ● **8%** 18 to 24 years
- ● **22%** 25 to 34 years
- ● **29%** 35 to 44 years
- ● **21%** 45 to 54 years
- ● **13%** 55 to 64 years
- ● **4%** 65 to 74 years
- ● **2%** 75 years or older
- ● **1%** Prefer not to answer

Sample Size = 2,346
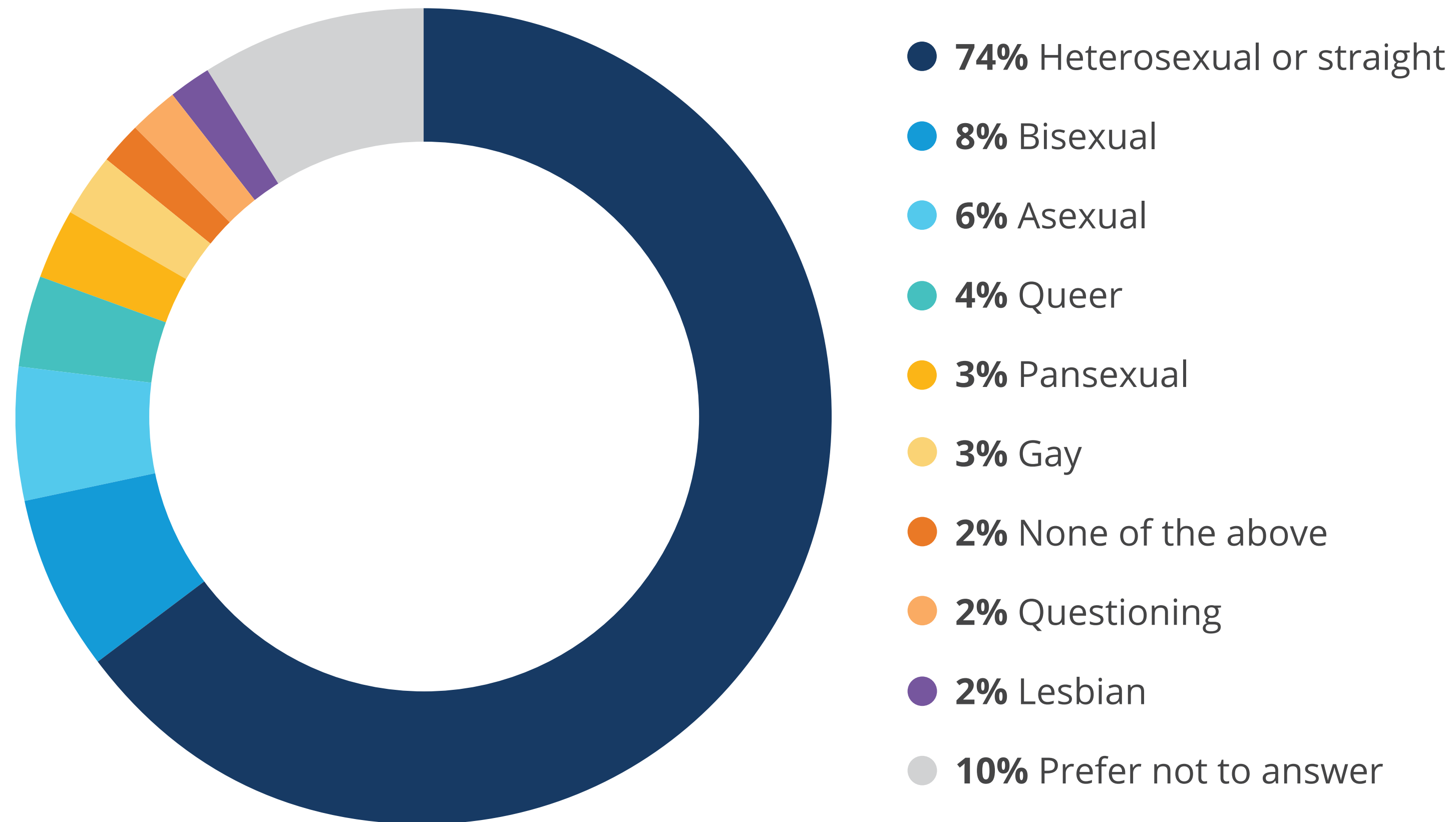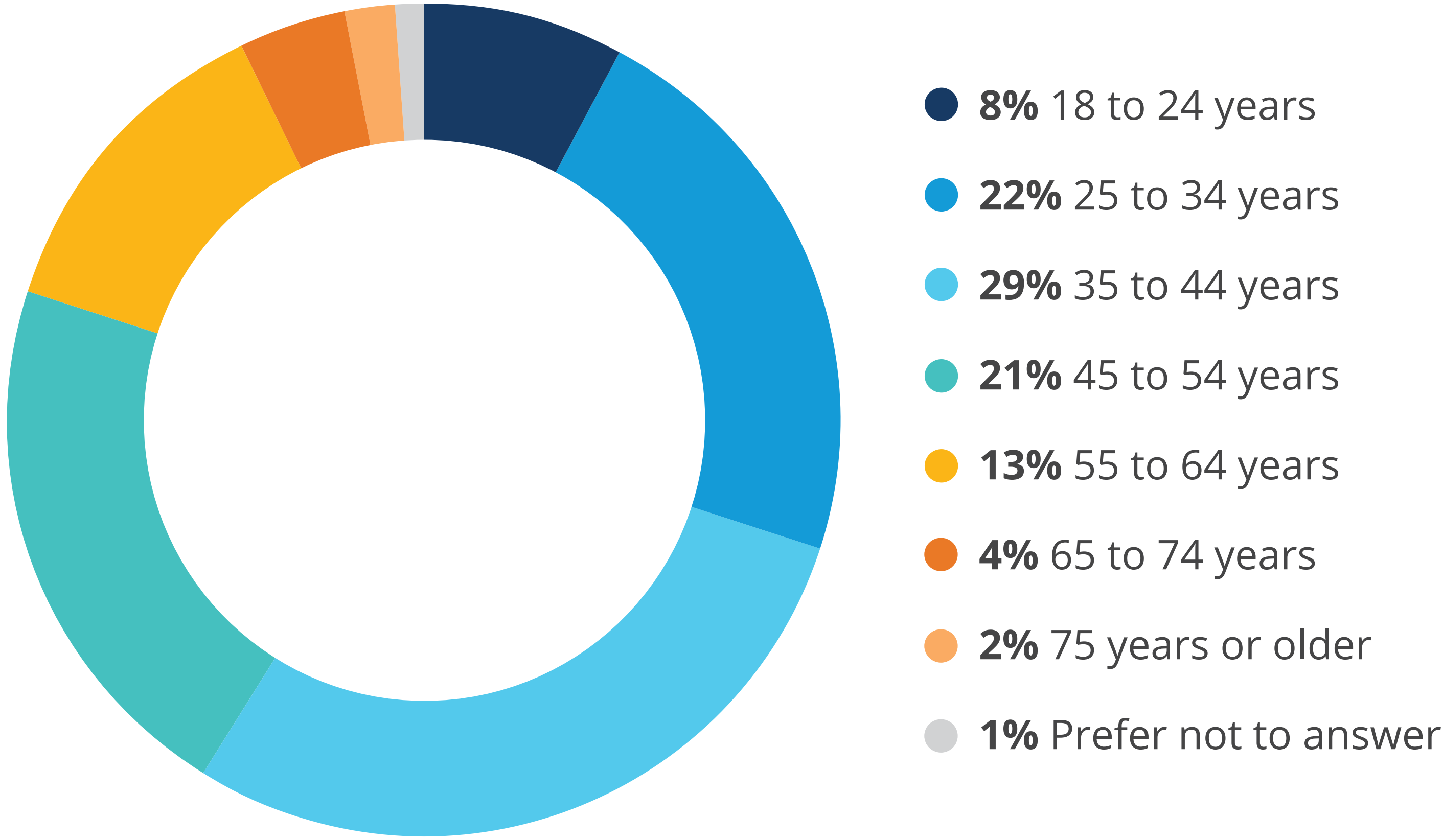
Do you have caregiving responsibilities? Select all that apply.

54% No

30% Yes, for a child

14% Yes, for an elder

9% Yes, other

Sample Size = 2,336, Total Mentions = 2,527
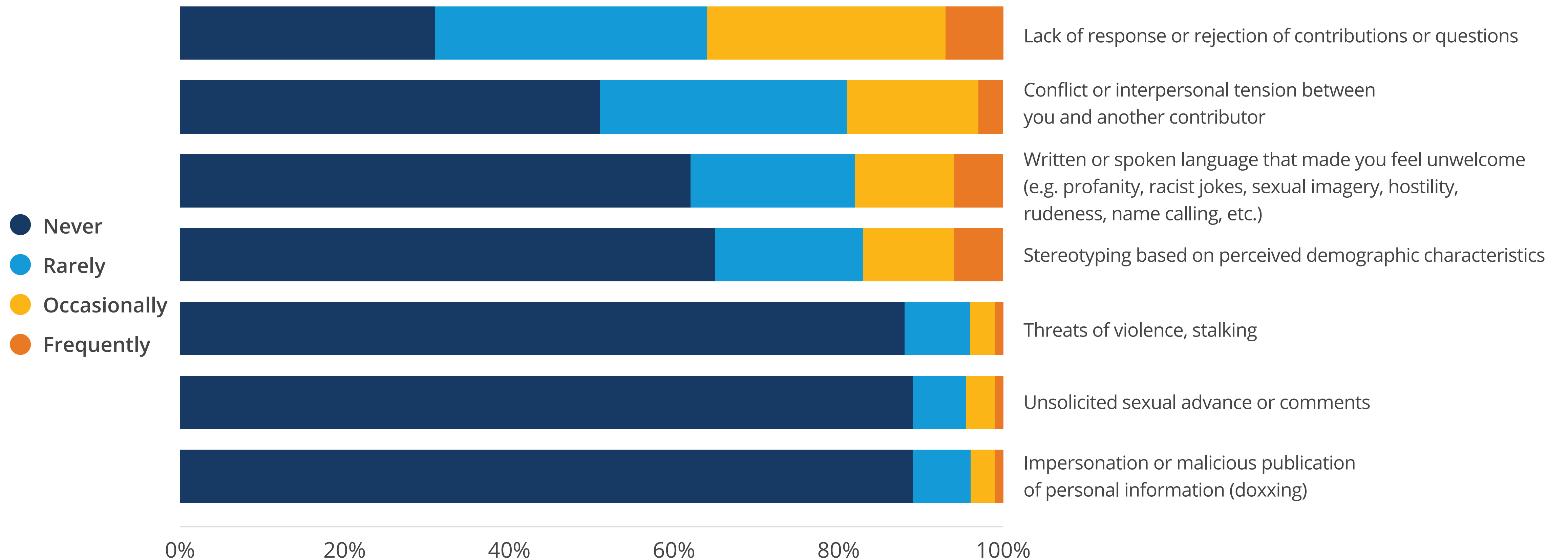
Key Findings

To what extent do you agree or disagree with the following statement? "I feel welcome in open source."

86% White Man in North America

85% Man

82% Study average (total sample)

80% White in North America

78% Hispanic/Latinx in North America

77% North American

75% Person with a dis/ability

75% Must leave home to access the Internet

74% Lesbian, gay, bisexual, asexual, pansexual, queer, questioning

74% Woman

69% Indigenous people in North America and Pacific Islander

65% Woman in North America

62% Non-binary, third gender, or other

55% Black in North America
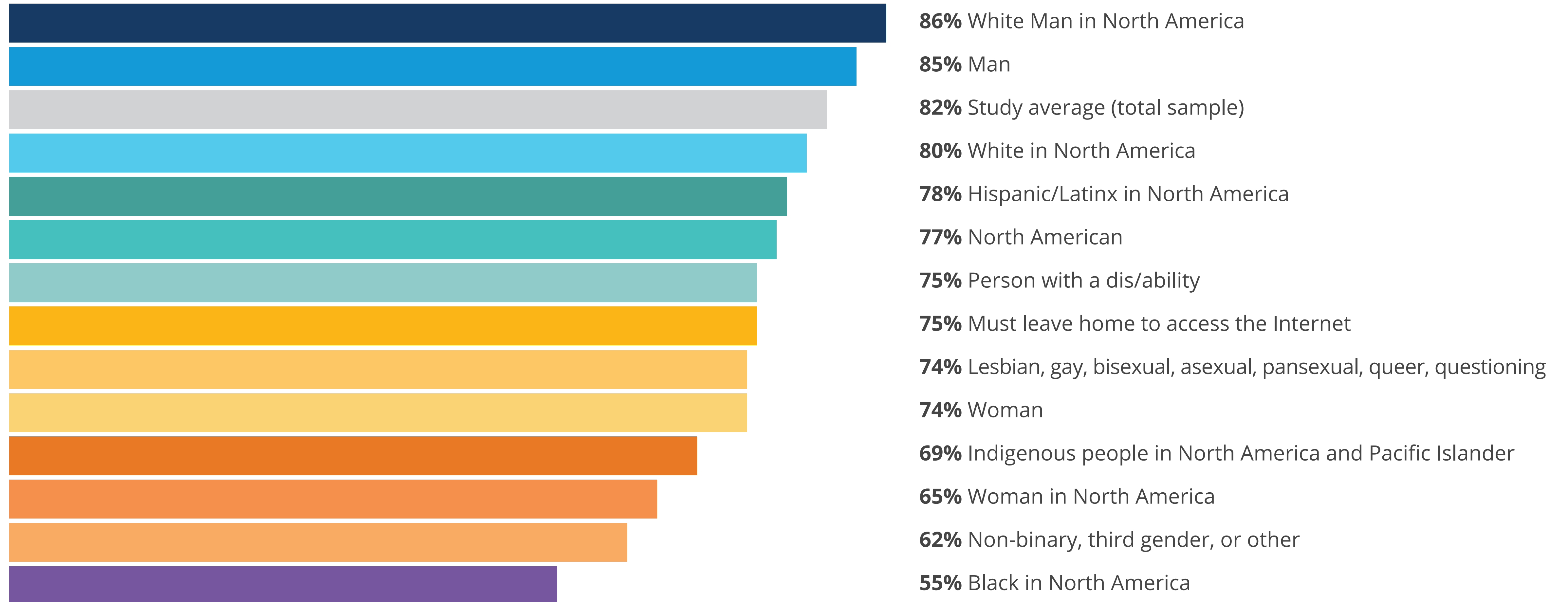
Note that race categorizations were only asked of North American respondents | Sample Size = 2,346. White Man in North America (n=641), Man (n=1,625), White in North America (n=587), Hispanic/Latinx in North America (n=82), North America (n=651), Person with a dis/ability (n=387), Must leave home to access the Internet (n=68), Lesbian, gay, bisexual, asexual, pansexual, queer, questioning (n=390), Woman in North America (n=147), Indigenous people in North America and Pacific Islander (n=51), Non-binary, third gender or other (n=116), Black in North America (n=84)

Have you ever experienced any of the following behaviors directed at you in the context of an open source project?

Legend:
- Never
- Rarely
- Occasionally
- Frequently

Bars (top to bottom):
- Lack of response or rejection of contributions or questions
- Conflict or interpersonal tension between you and another contributor
- Written or spoken language that made you feel unwelcome (e.g. profanity, racist jokes, sexual imagery, hostility, rudeness, name calling, etc.)
- Stereotyping based on perceived demographic characteristics
- Threats of violence, stalking
- Unsolicited sexual advance or comments
- Impersonation or malicious publication of personal information (doxxing)

X-axis: 0%, 20%, 40%, 60%, 80%, 100%

Sample Size = 2,291. Impersonation or malicious publication of personal information (doxxing) (n=2,281), Unsolicited sexual advances or comments (n=2,278), Threats violence, stalking (n=2,277), Stereotyping based on perceived demographic characteristics (n=2,276), Written or spoken language that made feel unwelcome (e.g. profanity, racist jokes, sexual imagery, hostility, rudeness, name calling etc.) (n=2,286), Conflict or interpersonal tension between you and another contributor (n=2,277), Lack of response to or rejection of contributions or questions (n=2,282).

Have you ever experienced written or spoken language that made you feel unwelcome in the context of an open source project?
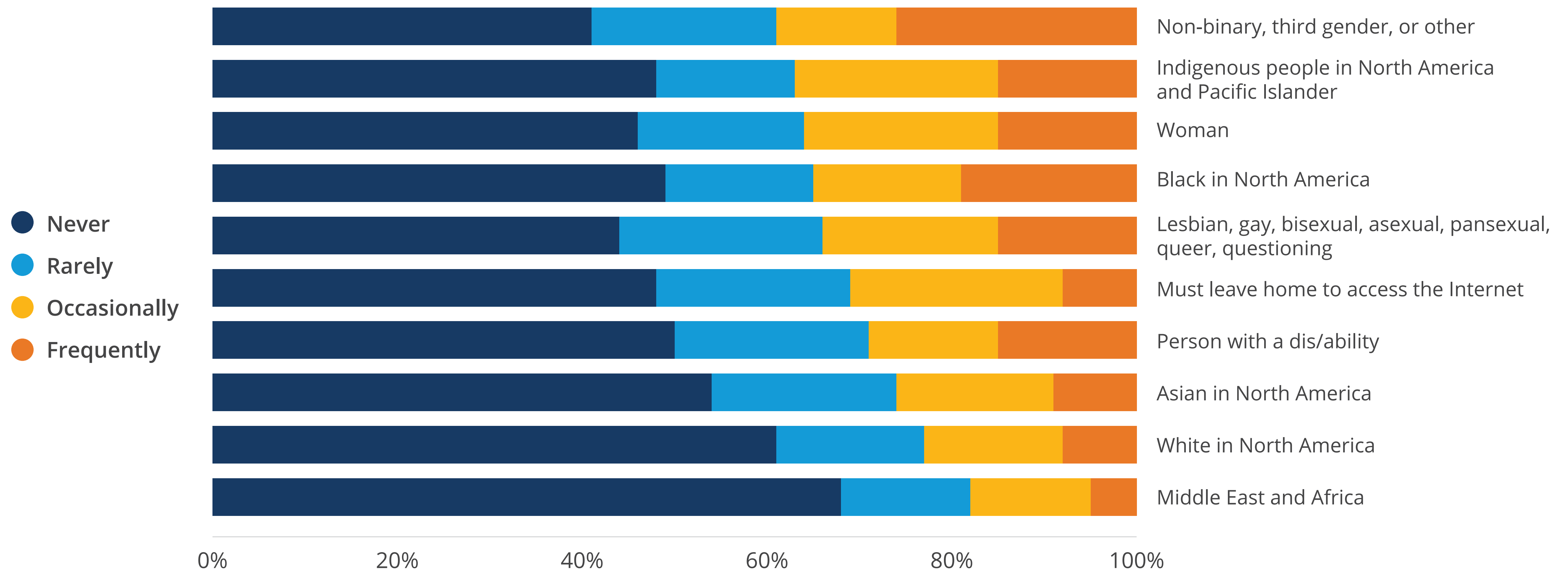
Written or spoken language that made you feel unwelcome (e.g., profanity, racist jokes, sexual imagery, hostility, rudeness, name calling, etc.)
Respondents, by demographic, answering "frequently" or "occasionally."
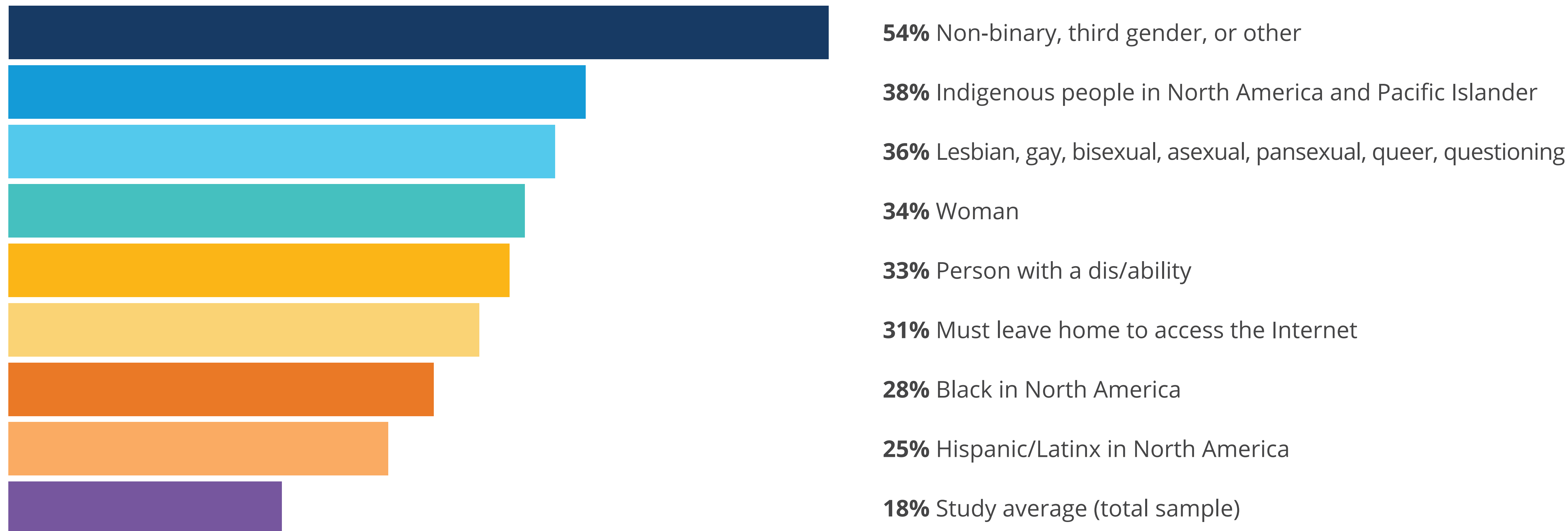
54% Non-binary, third gender, or other

38% Indigenous people in North America and Pacific Islander

36% Lesbian, gay, bisexual, asexual, pansexual, queer, questioning

34% Woman

33% Person with a dis/ability

31% Must leave home to access the Internet

28% Black in North America

25% Hispanic/Latinx in North America

18% Study average (total sample)

Note that race categorizations were only asked of North American respondents | Sample Size = 2,286. Black in North America in North America (n=81), Indigenous people in North America and Pacific Islander (n=45), Hispanic/Latinx in North America, (n=81) Must leave home to access the Internet (n=67), Non-binary, third gender or other (n=114), Lesbian, gay, bisexual, asexual, pansexual, queer, questioning (n=377), Women (n=325), Person with a dis/ability (n=379).
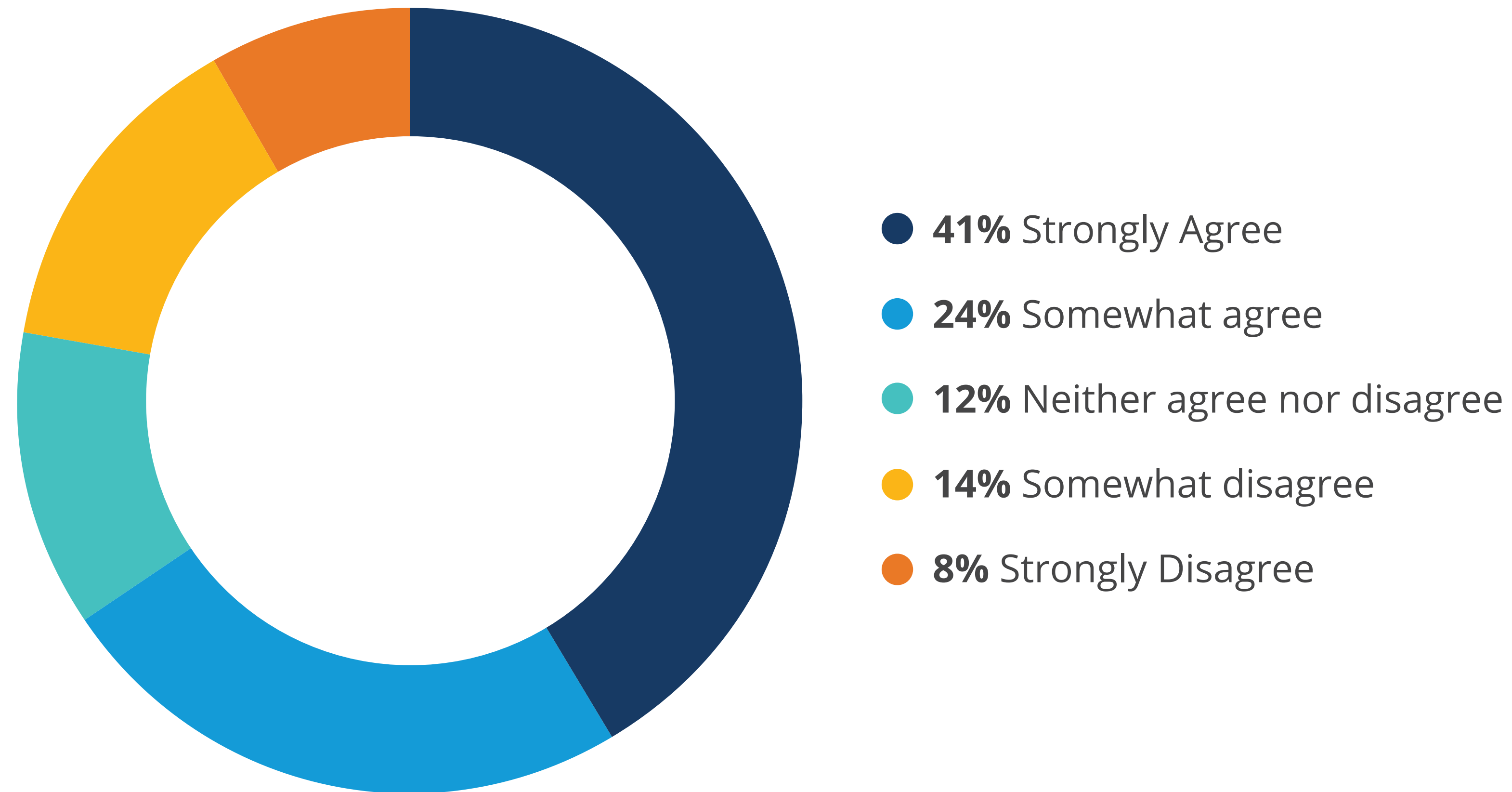
Have you ever experienced stereotyping based on perceived demographic characteristics directed at you in the context of an open source project?
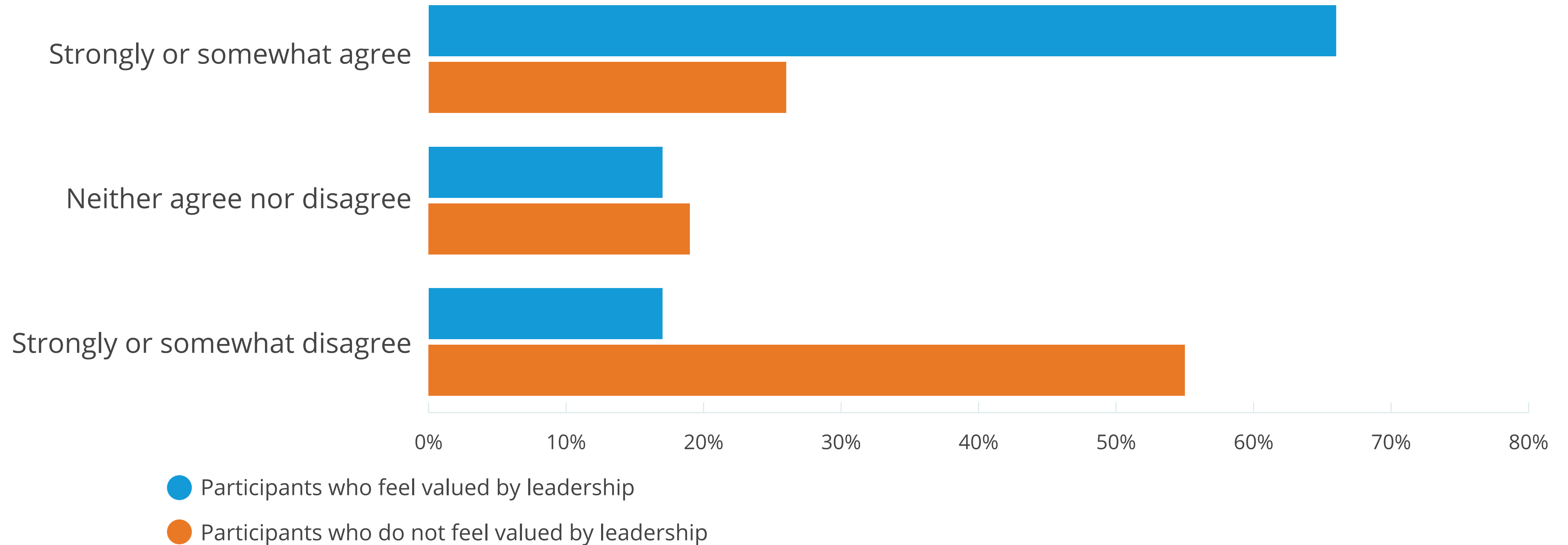

Categories (top to bottom):
- Non-binary, third gender, or other
- Indigenous people in North America and Pacific Islander
- Woman
- Black in North America
- Lesbian, gay, bisexual, asexual, pansexual, queer, questioning
- Must leave home to access the Internet
- Person with a dis/ability
- Asian in North America
- White in North America
- Middle East and Africa

Legend:
- Never
- Rarely
- Occasionally
- Frequently

To what extent do you agree or disagree with the following statement?

"People from different backgrounds have equal opportunities to participate in open source projects."

- **41%** Strongly Agree
- **24%** Somewhat agree
- **12%** Neither agree nor disagree
- **14%** Somewhat disagree
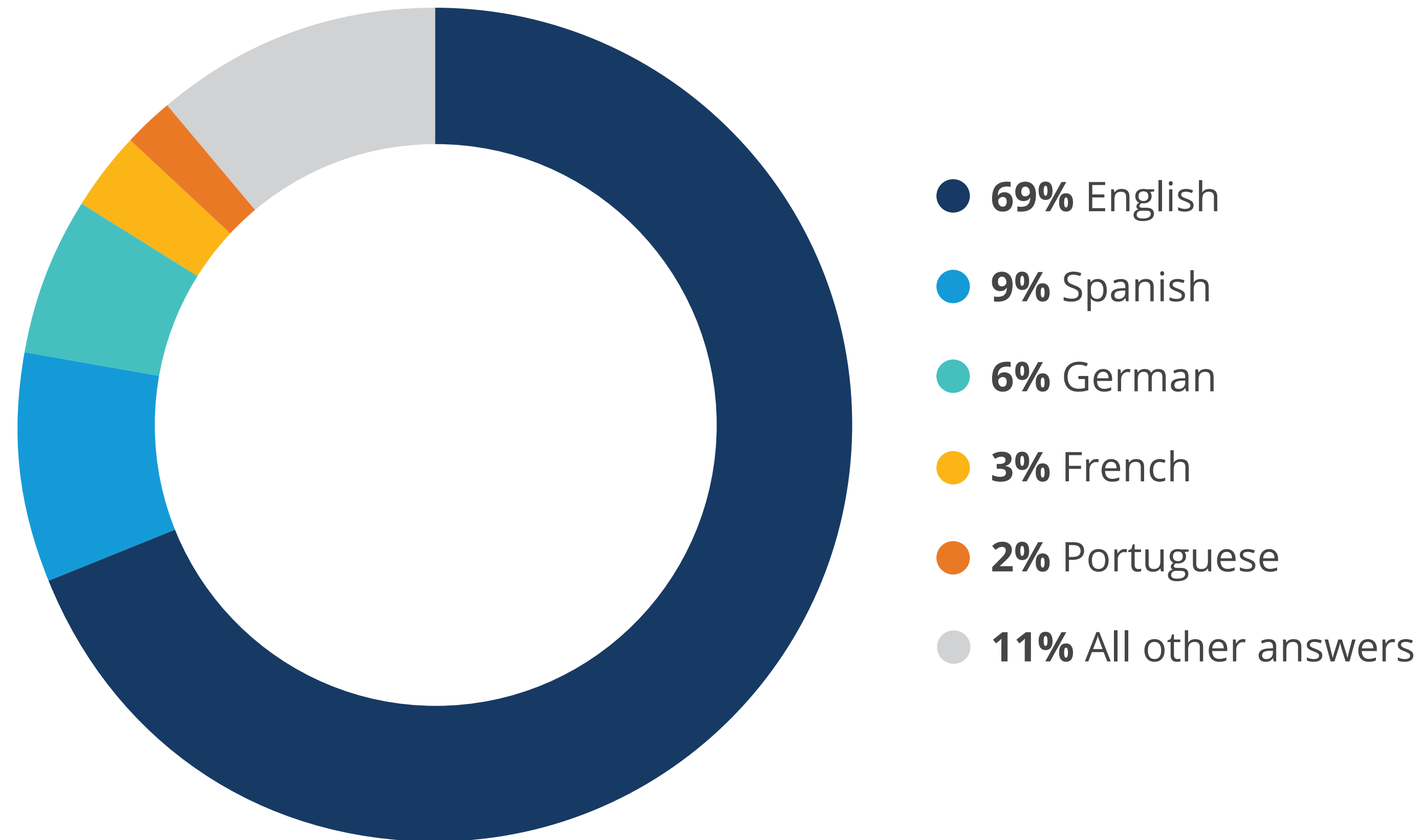- **8%** Strongly Disagree

Sample Size = 2,341

To what extent do you agree or disagree with the following statement?
"I feel that people from different backgrounds have an equal opportunity to be a part of the decision-making process within open source projects."

- **Strongly or somewhat agree**
- **Neither agree nor disagree**
- **Strongly or somewhat disagree**

● Participants who feel valued by leadership
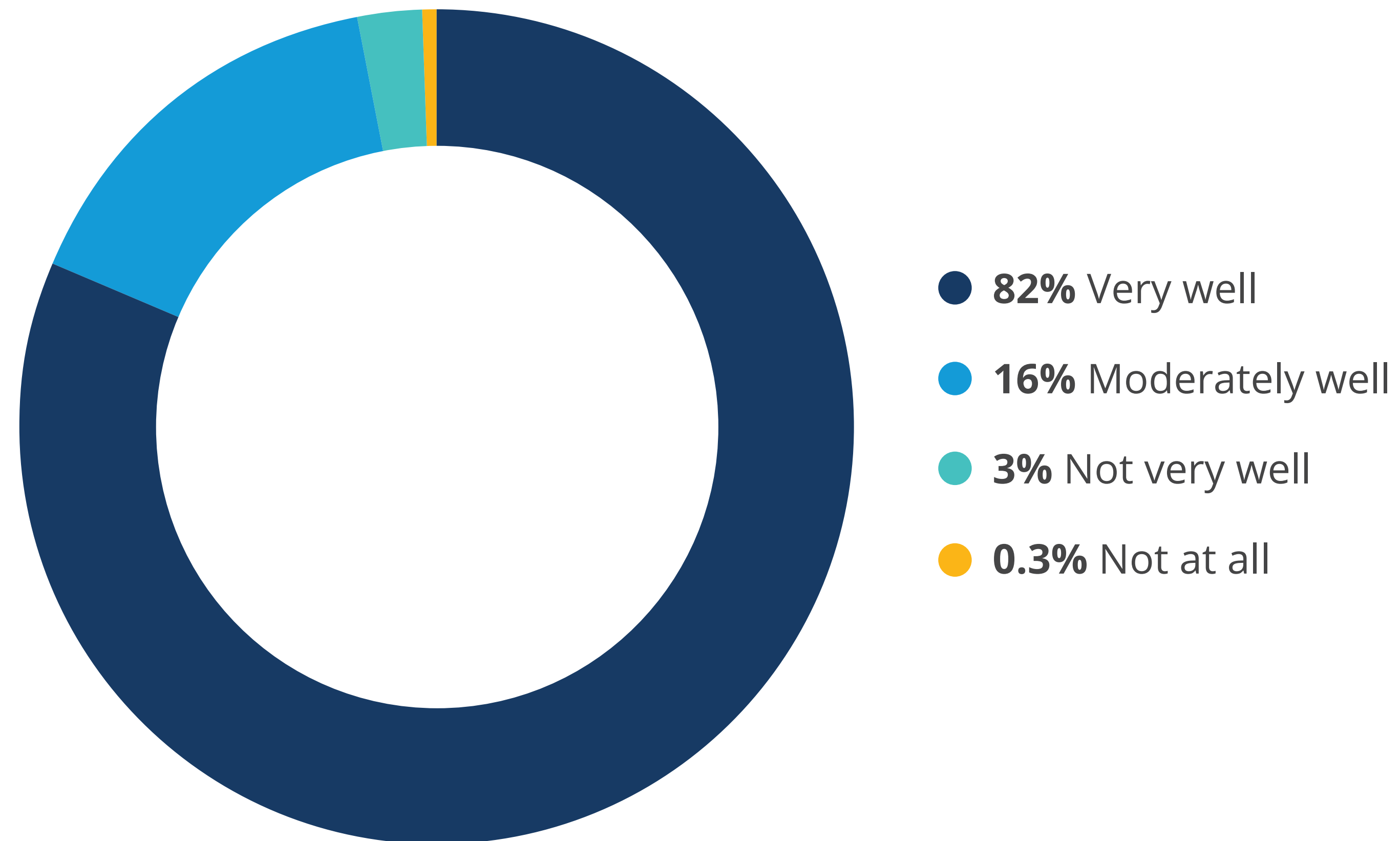● Participants who do not feel valued by leadership

Sample Size = 1,490. Strongly or somewhat agree that "I feel included and my opinion is valued by leadership in open source projects where I participate" (n=1,269), Strongly or somewhat disagree that "I feel included and my opinion is valued by leadership in open source projects where I participate" (n=221)
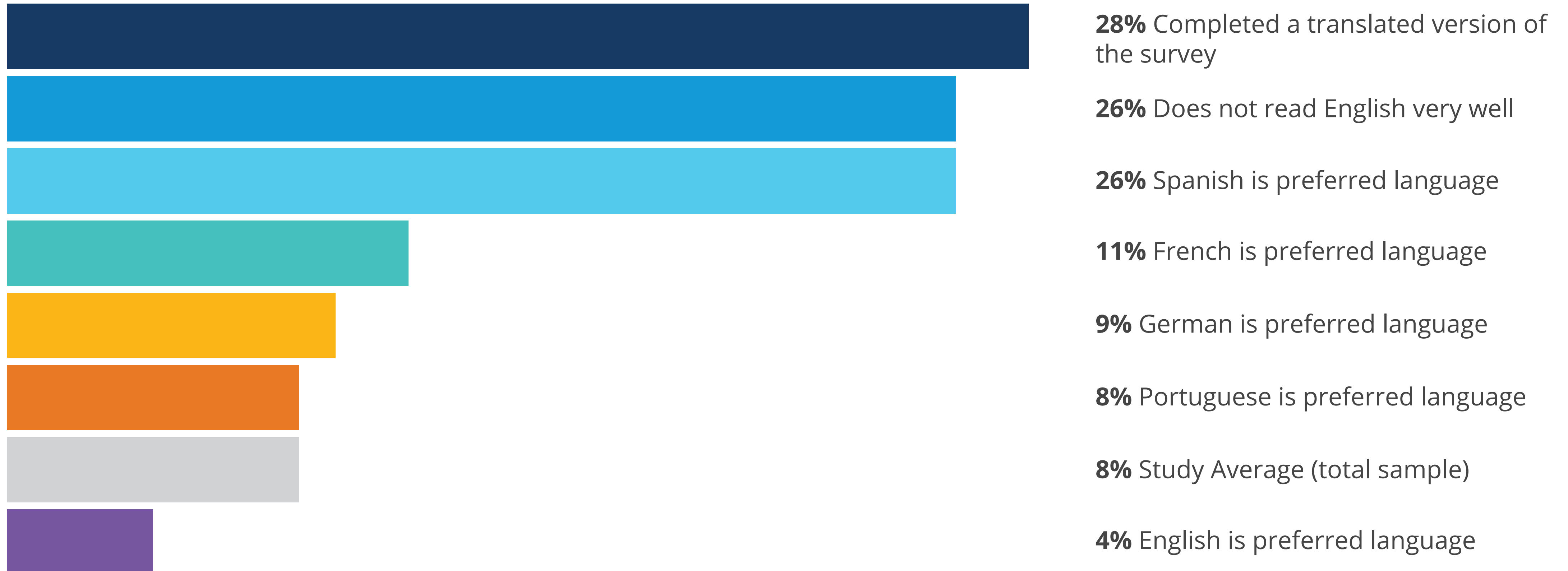
Language

What is your preferred language?

69% English

9% Spanish

6% German

3% French

2% Portuguese

11% All other answers

Sample Size = 2,234

How well can you read and write in English?

82% Very well

16% Moderately well

3% Not very well

0.3% Not at all

Sample Size = 2,346

Respondents answering "yes" to the question:

Has the general preference for use of English in open source negatively affected your ability to participate?

28% Completed a translated version of the survey

26% Does not read English very well

26% Spanish is preferred language

11% French is preferred language

9% German is preferred language

8% Portuguese is preferred language

8% Study Average (total sample)

4% English is preferred language

Sample Size = 2,346. Completed a translated version of the survey (n=258), Does not read English very well (n=112), Spanish is preferred language (n=191), French is preferred language (n=61), German is preferred language (n=137), Portuguese is preferred language (n=48), English is preferred language (n=1,540)

Obstacles and Challenges Faced

To what extent do you agree or disagree with the following statements?
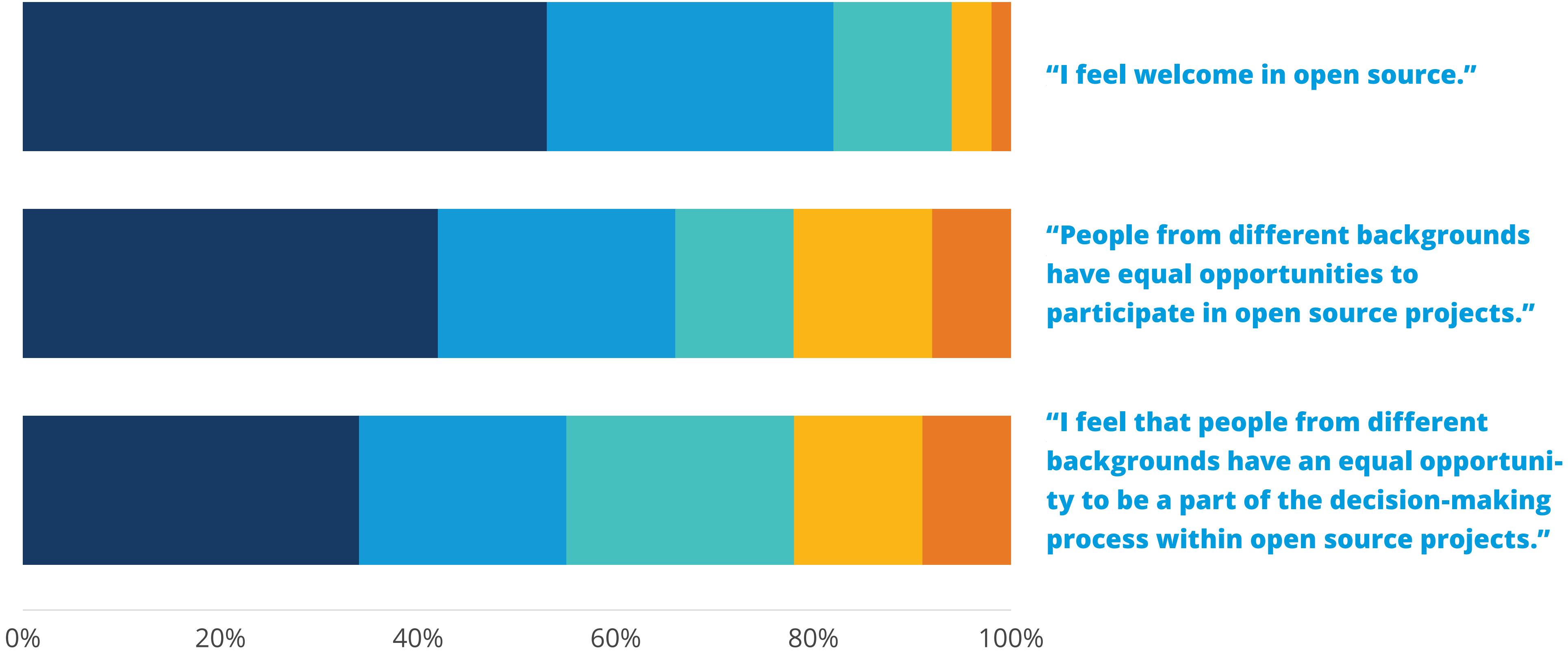
Legend:
- Strongly agree
- Somewhat agree
- Neutral
- Somewhat disagree
- Strongly disagree
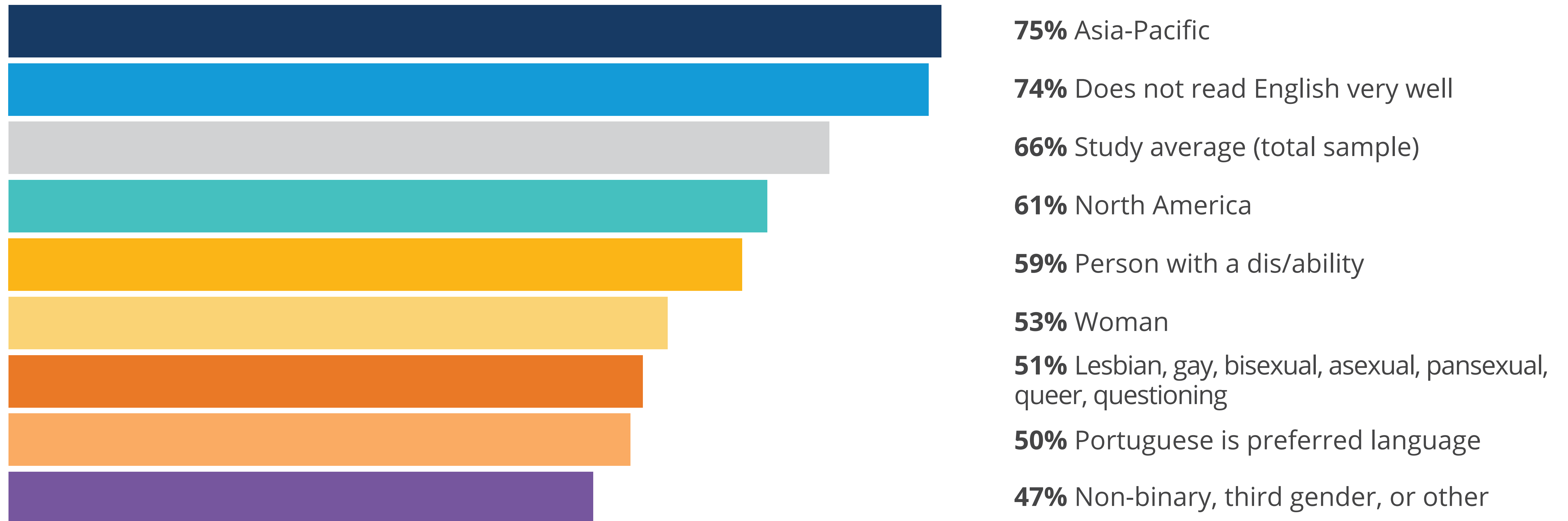
"I feel welcome in open source."

"People from different backgrounds have equal opportunities to participate in open source projects."

"I feel that people from different backgrounds have an equal opportunity to be a part of the decision-making process within open source projects."

0%   20%   40%   60%   80%   100%

# To what extent do you agree or disagree with the following statement?

"I feel people from different backgrounds have equal opportunities to participate in open source projects."

Respondents answering "strongly agree" or "somewhat agree"

75% Asia-Pacific

74% Does not read English very well

66% Study average (total sample)

61% North America

59% Person with a dis/ability

53% Woman

51% Lesbian, gay, bisexual, asexual, pansexual, queer, questioning

50% Portuguese is preferred language

**47%** Non-binary, third gender, or other

Respondents who "strongly agree" or "somewhat agree" with the following statement:

"I feel that people from different backgrounds have an equal opportunity to be a part of the decision-making process within open source projects."

65% Asia-Pacific

55% Study average (total sample)

48% White in North America

45% Woman
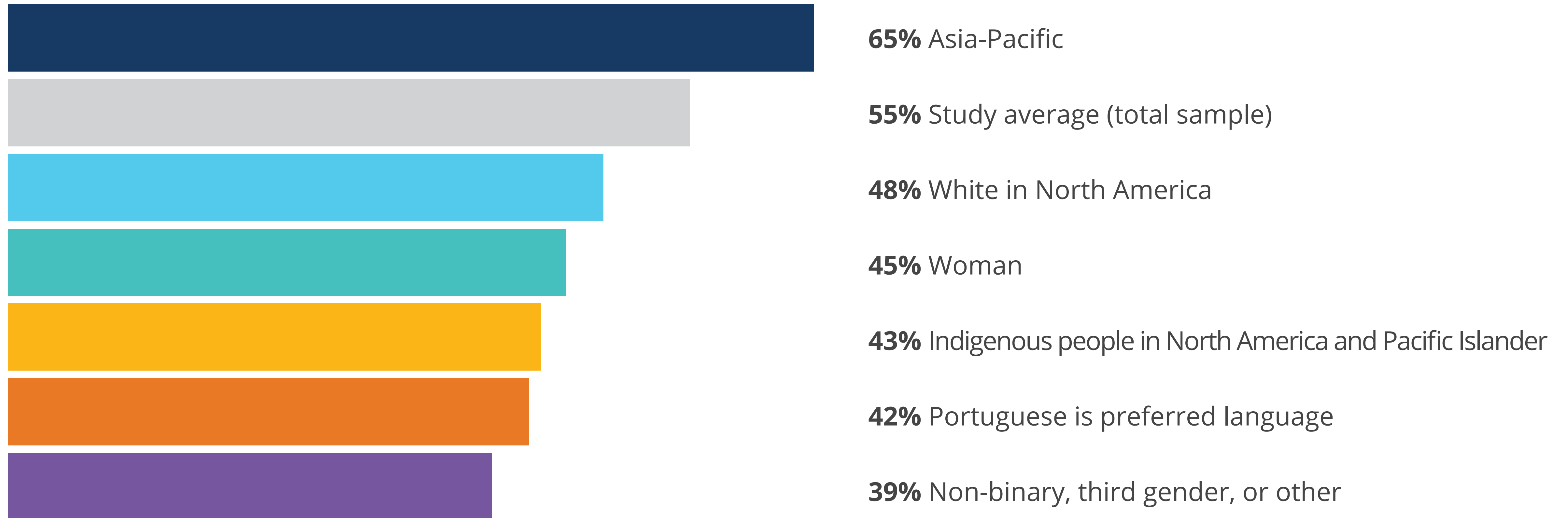
43% Indigenous people in North America and Pacific Islander

42% Portuguese is preferred language

39% Non-binary, third gender, or other

Have you felt like your identity has affected the ability to reach your goals when contributing to open source? For example, gaining the needed skills or networking with people?
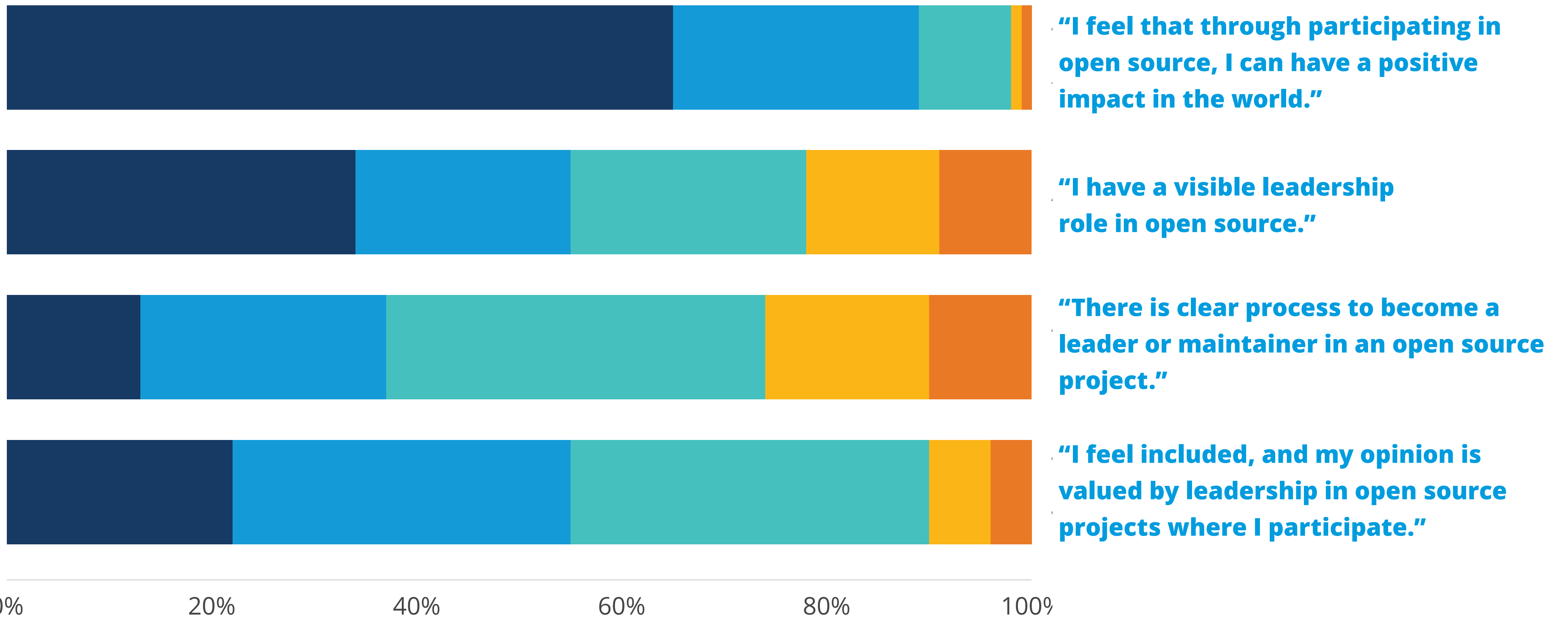
70% No

30% Yes
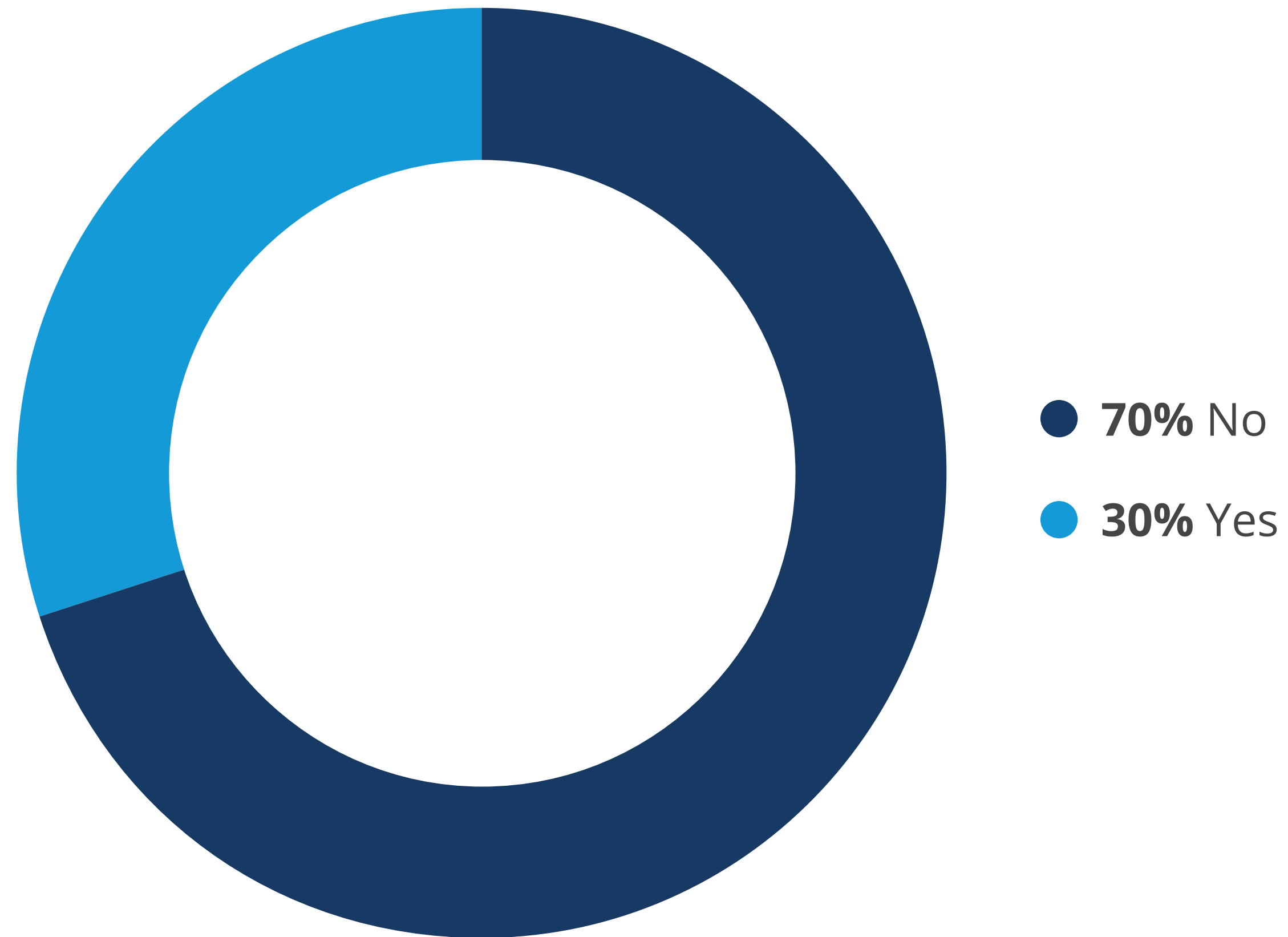
Lack of participation affects goal achievement. On average, 30% believe their identity has had an impact on their ability to reach their goals when contributing to open source.

Sample Size = 2,297

Making a Difference

To what extent do you agree or disagree with the following statements?

Legend:
- Strongly agree
- Somewhat agree
- Neutral
- Somewhat disagree
- Strongly disagree

Statements:
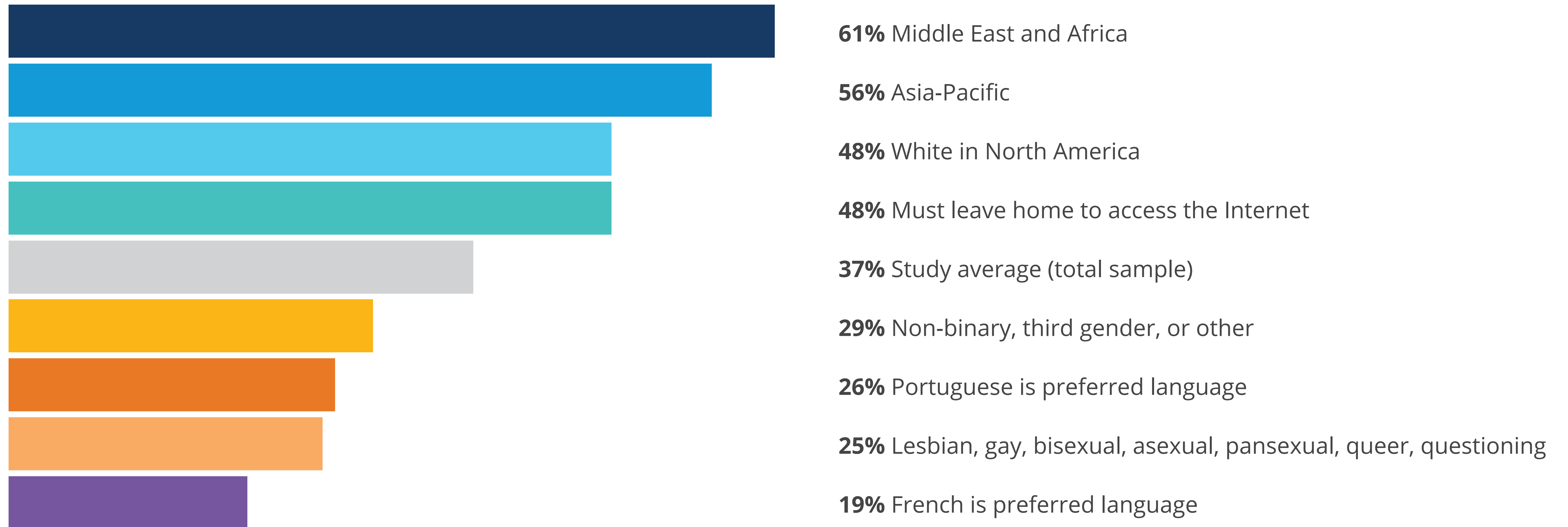- "I feel that through participating in open source, I can have a positive impact in the world."
- "I have a visible leadership role in open source."
- "There is clear process to become a leader or maintainer in an open source project."
- "I feel included, and my opinion is valued by leadership in open source projects where I participate."

Respondents who "strongly agree" with the following statement with the following statement:

"I feel that through participating in open source, I can have a positive impact in the world."

80% Frequently engaged in open source maintainer/leadership tasks

79% Central and South America

70% Ages 18 to 34 years old

65% Study average (total sample)

55% 65 years and older

Sample Size = 2,344. Frequently engaged in open source maintainer/leadership tasks (n=276), 18 to 34 years old (n=664), 65 years or older (n=122), and South America (n=170)
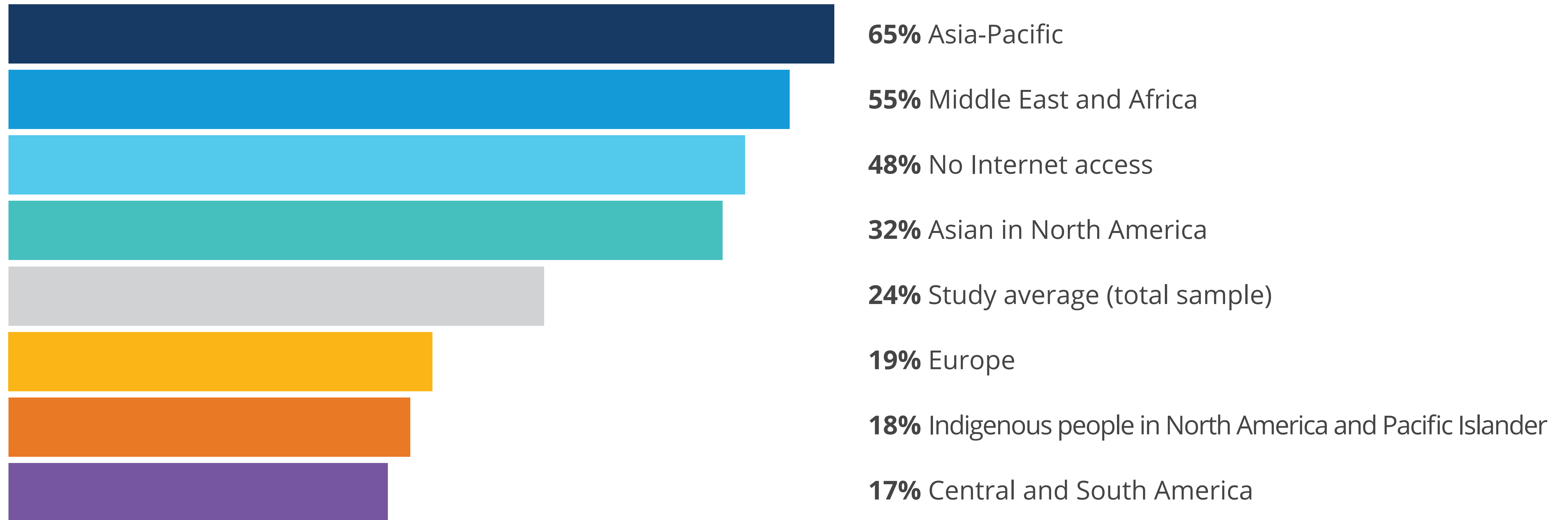
Respondents who "strongly agree" or "somewhat agree" with the following statement: "There is a clear process to become a leader or maintainer in an open source project."

61% Middle East and Africa

56% Asia-Pacific

48% White in North America

48% Must leave home to access the Internet

37% Study average (total sample)

29% Non-binary, third gender, or other

26% Portuguese is preferred language

25% Lesbian, gay, bisexual, asexual, pansexual, queer, questioning

19% French is preferred language

Sample Size = 2,292. Asia-Pacific (n=325), Middle East and Africa (n=125), White in North America (n=578), Must leave home to access the Internet (n=68), Lesbian, gay, bisexual, asexual, pansexual, queer, questioning (n=384), Non-binary, third gender or other (n=112), French is preferred language (n=59), Portuguese is preferred language (n=47)

Respondents who "strongly agree" or "somewhat agree" with the following statement:
"I have a visible leadership role in open source."

65% Asia-Pacific

55% Middle East and Africa

48% No Internet access

32% Asian in North America

24% Study average (total sample)

19% Europe

18% Indigenous people in North America and Pacific Islander

17% Central and South America

Conduct & Responses

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Have you ever experienced any of the following behaviors directed at you in the context of an open source project?

Legend:
- Never
- Rarely
- Occasionally
- Frequently

Categories (top to bottom):
- Lack of response or rejection of contributions or questions
- Conflict or interpersonal tension between you and another contributor
- Written or spoken language that made you feel unwelcome (e.g., profanity, racist jokes, sexual imagery, hostility, rudeness, name calling, etc.)
- Stereotyping based on perceived demographic characteristics
- Threats of violence, stalking
- Unsolicited sexual advance or comments
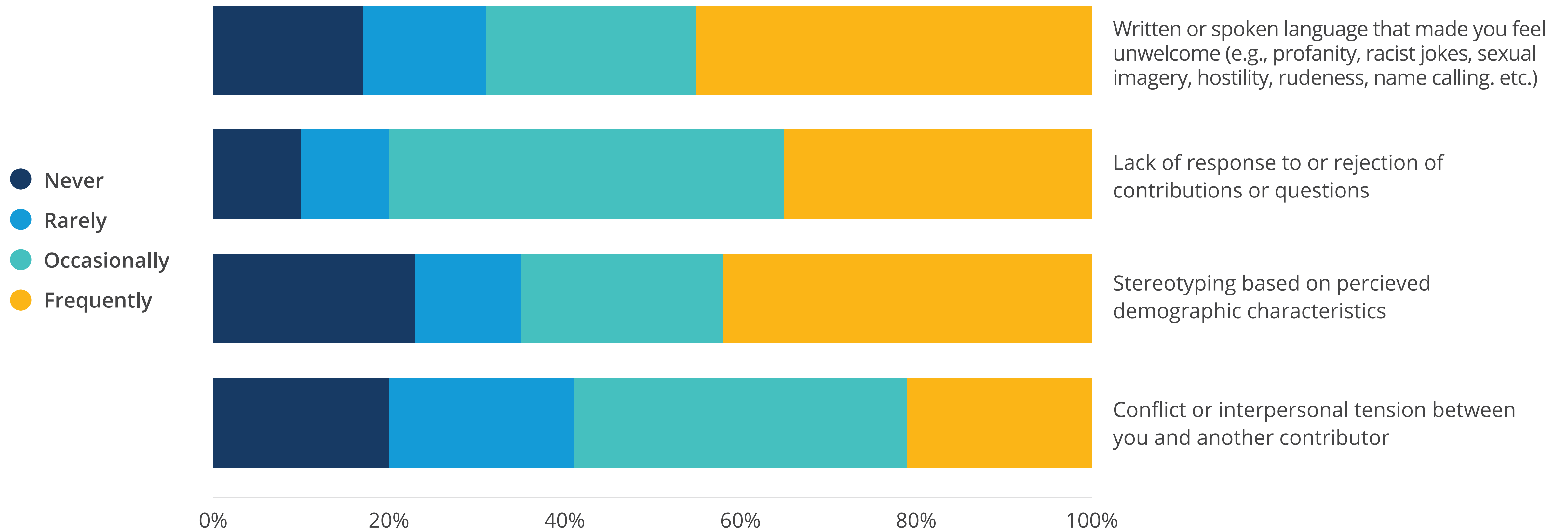- Impersonation or malicious publication of personal information (doxxing)

Have you ever experienced any of the following behaviors directed at you in the context of an open source project?

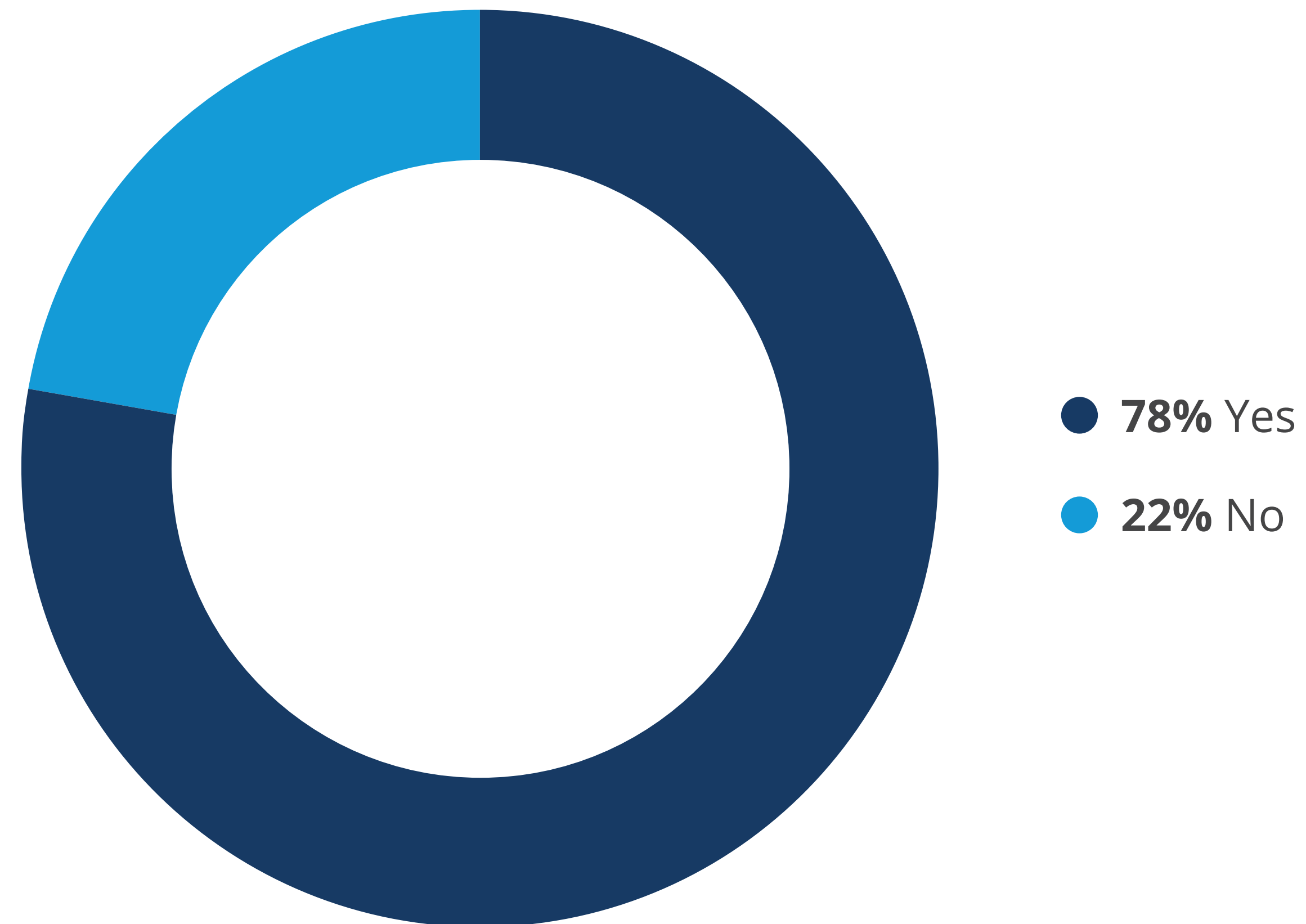### Frequency of Behaviors Experienced in the Context of an Open Source Project by Those That Do Not Feel Welcome in Open Source

Legend:
- Never
- Rarely
- Occasionally
- Frequently

Written or spoken language that made you feel unwelcome (e.g., profanity, racist jokes, sexual imagery, hostility, rudeness, name calling. etc.)

Lack of response to or rejection of contributions or questions

Stereotyping based on percieved demographic characteristics

Conflict or interpersonal tension between you and another contributor

(x-axis: 0%, 20%, 40%, 60%, 80%, 100%)

Sample Size = 130. Respondents Included = 18%, Filter Applied, (To what extent do you agree or disagree with the following statement: "I feel welcome in open source = Disagree)

If you have experienced harassment, do you think the situation was connected to your background?

78% Yes

22% No

Sample Size = 1,799

If you've witnessed or experienced hostility or harassment within an open source community, how do you typically respond? Choose all that apply.
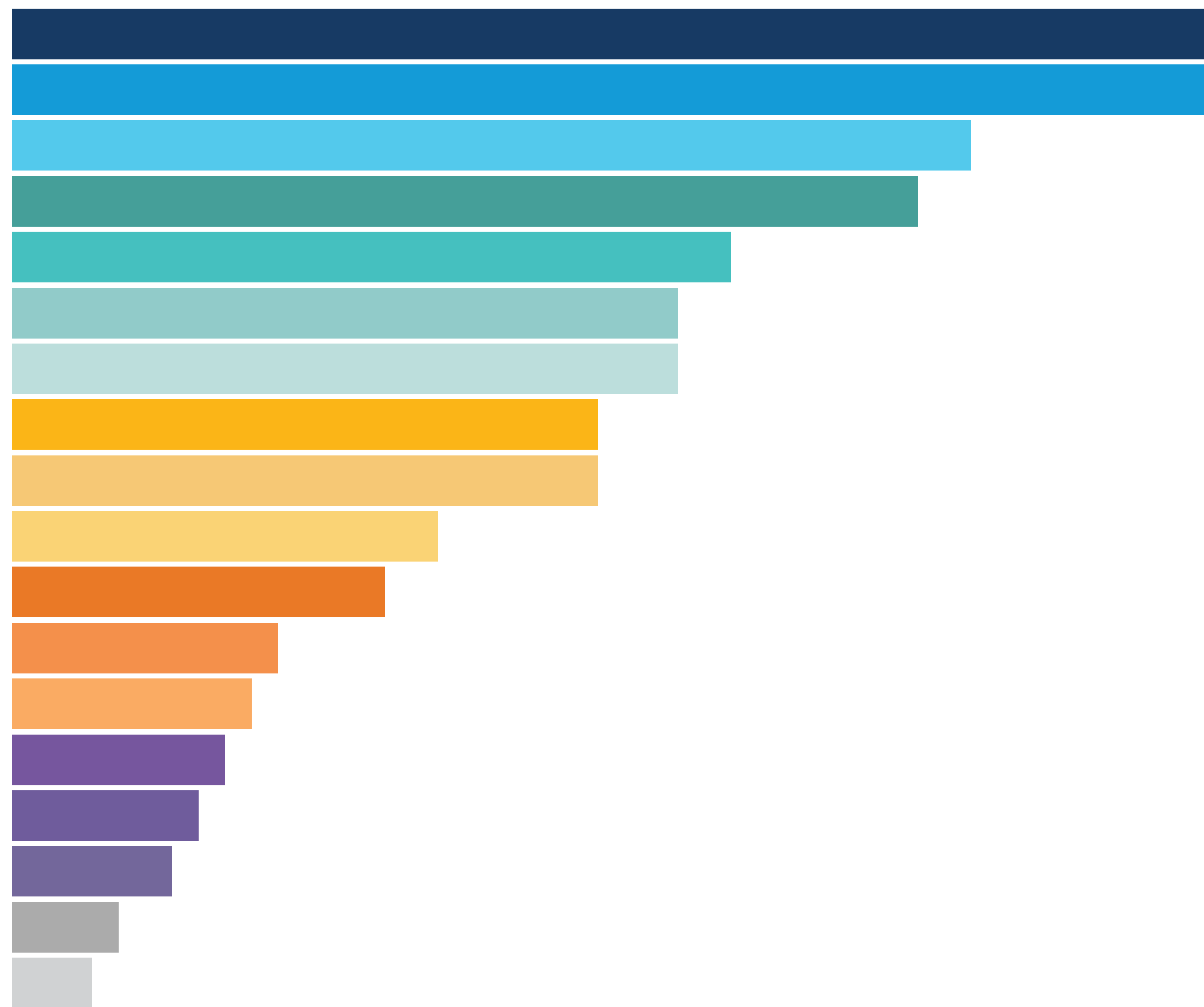
45% I did not react/ignored the incident

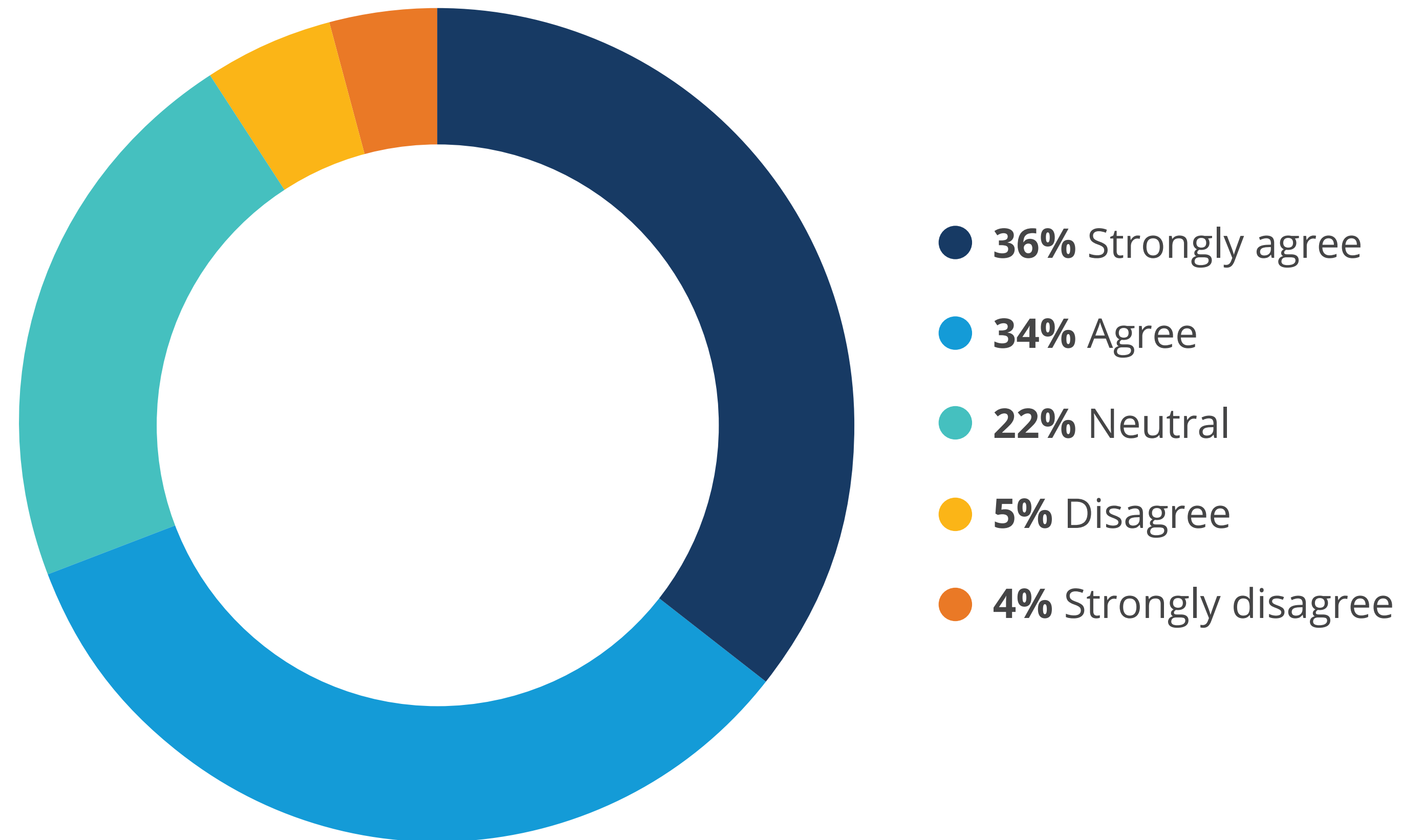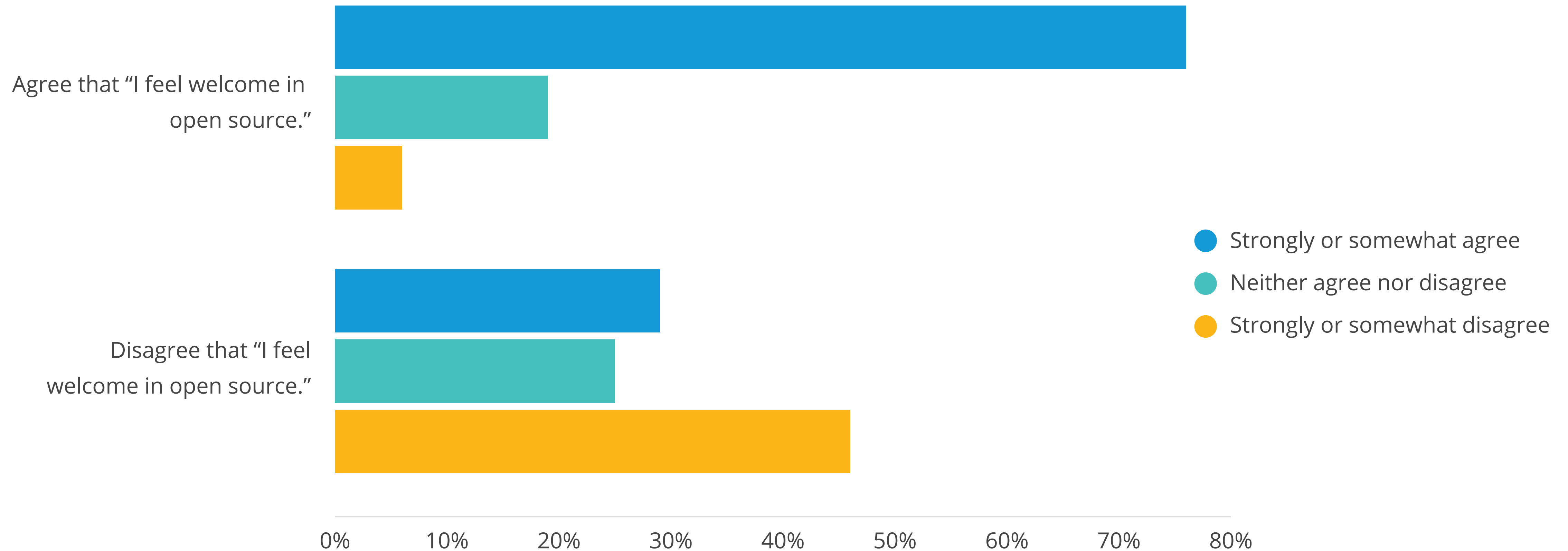**45%** Asked the user(s) to stop the harassing behavior

36% Reported the incident to project maintainers

34% Blocked the user(s) harassing me

27% Solicited support from other community members

25% Left the project/open source community temporarily or permanently

25% Stopped contributing to a project

22% Reported the incident to event organizers

22% Engaged in private discussion with community members about the issue

16% Engaged in public discussion with community members about the issue

14% Worked, asked questions, or collaborated in private channels more often

10% Made changes in my life online (e.g., stopped attending meetups or conferences, etc.)

9% Removed or changed content on my public online presence

8% Reported the incident to the hosting service or ISP

7% Changed or deleted a username

6% Started contributing under a pseudonym

4% Consulted legal counsel / an attorney

3% Contacted law enforcement

To what extent do you agree or disagree with the following statement?
"When I participate in open source, I trust that the code of conduct is enforced."

- **36%** Strongly agree
- **34%** Agree
- **22%** Neutral
- **5%** Disagree
- **4%** Strongly disagree

Sample Size = 2,307

If you don't feel welcome, you also don't trust that the Code of Conduct is being enforced.

To what extent do you agree or disagree with the following statement?
When I participate in open source, I trust that the code of conduct is enforced."

Legend:
- ● Strongly or somewhat agree
- ● Neither agree nor disagree
- ● Strongly or somewhat disagree

Categories:
- Agree that "I feel welcome in open source."
- Disagree that "I feel welcome in open source."

Sample Size = 2,028. Strongly or somewhat agree that "I feel welcome in open source" (n=1,895). Strongly or somewhat disagree that "I feel welcome in open source" (n=1,895). Somewhat disagree " and Strongly disagree " (n=133).

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Employment & Education Opportunities

Which best describes your employment (paid work) status?

65.7% Employed full time

10.8% Self-Employed full or part time

5.3% Retired

5% Temporarily not working

4.8% Full-time university student

4.3% Employed part time

2.7% Other

1.2% Permanently not working due to disability or other commitments

0.3% Full-time high school student

Sample Size = 2,333. North America (n=839), Central and South America (n=181), Asia Pacific (n=335), Europe (n=848), Middle East and Africa (n=128)

Which best describes your employment (paid work) status?

Legend:
- Employed full time
- Employed part time
- Self-Employed full or part time
- Full-time student
- Temporarily not working
- Retired
- Permanently not working due to disability or other commitments
- Other

X-axis: 0% 20% 40% 60% 80% 100%

Bars (top to bottom): Europe, North America, Asia-Pacific, Middle East and Africa, Central and South America

Sample Size = 2,333. North America (n=839), Central and South America (n=181), Asia-Pacific (n=335), Europe (n=848), Middle East and Africa (n=128)

In your main job, how often do you contribute to open source communities?

Legend:
- Never
- Rarely
- Occasionally
- Frequently

Categories (top to bottom):
- Women
- Non-binary, third gender, or other
- Study average (total sample)
- Men

X-axis: 0%, 20%, 40%, 60%, 80%, 100%

Note that the question was only asked if the respondent is a full-time student. Sample Size = 1,898. Woman (n=270), Man (n=1,551), Non-binary, third gender or other (n=83)
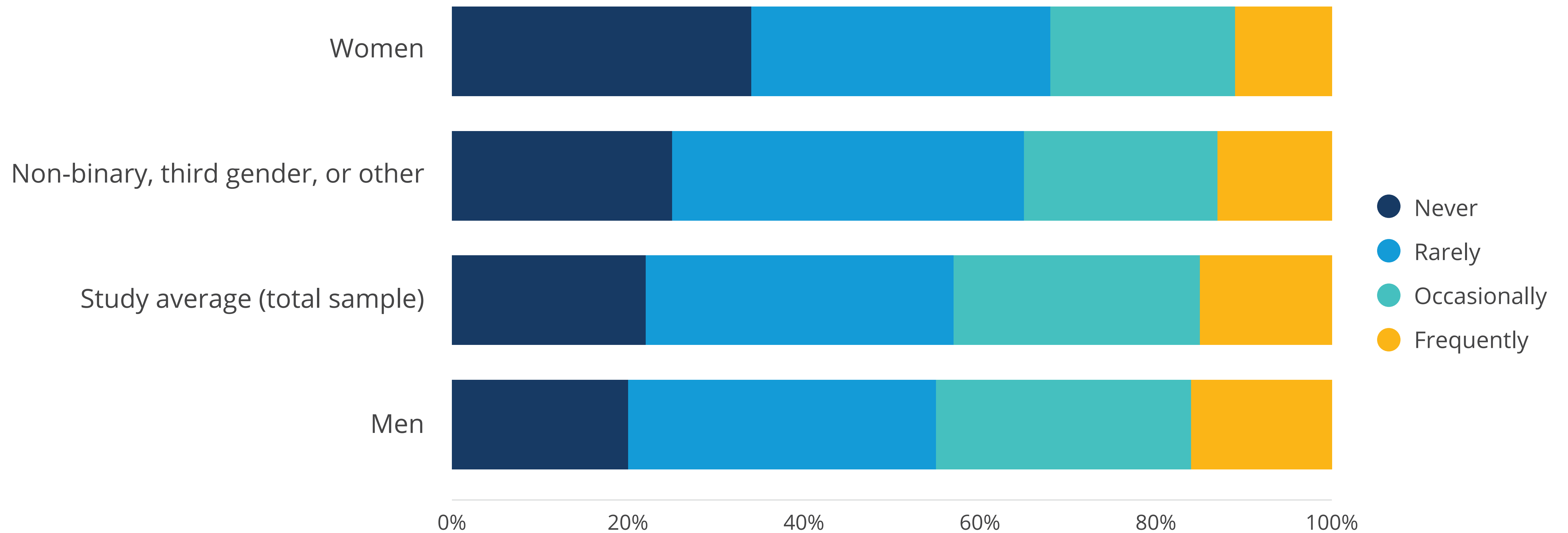
Respondents answering "yes" to the question:
Do you receive/accept payments for your contributions to open source?
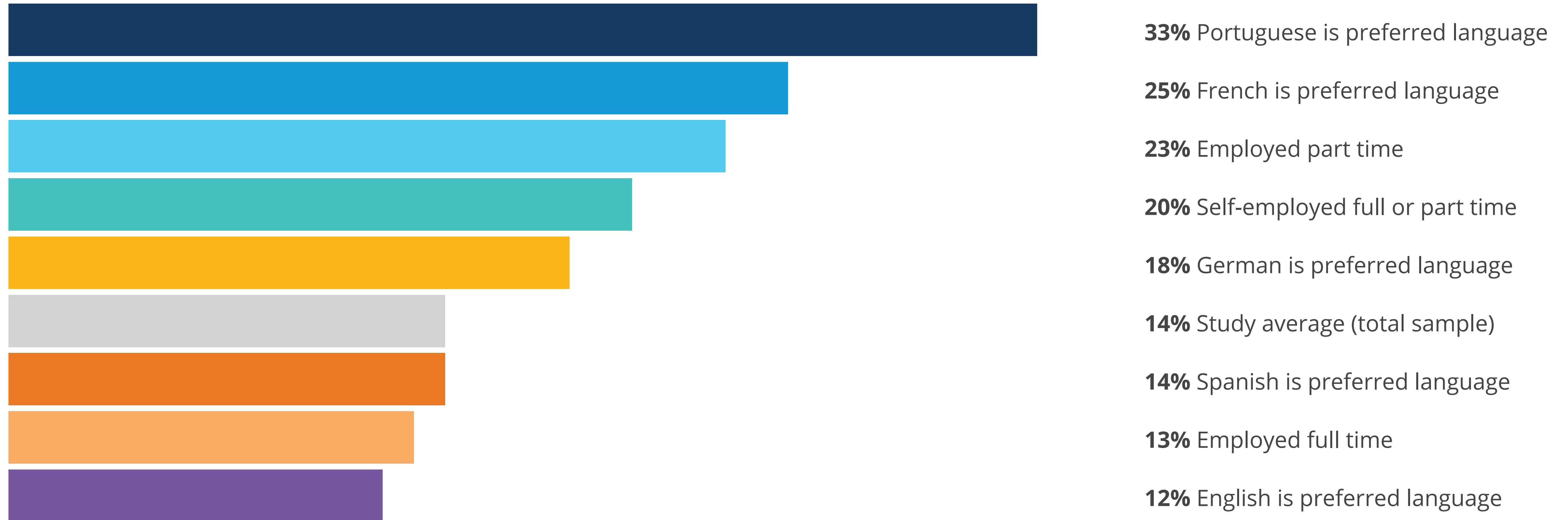
33% Portuguese is preferred language

25% French is preferred language

23% Employed part time

20% Self-employed full or part time

18% German is preferred language

14% Study average (total sample)

14% Spanish is preferred language

13% Employed full time

12% English is preferred language

Is open source taught as part of your school's curriculum?

Legend:
- Yes
- No
- Don't Know

Regions (top to bottom): Europe, Central and South America, Study average (total sample), Asia-Pacific, Middle East and Africa, North America

X-axis: 0%, 20%, 40%, 60%, 80%, 100%
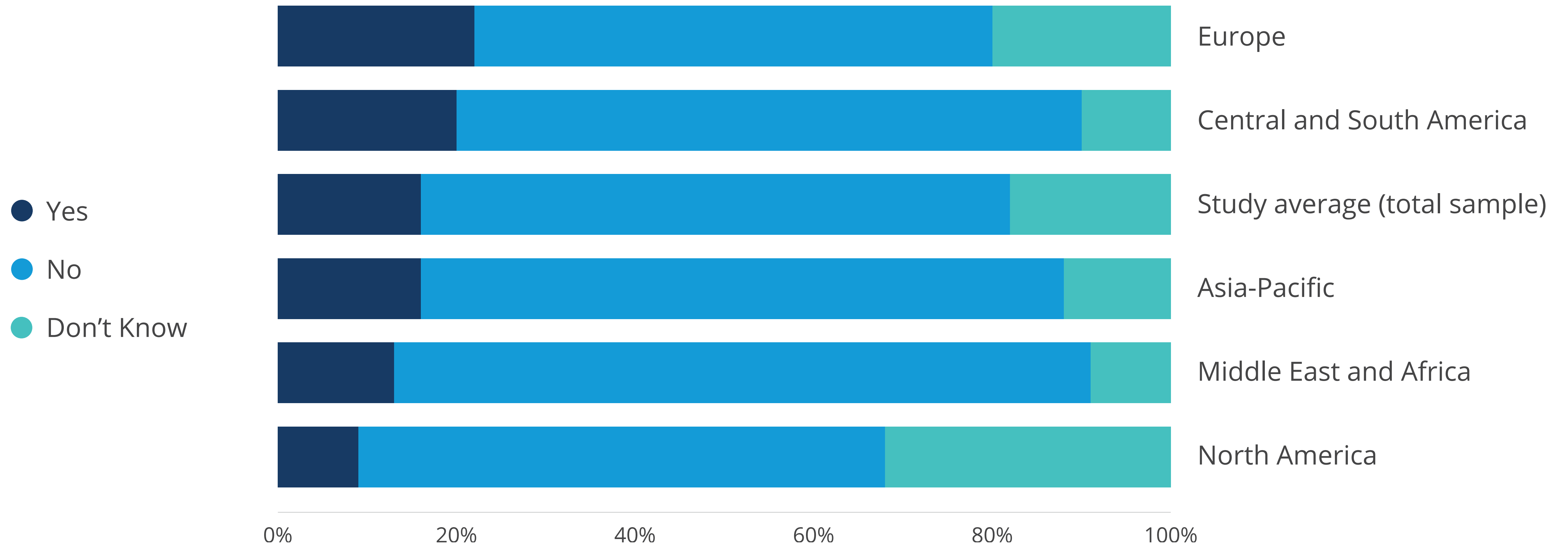
Note that the question was only asked if the respondent is employed. Sample Size = 234. North America (n=53), Central and South America (n=30), Asia-Pacific (n=69), Europe (n=59), Middle East and Africa (n=23)

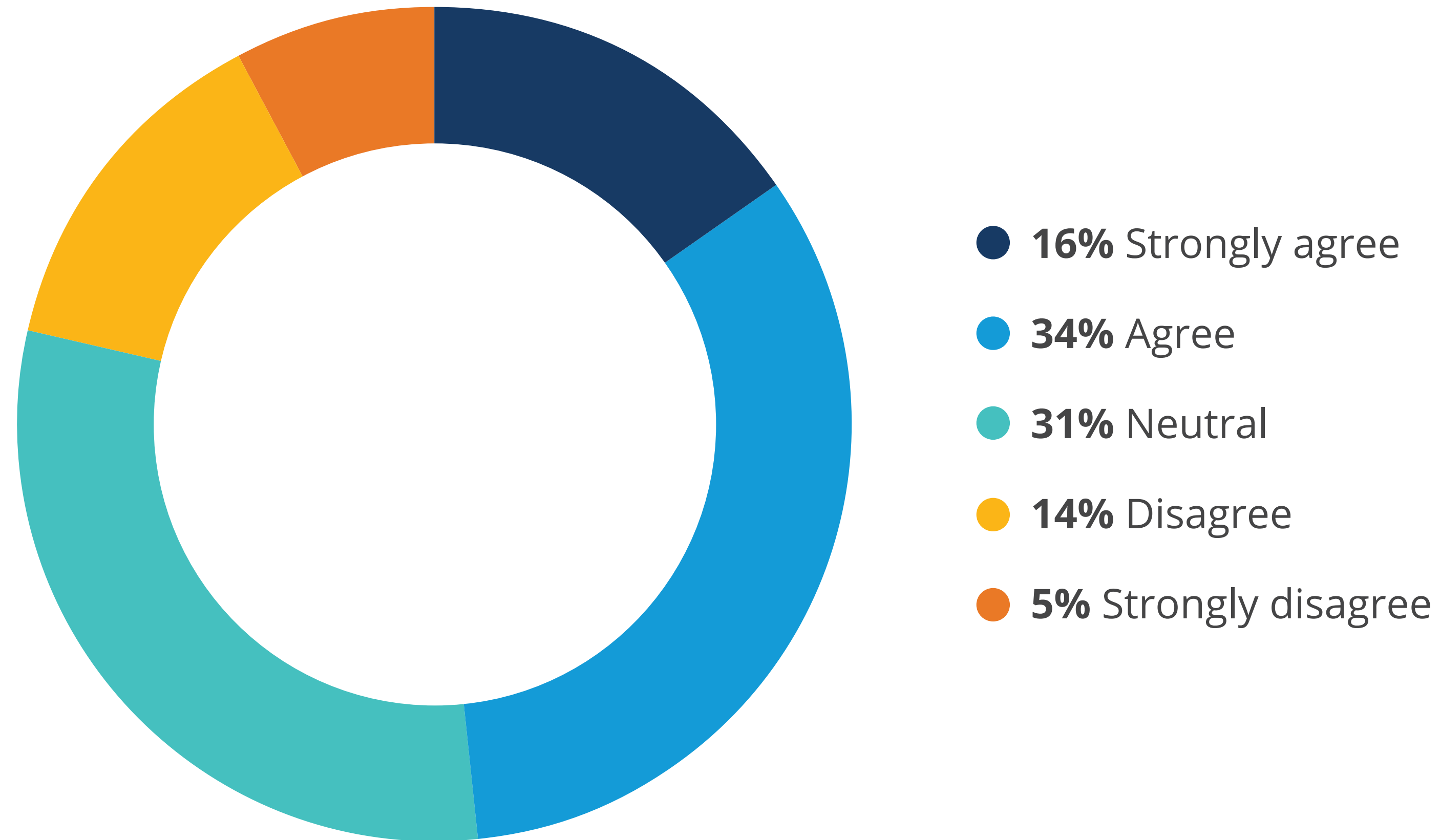THE LINUX FOUNDATION | Research 49

Activities

Where are your efforts focused in open source participation and how often do you engage in those activities?

Legend:
- Never
- Rarely
- Occasionally
- Frequently

Categories (top to bottom):
- Listening
- Advocacy, Knowledge Sharing, Mentoring
- Software Development
- Website, Blog Posts, Podcasts, Social Media
- Documentation/Technical Writing
- Q/A, Testing
- User Support
- Community Building
- Design Usability
- Maintainer/Leadership Tasks
- Translation/Localization
- Diversity Inclusion, Acessibility, Code of Conduct Enforcement
- Event Planning

X-axis: 0%, 20%, 40%, 60%, 80%, 100%

Sample Size = 2,309

Documentation

To what extent do you agree with this statement?

"Open source projects I work on have documentation that captures process documentation in addition to technical documentation?"

- **16%** Strongly agree
- **34%** Agree
- **31%** Neutral
- **14%** Disagree
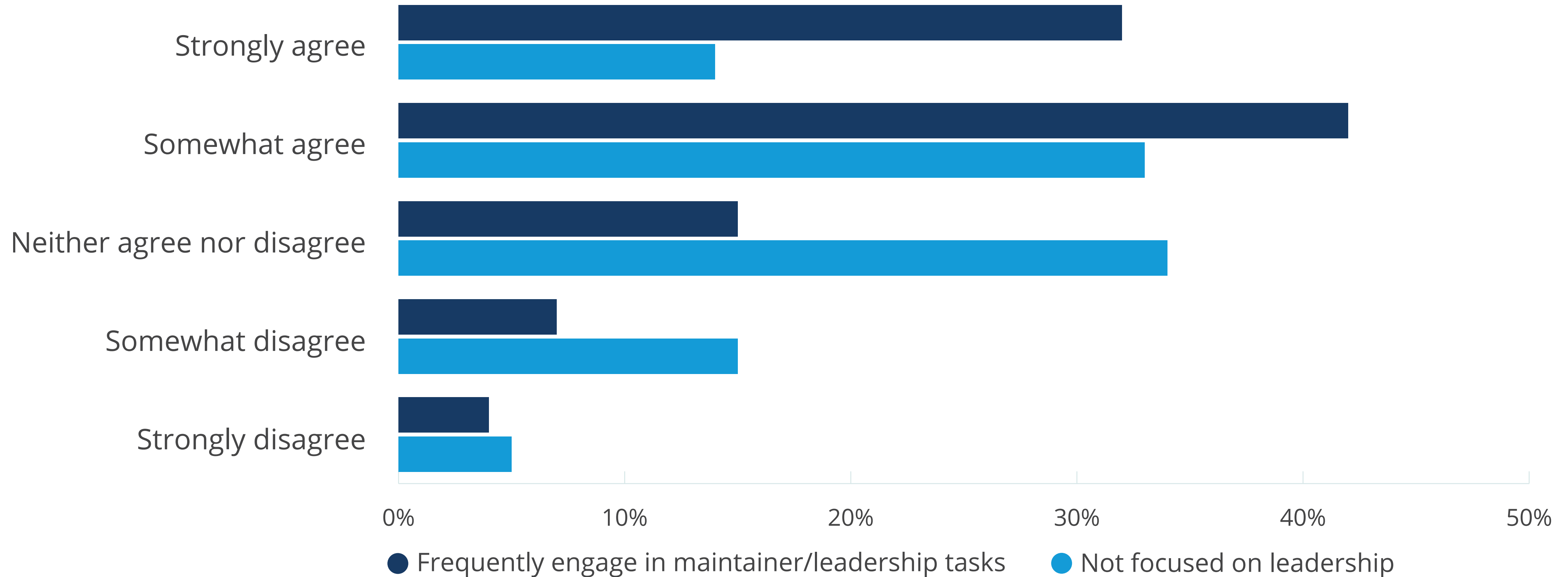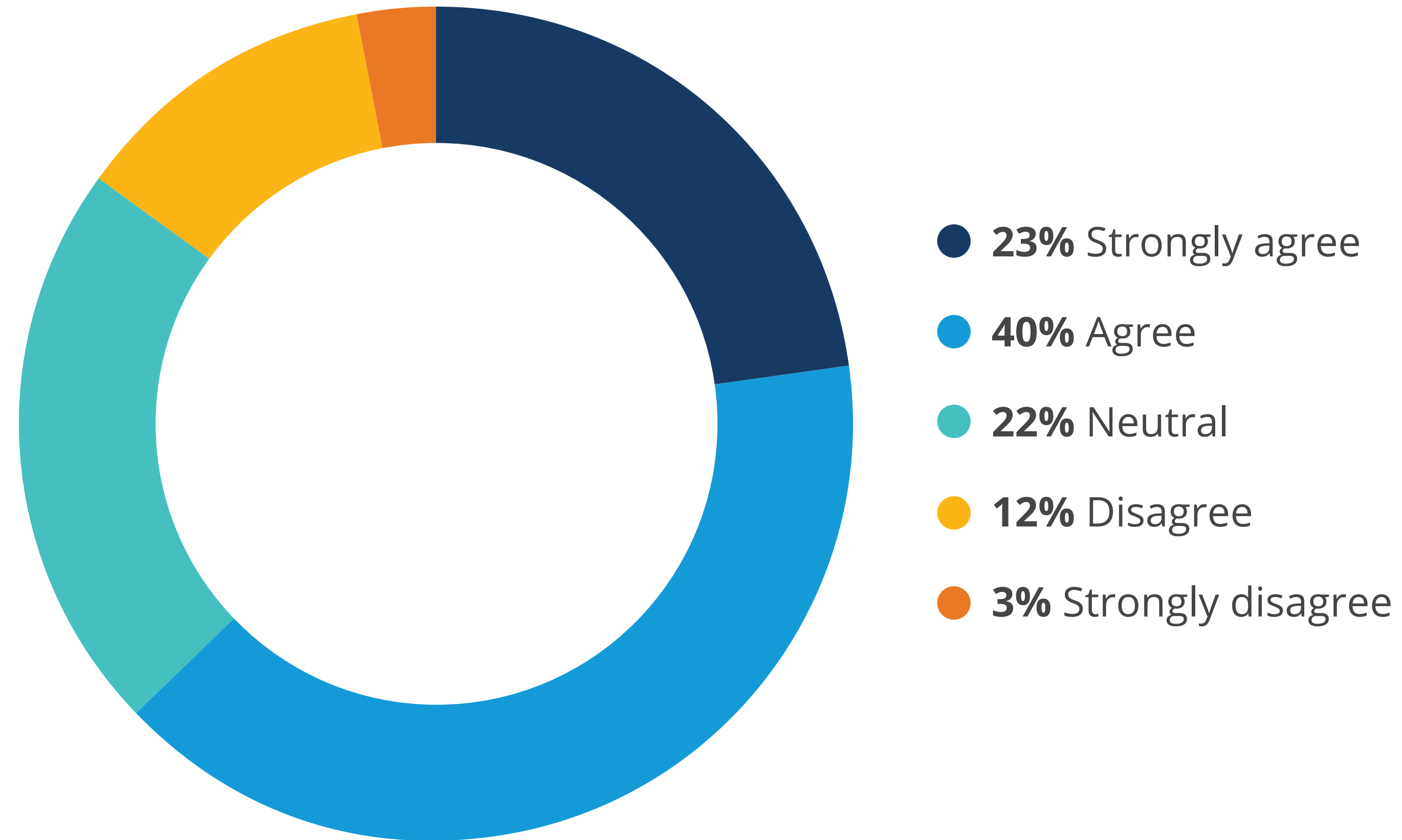- **5%** Strongly disagree

Sample Size = 2,254

To what extent do you agree with this statement?
"Open source projects I work on have documentation that captures process documentation in addition to technical documentation?"

Strongly agree

Somewhat agree

Neither agree nor disagree

Somewhat disagree

Strongly disagree

0%   10%   20%   30%   40%   50%

● Frequently engage in maintainer/leadership tasks   ● Not focused on leadership

Sample Size = 2,190. Frequently engage in maintainer/leadership tasks (278), Not focused on leadership (1,912)

To what extent do you agree with this statement?

"Open source projects I work on have documentation that is easily findable, searchable, and accessible?"
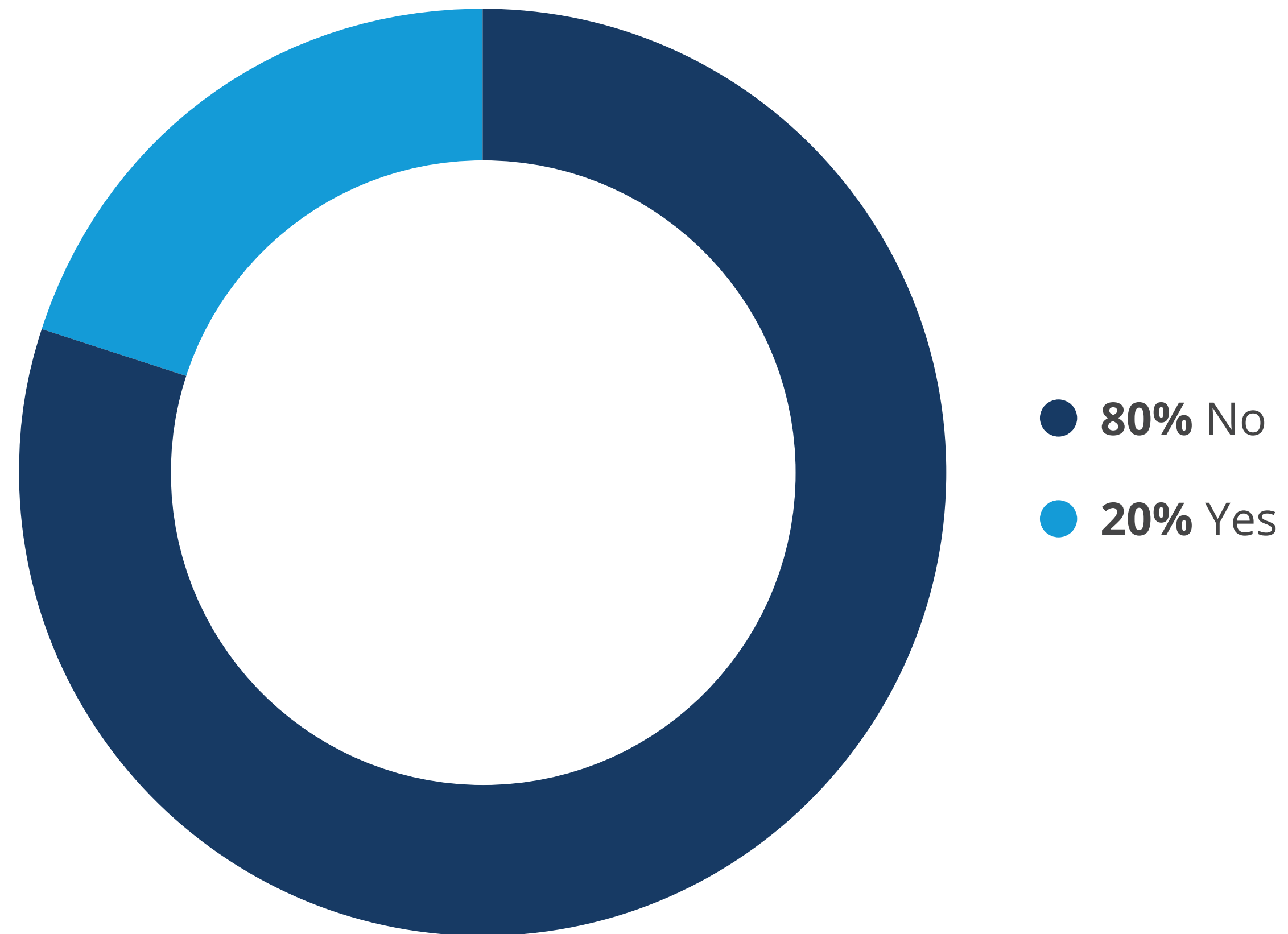

- **23%** Strongly agree
- **40%** Agree
- **22%** Neutral
- **12%** Disagree
- **3%** Strongly disagree

Sample Size = 2,281

Tooling

What source code hosting platforms do you most regularly use when participating in open source?

89% GitHub

37% GitLab

20% SourceForge

14% BitBucket

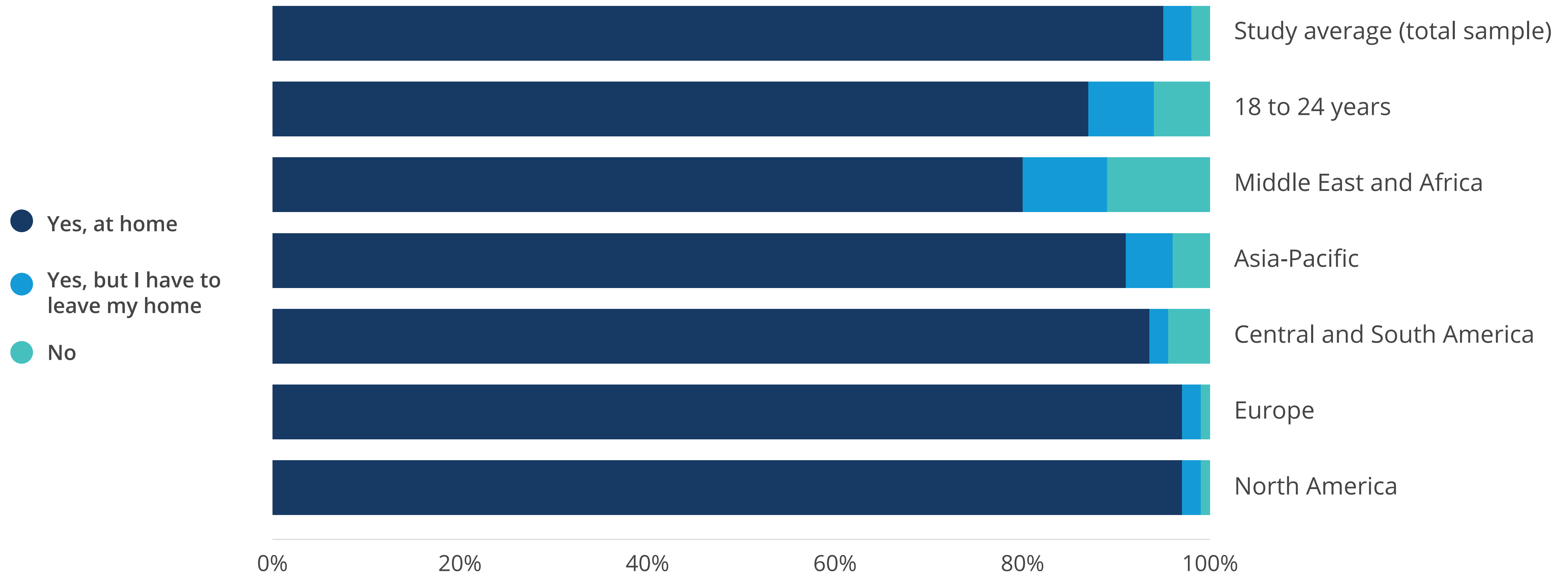**10%** Other

5% Launchpad

2% Gitee

Sample Size = 2,283, Total Mentions = 4,028

Have you had difficulty participating in an open source community because of tools used in an open source project?
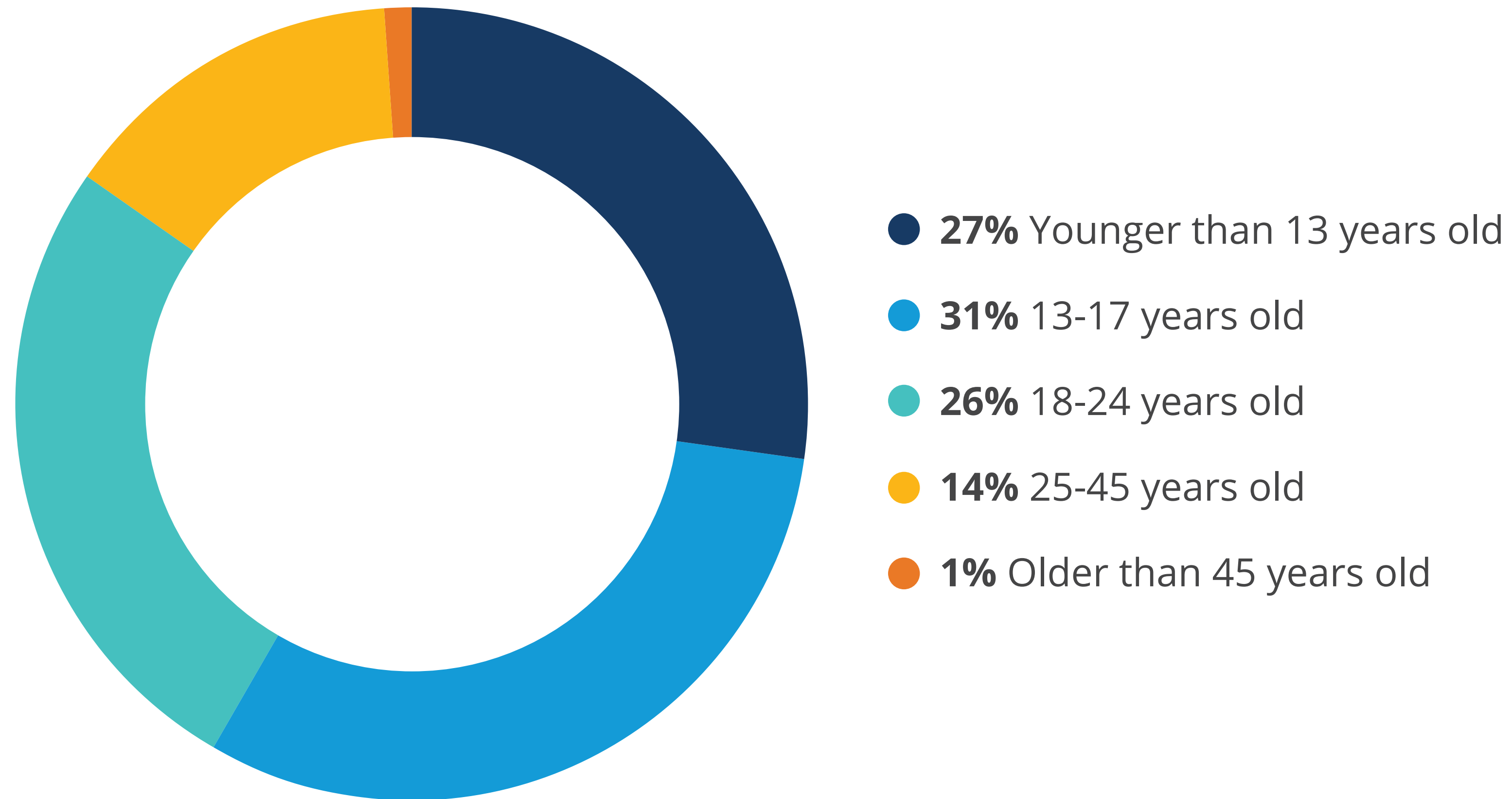

- **80%** No
- **20%** Yes

Sample Size = 2,233

Internet Access & Connectivity

Do you have access to a reliable Internet connection?

Legend:
- Yes, at home (dark blue)
- Yes, but I have to leave my home (blue)
- No (teal)

Categories (top to bottom):
- Study average (total sample)
- 18 to 24 years
- Middle East and Africa
- Asia-Pacific
- Central and South America
- Europe
- North America

X-axis: 0%, 20%, 40%, 60%, 80%, 100%

Middle East and Africa (n=128), Asia-Pacific (n=337), Central and South America (n=179), Europe (n=849), North America (n=836)

Please select all of the devices that you have access to (leave blank if you do not have any of the listed devices).

99% Computer or laptop

85% Smartphone

40% Android-based tablet (Samsung Galaxy Tab, Lenovo Tab, Fire, etc.)

27% iOS-based tablet (iPad, iPad Pro)

11% Chromebook

8% Other

Sample Size = 2,341. Total Mentions = 6,300

How old were you when you first had access to a computer connected to the Internet or other public network such as BBSes?

- **27%** Younger than 13 years old
- **31%** 13-17 years old
- **26%** 18-24 years old
- **14%** 25-45 years old
- **1%** Older than 45 years old

Where did you first have regular access to a computer with an Internet connection?

- **51%** At home
- **27%** In a classroom, computer lab, or library at school
- **7%** At an Internet cafe or similar space
- **6%** At work
- **4%** At a public library or community center
- **2%** University
- **3%** Other

86% of "at school" and **84%** of the at "public library or community center" respondents do not have reliable Internet access at home.

The "At work" and "University" categories were added as a result of coding open-ended "other" responses.

Sample Size = 2,342

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Do you identify as a person with a dis/ability?

For the purpose of this survey we define dis/ability as a long-term physical, mental, intellectual, or sensory impairment which, in interaction with various attitudinal and environmental barriers, hinders your full and effective participation in society on an equal basis with others.

● **83%** No
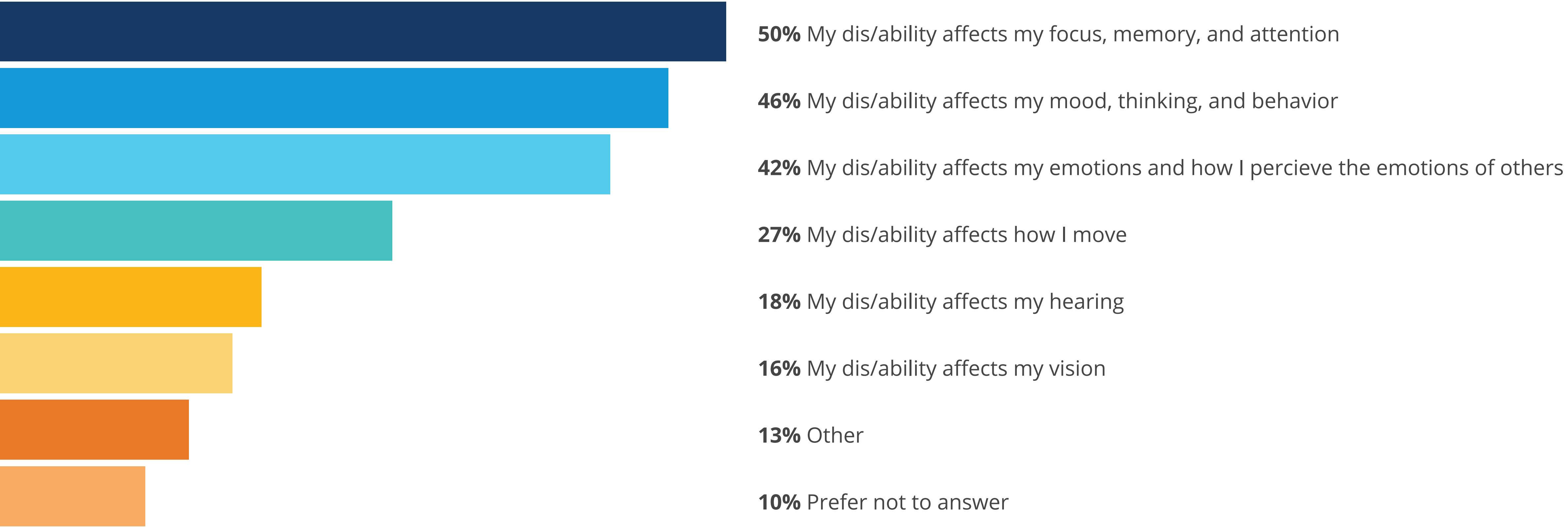
● **17%** Yes

Sample Size = 2,345
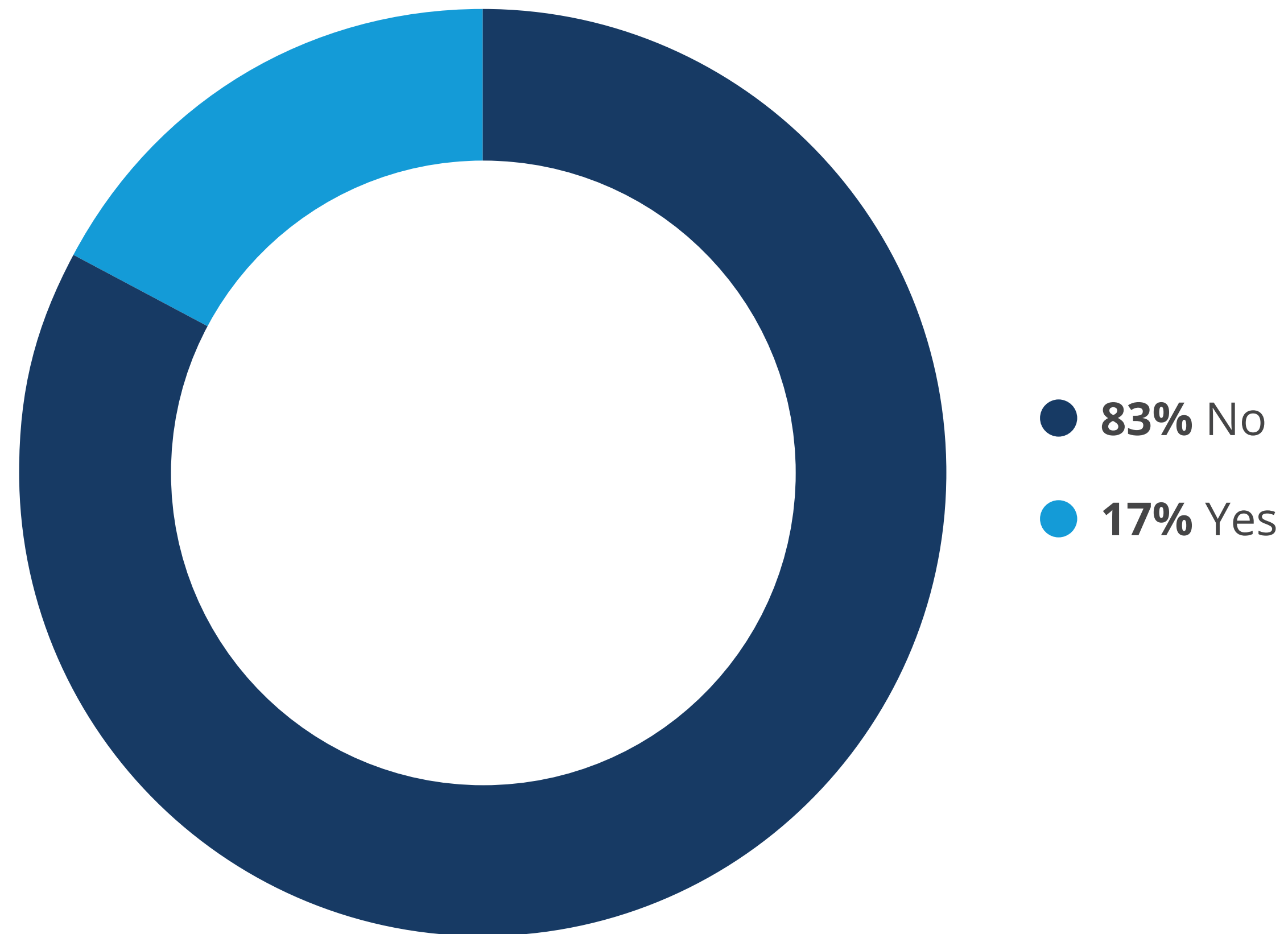
Does your dis/ability affect how you work?

For the purpose of this survey we define dis/ability as a long-term physical, mental, intellectual, or sensory impairment which, in interaction with various attitudinal and environmental barriers, hinders your full and effective participation in society on an equal basis with others.

- **68%** Yes
- **25%** No
- **6%** Prefer not to answer

Sample Size = 389
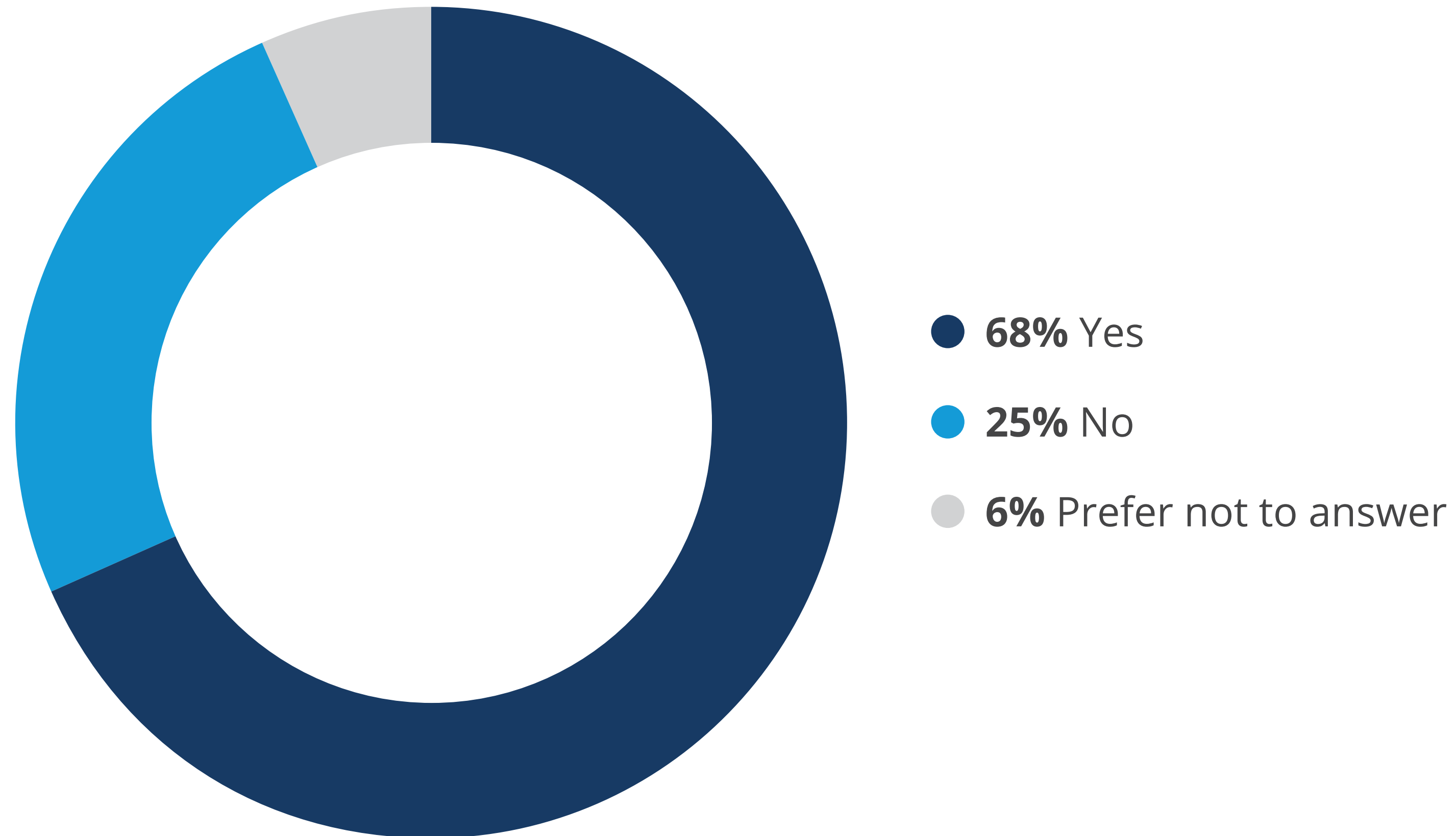
What parts of your life does your dis/ability affect? Select all that apply:

50% My dis/ability affects my focus, memory, and attention

46% My dis/ability affects my mood, thinking, and behavior

42% My dis/ability affects my emotions and how I percieve the emotions of others

27% My dis/ability affects how I move

18% My dis/ability affects my hearing

16% My dis/ability affects my vision

13% Other

10% Prefer not to answer

Sample Size = 389, Total Mentions = 869

Miscellaneous

What are your pronouns?

Analysis of over a thousand open-ended responses indicates that usage of gender-neutral pronouns is not widespread in the open source community.

We looked at the results according to how respondents answered, "Do you consider yourself to be gender non-conforming, gender diverse, gender variant, or gender expansive?"

- **The gender conforming respondents' pronouns typically conformed also. Seventy-one percent use a pronoun like "he / him / his" or "she / her / hers."**

- **Slightly fewer (61%) of those questioning their gender still named either a "he / him / his" or "she / her / hers" type formulation.**

- **Forty-five percent of gender non-conforming respondents describe their pronouns in the traditional manner. At the same time, 35% did provide an answer that purposefully mentioned "they" or "he and/or she" or some other combination seemingly as a means to be inclusive.**

- "There are no pronouns in my native language."

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