McGraw-Hill Education 2016 Workforce Readiness Survey

Prepared by Hanover Research

June 2016

INTRODUCTION, SUMMARY, & KEY FINDINGS

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Introduction

This report presents findings from the McGraw-Hill Education 2016 Workforce Readiness Survey. The primary goal of the survey is to provide a picture of how students are faring as they near graduation and prepare to enter the workforce.

In some cases, this survey compares and contrasts results from March 2016 and similar surveys conducted in March 2015 and March 2014 (when possible). The report also includes insightful results of the 2016 survey segmented by collegiate status, gender, and field of study.

**When applicable, this document will indicate if there are statistically significant differences between survey years 2014-2016. For the 2016 segmentation analysis, the statistical significant testing evaluates if result are significantly different across segmentation categories. Statistical significance means that two results obtained from either sample are real and profoundly different from each other (i.e. it is likely that these two results do not just differ by random chance). Please refer to the appendix for a more detailed explanation on statistical significance testing.

Summary

Overall, only 21 percent of college students feel very prepared for a professional career, mirroring results from 2015. While the difference in preparedness across years is minimal, differences among student groups are more apparent:

- Unsurprisingly, respondents who have been in college longer tend to feel more prepared for a professional career. More mature students (grad students) value a marketable degree, while underclassmen (freshmen and sophomores) emphasize grades/GPA and internship experience.
- There is a sizeable difference between genders, as 24 percent of male, but only 19 percent of female, respondents feel very prepared for the workforce. This may be due to males being less concerned about having a job that is beneficial to society, giving them more options post-graduation.
- Arts and humanities majors also tend to feel less prepared for a career than students from other majors. This may be tied to their pessimism with getting a job upon graduation (along with social science majors, they are the least optimistic among all respondents).

Respondents believe that interpersonal skills are most likely to improve their job prospects. Students also believe that using workforce related technology improves their employment odds. However, respondents indicate that the use of study technology has decreased significantly over the past year.

Key Findings I

- **Only 21% of respondents feel "very prepared" for a professional career.** When asked how they felt about being prepared for a career, only 21 percent of respondents stated they felt "very" prepared to join the workforce.

- **Workforce readiness differs by collegiate status, gender, and field of major.** Similar to 2015 results, respondents who have been in college longer tend to feel more prepared for a professional career. For example, 47 percent of graduate students feel very prepared for a career, while only 15 percent of freshman feel the same way. There is also a sizeable difference between genders as 24 percent of male, but only 19 percent of female, respondents feel very prepared for the workforce. Arts and humanities majors also tend to feel less prepared for a career than students from other majors.

- **Respondents feel that their workforce readiness could be improved through more internships, more time for career preparation, and better access to preparation tools.** Slightly more than two-thirds of respondents (67%) feel that more professional experience would have improved their career readiness. Fifty-nine and 47 percent of respondents stated that they should have had more time for career planning and better access to preparation tools, respectively. Around a third of respondents listed more networking and better study technology as important components to prepare for a professional career. Nevertheless, the vast majority of respondents (89%) feel that college has been at least somewhat helpful in preparing them for a professional career. Overall, these results closely mirror 2015 findings.

- **A majority of respondents learned how to multitask, hold presentations, and use workplace related technology while attending college.** Again mirroring results from 2015, around two-thirds of students (66% and 63% respectively) learned multitasking and presentation techniques while in college. Using workplace related technology is the third most mentioned skills, acquired by 55 percent of respondents.

Key Findings II

- **Respondents believe that interpersonal skills, degree marketability, grades, and internships make a good job candidate.** The vast of majority of respondents (78%) believe interpersonal skills are essential for a good job candidate. Slightly more than two-thirds of respondents also believe that a marketable degree (67%) and good grades (67%) help improve job chances.

- **Respondents tend to use career resources and generally perceive them to be effective.** Eighty-six percent of respondents think that available career resources are at least somewhat effective, and more than three-quarters of respondents (78%) used available career resources when attending college. Respondents reporting use of career resources "a lot" has increased significantly from 2015 (14%) to 2016 (21%).

- **Students feel largely optimistic about their career prospects.** More than two-thirds of respondents (70%) feel either somewhat or very optimistic about their job prospects, with only 39 percent agreeing they are uncertain their major will secure a job after graduating. In general, STEM major respondents are the most optimistic about future job prospects, especially compared to respondents studying arts, humanities, or social sciences.

Key Findings III

- **Over three-quarters of students prefer doing what they love over being paid well.** Similarly, 57 percent of students prefer to have a job that pays less but has a beneficial impact on society over a well paying job with no beneficial impact on society. Outliers who indicate preferences for well paying, rather than societally beneficial, jobs include graduate students respondents (55%), males (52%), and business/economics major respondents (52%).

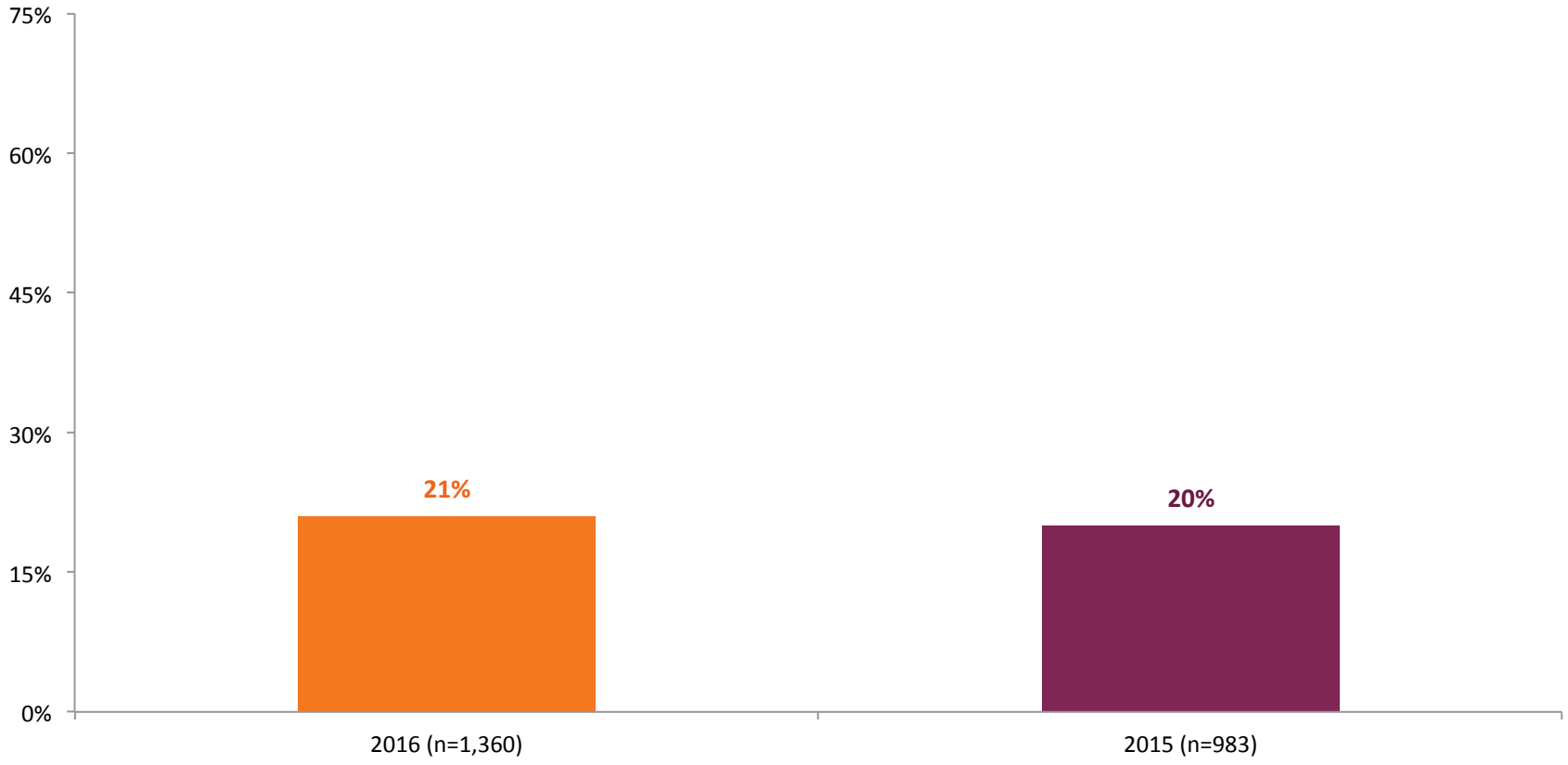
- **In general, respondents are satisfied with their college experience.** More than three-quarters of respondents (79%) are either somewhat or very satisfied with their college experience, a significant increase from 2015 (75%). Female respondents indicate higher satisfaction (82%) compared to male respondents (74%).

- **Academics, cost, and value are the most important factors respondents consider when choosing a college.** Over half list either cost (32%) or academics (20%) as their most important consideration. Fifteen percent of respondents perceive value – the quality of academics at the best price – as the most important factor when making a decision. Student life, reputation, job placement, and flexible course options are less important in student decision making.

CAREER PREPAREDNESS

Career Preparedness

Just over one-fifth (21%) of respondents feel very prepared for a professional career after completing college, a one percent increase from 2015.



How prepared do you feel for your professional career?
Percentages reflect respondents' top choice ("very prepared").

Career Preparedness, by Segment 2016

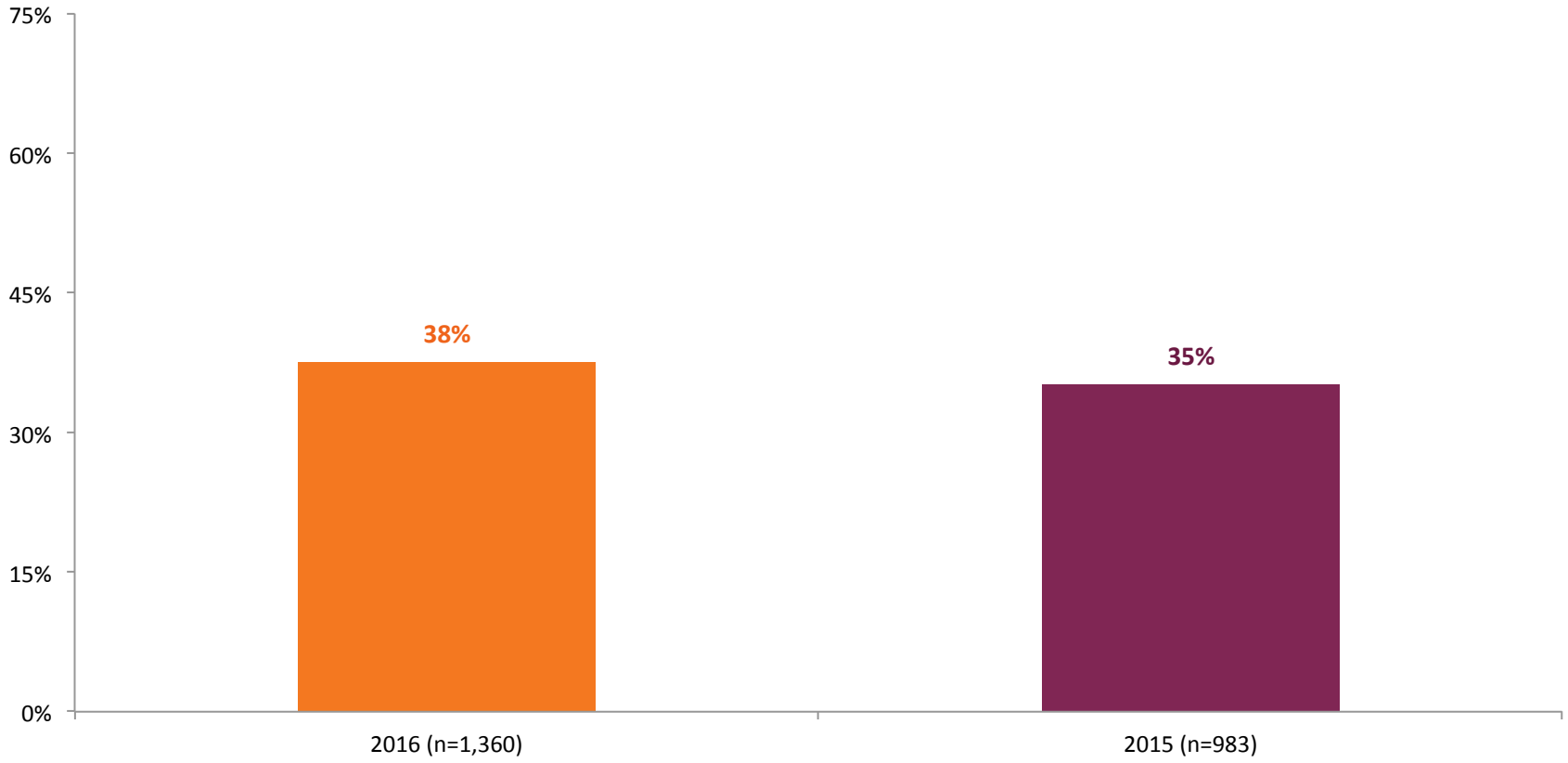
Respondents who have been in college longer tend to feel more prepared for a professional career. For example, 47 percent of graduate students feel very prepared for a career, while only 15 percent of freshman feel the same way. There is also a sizeable difference between gender as 24 percent of male but only 19 percent of female respondents feel very prepared for the workforce. Arts, humanities, and social sciences majors also tend to feel less prepared for a career than students from other majors.

Collegiate Status	Not at all prepared	Only a little prepared	Somewhat prepared	Very prepared
Freshman (N=362)	12%	31%	42%	15%
Sophomore (N=409)	5%	26%	49%	20%
Junior (N=291)	4%	21%	56%	19%
Senior (N=243)	5%	16%	53%	27%
In a masters or doctorate program (N=55)	0%	9%	44%	47%
Gender	**Not at all prepared**	**Only a little prepared**	**Somewhat prepared**	**Very prepared**
Female (N=932)	7%	24%	50%	19%
Male (N=427)	6%	24%	47%	24%
Field of Major	**Not at all prepared**	**Only a little prepared**	**Somewhat prepared**	**Very prepared**
Arts and humanities (N=100)	18%	24%	47%	11%
Business and economics (N=500)	5%	22%	51%	23%
Social Sciences (N=112)	4%	26%	56%	13%
STEM field (N=304)	5%	31%	44%	20%
Other (N=344)	8%	20%	49%	24%

How prepared do you feel for your professional career?
Figures in red font indicate statistically significant different results within segments at $p < .05$

Career Preparedness

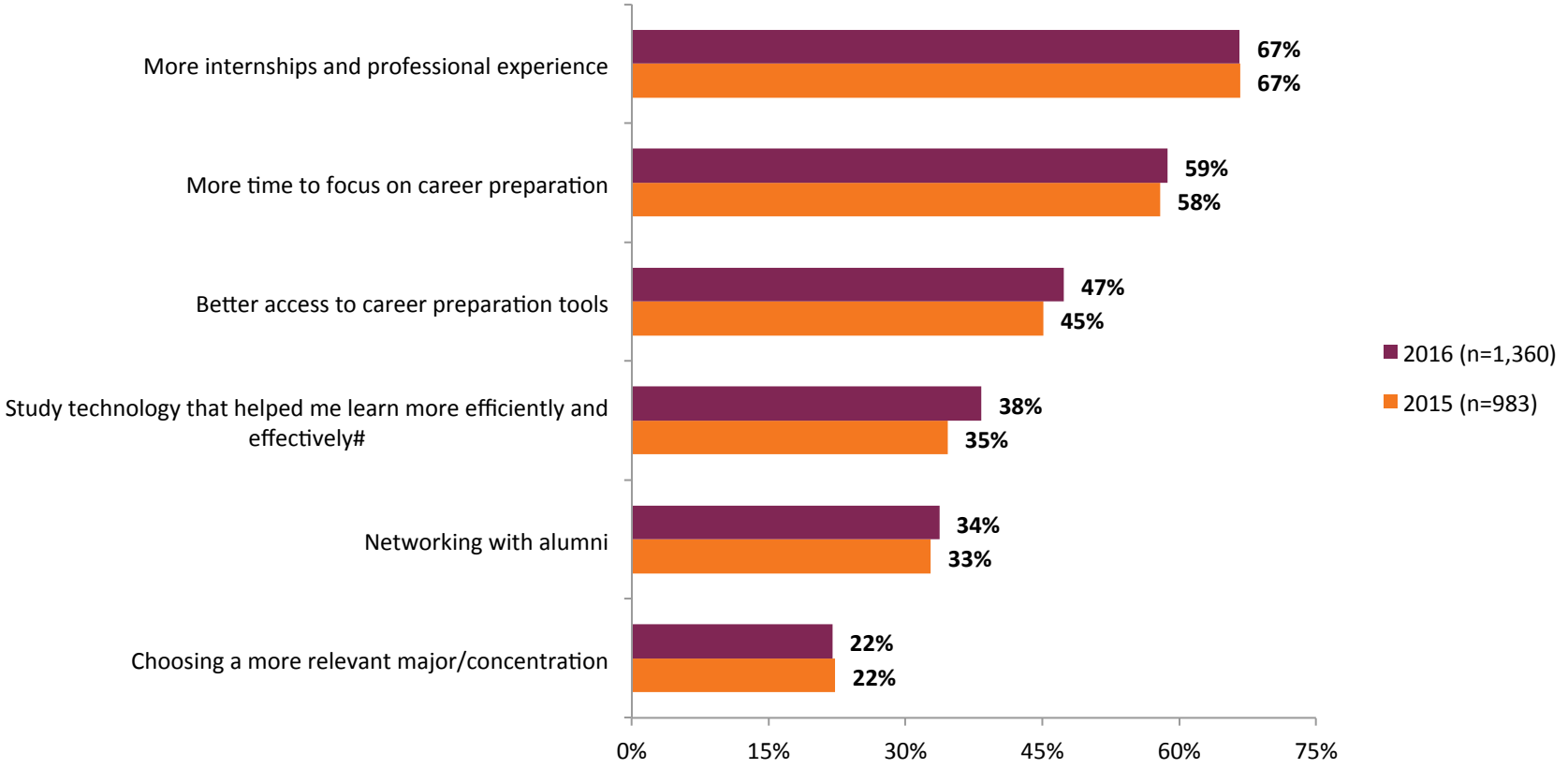
38 percent of respondents felt that college has been “very helpful” in preparing them for a professional career..



How helpful has your college education/experience been in preparing you for a professional career?
Note: Response reflects respondents’ top choice (“very prepared”).

Career Preparedness

From 2015-2016, more professional experience and additional career preparation efforts remain most important for helping students feel work ready. Slightly over two-thirds of respondents (67%) feel that internships would have improved their work readiness. More career preparation, better access to career tools and networking have increased slightly in important to students from 2015 to 2016.

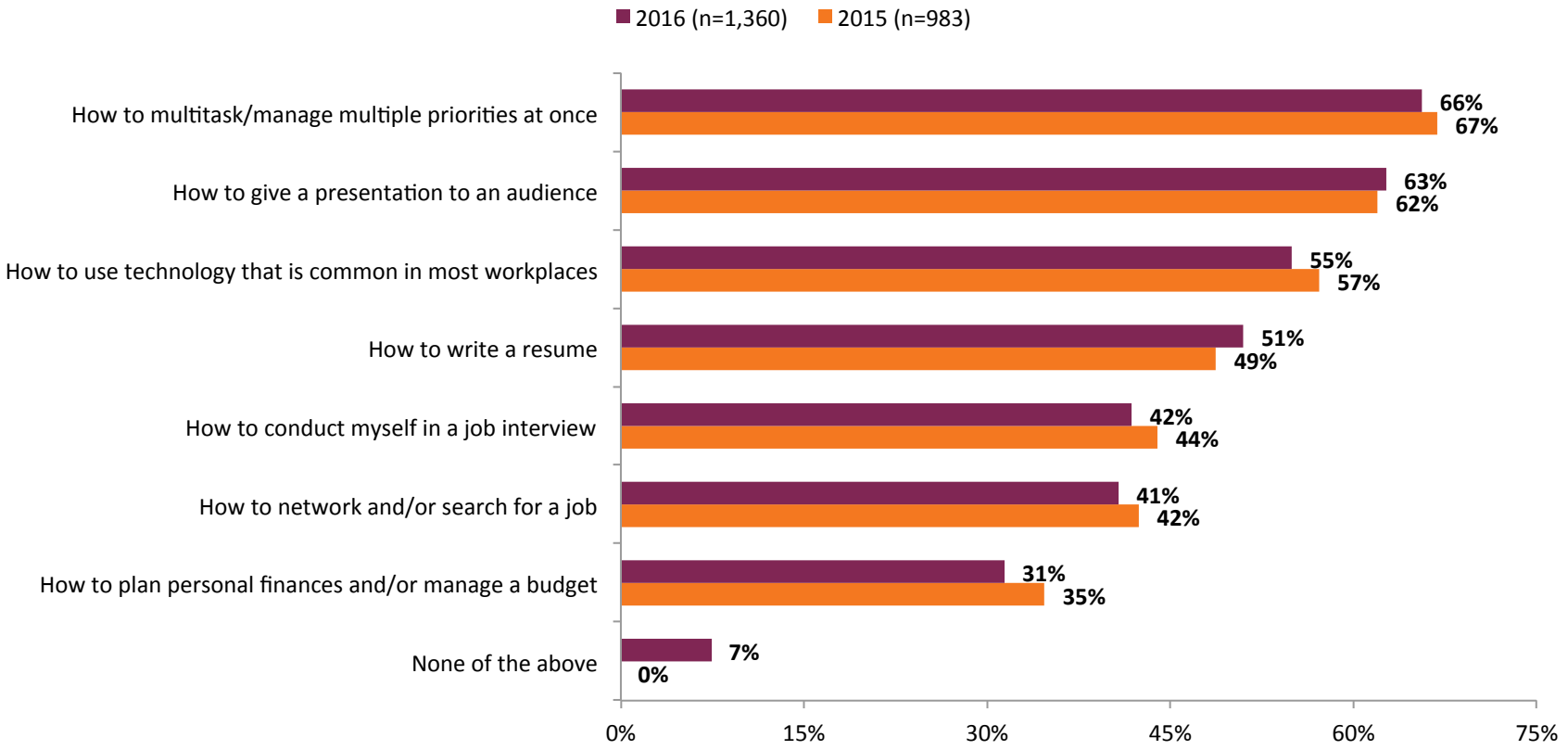


What would have made you feel more prepared for your professional career? Select all that apply.

SKILLS LEARNED & TECHNOLOGY USED

Skills Learned – 2015 & 2016

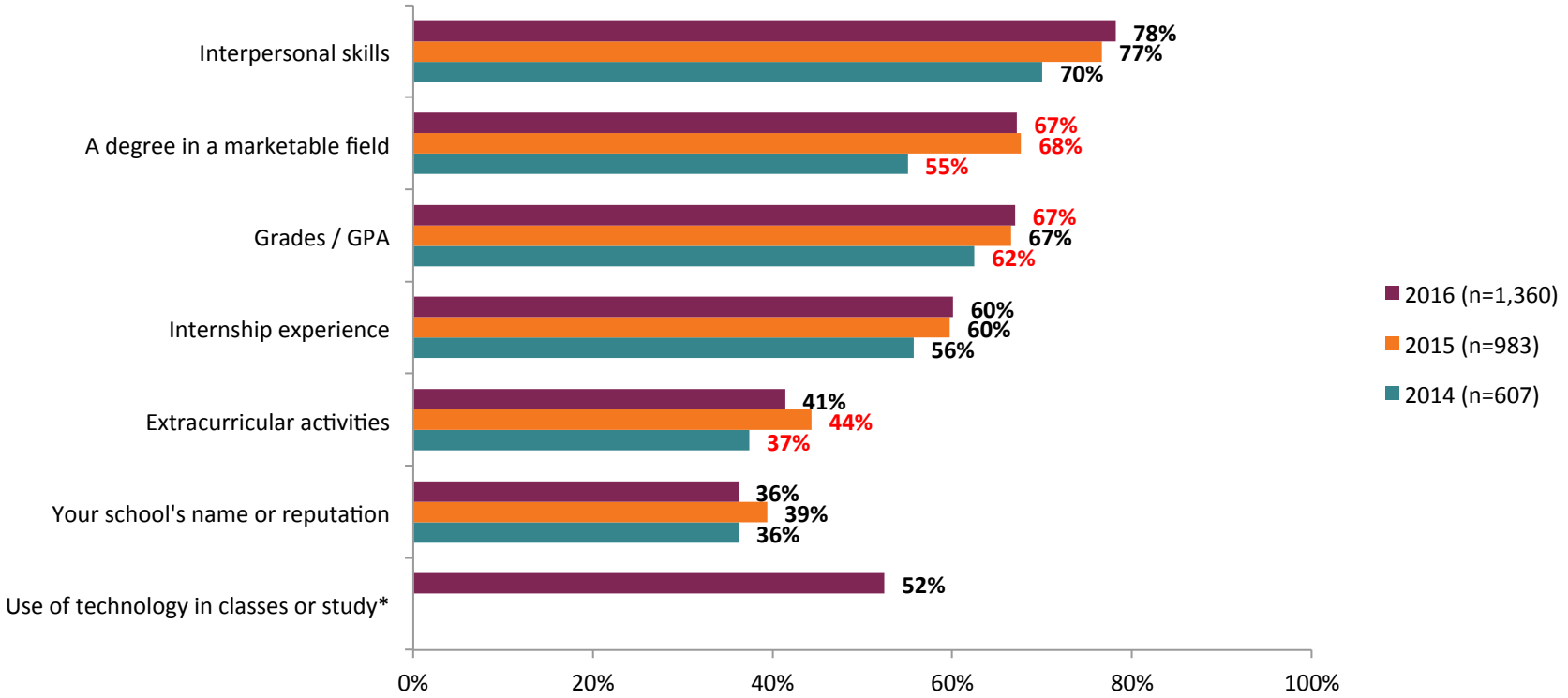
Multitasking and manage multiple priorities at once continues to be the most reported skill learned at college, followed by giving a presentation in front of an audience.



Which of the following skills have you learned at college? Select all that apply.

Skills Learned – Job Candidate

Respondents in 2016 continue to emphasize the importance of interpersonal skills, degree marketability, grades, and internships to becoming a good job candidate. Seventy-eight percent of respondents believe that interpersonal skills are important for job candidacy. Most differences are statistically significant between 2014 and 2015/2016 (there are no significant differences between 2015 & 2016). However, the 2014 and 2015 & 2016 iterations differ in answer options, which somewhat limits the comparability of results.



Which of the following parts of your college career, if any, do you believe will make you a good job candidate? Select all that apply.

* Not an answer option in 2014 & 2015

Note: Figures in red font are statistically significant different at $p < .05$

Skills Learned – Job Candidate, by Collegiate Status

Graduate students differ significantly in their perceptions of what makes someone a good job candidate. Undergraduates put more emphasis on grades and internship experience than graduate students, who perceive a degree in a marketable field as more important. Notably, with each successive year of college experience, respondents perceive grades/GPA and internship experience as less important for job candidacy.

2016	Freshman (N=362)	Sophomore (N=409)	Junior (N=291)	Senior (N=243)	In a masters or doctorate program (N=55)
Interpersonal skills	77%	81%	77%	79%	71%
A degree in a marketable field	64%	66%	69%	67%	82%
Grades / GPA	75%	68%	65%	60%	49%
Internship experience	62%	62%	61%	56%	45%
Extracurricular activities	45%	40%	40%	43%	27%
Your school's name or reputation	34%	33%	37%	42%	38%
Use of technology in classes or study	51%	56%	52%	49%	55%

Which of the following parts of your college career, if any, do you believe will make you a good job candidate? Select all that apply.

Note: Figures in red font indicate statistically significant different results across collegiate status at $p < .05$

Skills Learned – Job Candidate, by Field of Major

Business and economics majors place a strong emphasis on a degree in a marketable field, while STEM majors focus on grades/GPA. Arts and humanities majors place a higher priority on interpersonal skills as important factors for improving job candidacy compared to other majors.

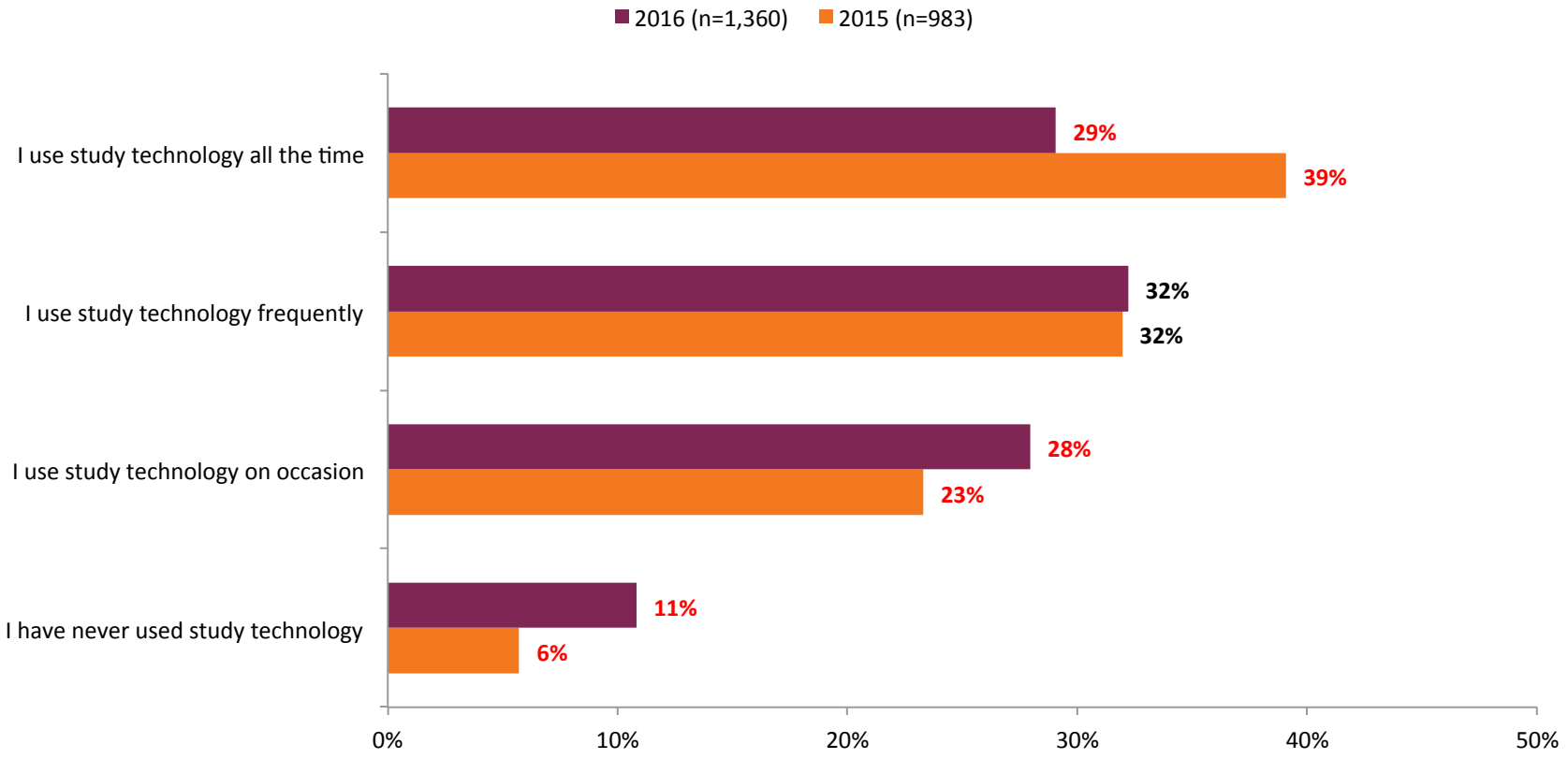
2016	Arts and humanities (N=100)	Business and economics (N=500)	Social Sciences (N=112)	STEM field (N=304)	Other (N=344)
Interpersonal skills	84%	79%	79%	74%	79%
A degree in a marketable field	57%	75%	51%	67%	64%
Grades / GPA	65%	62%	71%	72%	69%
Internship experience	61%	59%	52%	65%	59%
Extracurricular activities	45%	39%	46%	46%	38%
Your school's name or reputation	38%	38%	33%	38%	33%
Use of technology in classes or study	45%	54%	41%	54%	54%

Which of the following parts of your college career, if any, do you believe will make you a good job candidate? Select all that apply.

Note: Figures in red font indicate statistically significant different results across field of major at $p < .05$

Technology Used

Responses suggest that the use of study technology has decreased from 2015 to 2016. The number of respondents using study technology all the time decreased from 39 percent in 2015 to 29 percent in 2016. A larger proportion of respondents in 2016 report using study technology on occasion (28%) compared to 2015 (23%). The number of students who have never used study technology increased from six to 11 percent during the same time period. These reported changes are statistically significant.

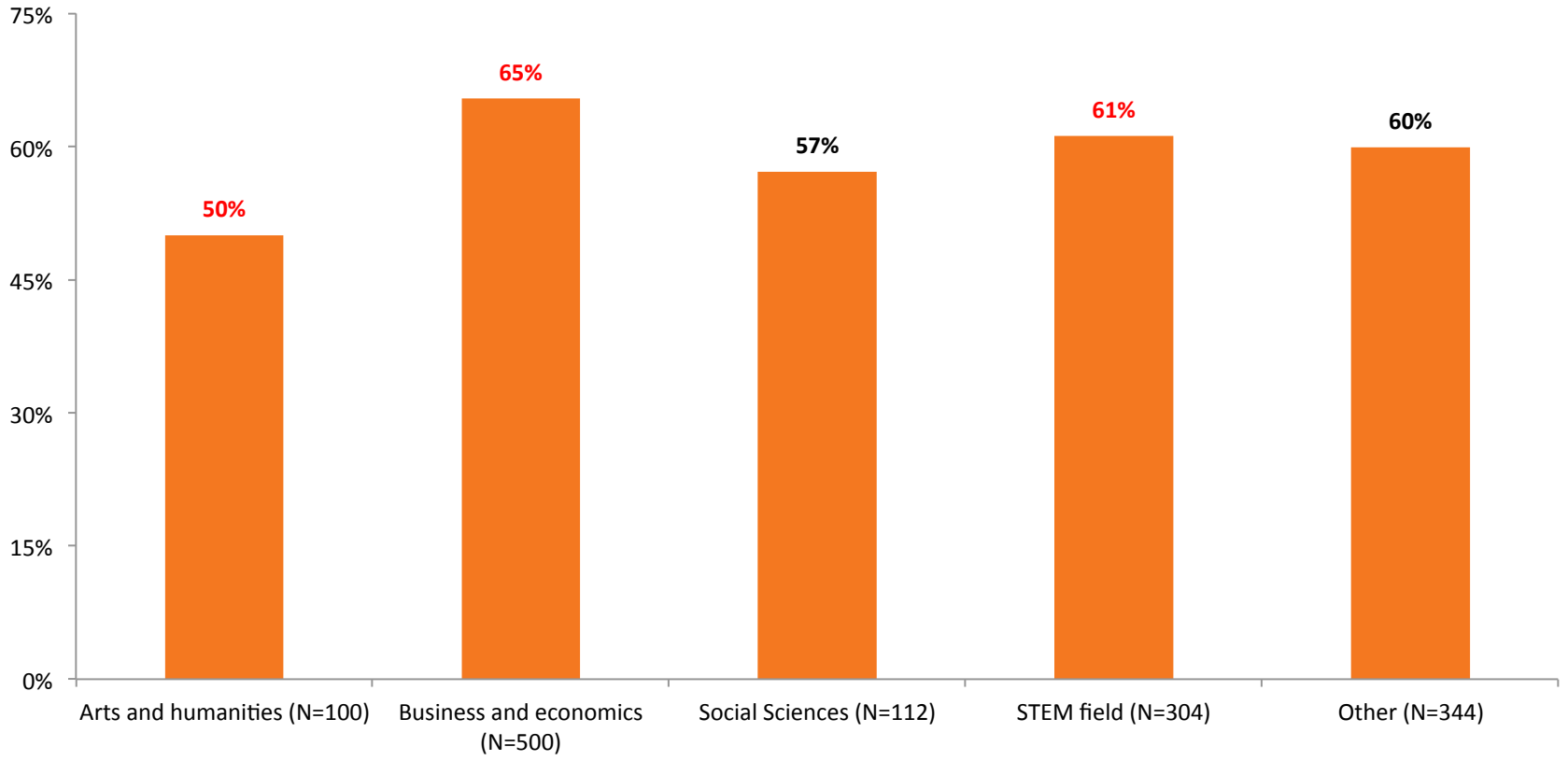


How much do/did you use study technology in college? Study technology is defined as any digital/online program or application that allows you to learn classroom concepts.

Note: Figures in red font are statistically significant different at p < .05

Technology Used, by Field of Major

Study technology is used most frequently by business and economics majors (65%) and STEM majors (61%). Only half of arts and humanities majors report frequent use of study technology in college.



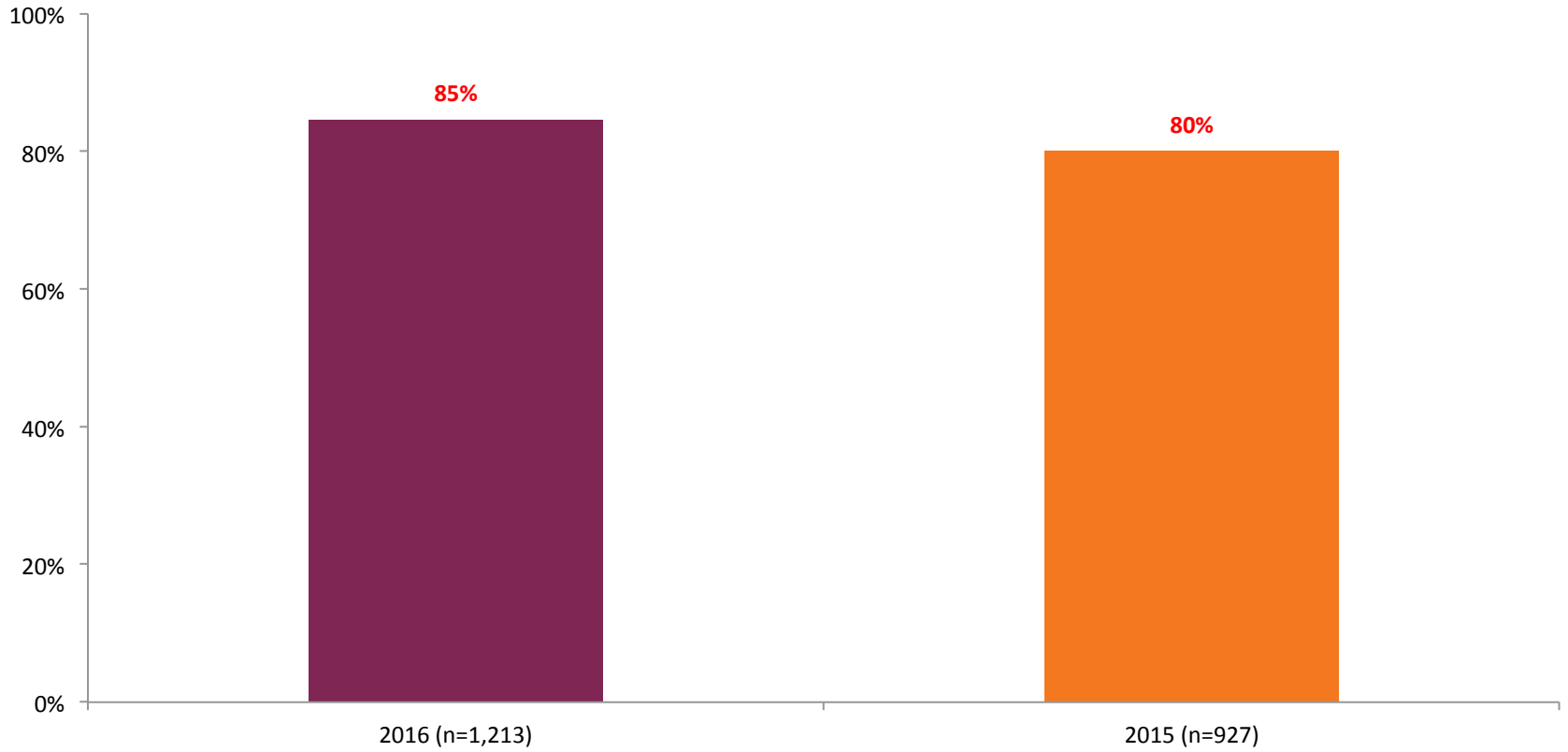
How much do/did you use study technology in college? Study technology is defined as any digital/online program or application that allows you to learn classroom concepts.

Note: Percentages reflect respondents' "top 2" choices ("I use study technology all the time" and "I use study technology frequently").

Figures in red font are statistically significant different at $p < .05$

Technology Used

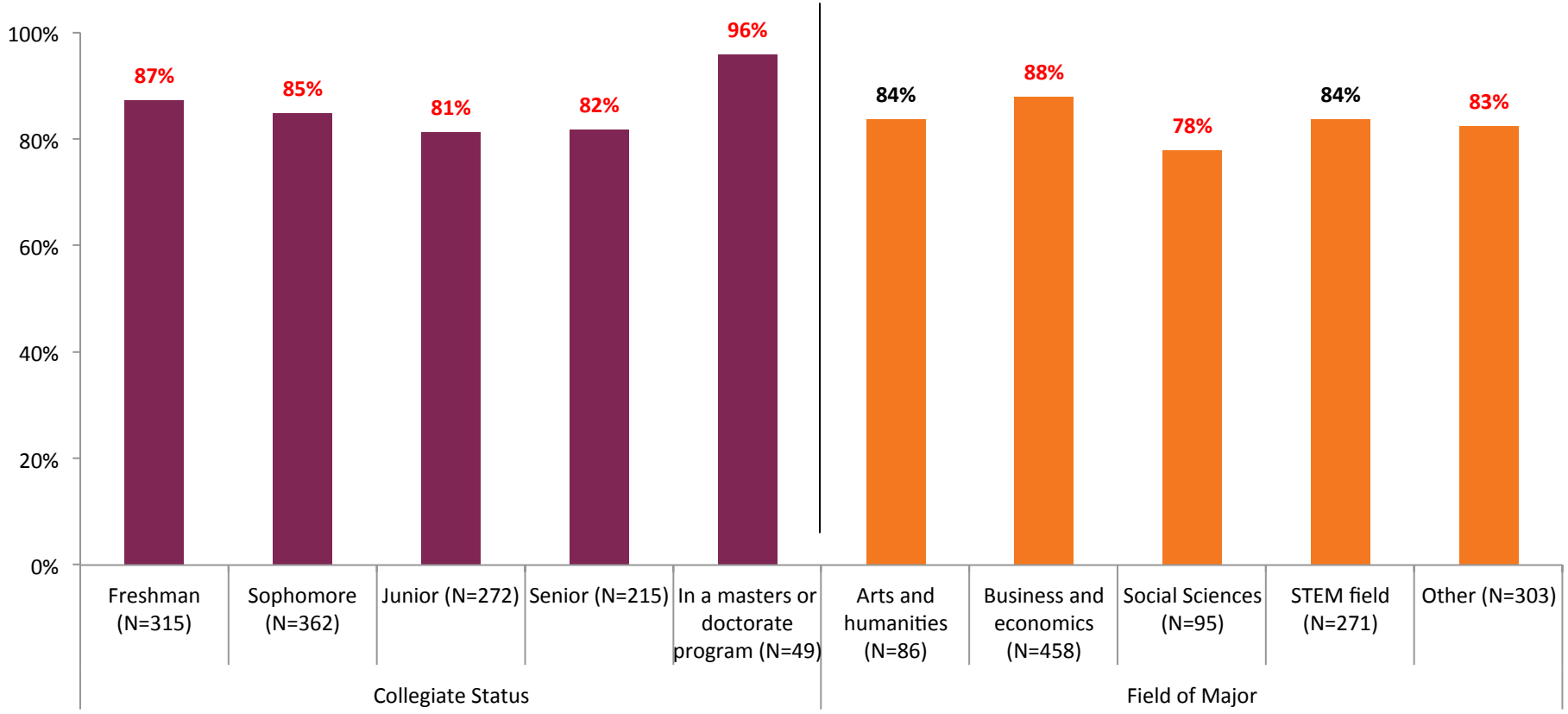
Agreement with the statement, “The frequent use of technology in my coursework and as a study aid will make me a stronger candidate for employment” has increased significantly from 2015 (80%) to 2016 (85%), suggesting that respondents continue to see the value of technology in coursework and job candidacy.



Please respond to the following statement: The frequent use of technology in my coursework and as a study aid will make me a stronger candidate for employment.
Note: Percentages reflect respondents’ “top 2” choices (“Strongly agree” and “Somewhat agree”).
Respondents reporting they never used study technology did not see this question.
Figures in red font are statistically significant different at $p < .05$.

Technology Used, by Collegiate Status & Field of Major

Graduate students differ significantly in their agreement with frequent use of technology from undergraduate students. Nearly all graduate students (96%) agree that frequent technology use will positively impact candidacy for employment. Business and economic majors also report high agreement (88%), while social science majors report significantly lower agreement (78%).



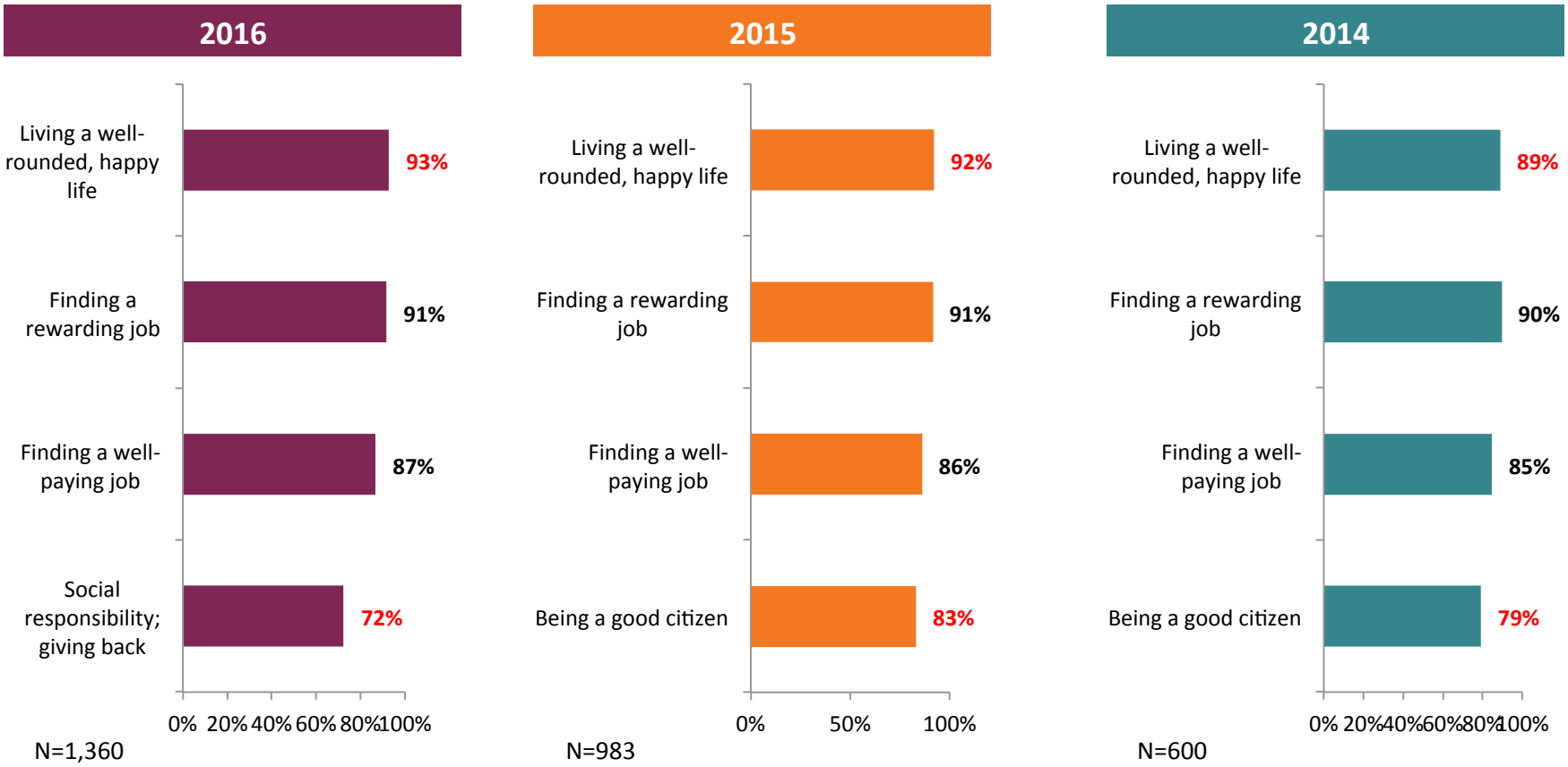
Please respond to the following statement: The frequent use of technology in my coursework and as a study aid will make me a stronger candidate for employment.

Note: Percentages reflect respondents' "top 2" choices ("Strongly agree" and "Somewhat agree").
Respondents reporting they never used study technology did not see this question.
Figures in red font indicate statistically significant different results within segments at $p < .05$

CAREER PLANNING

Career Planning

Living a well-rounded, happy life continues to be the most important planning priority to respondents in 2016. In addition, social responsibility/giving back is becoming less of a priority to respondents.

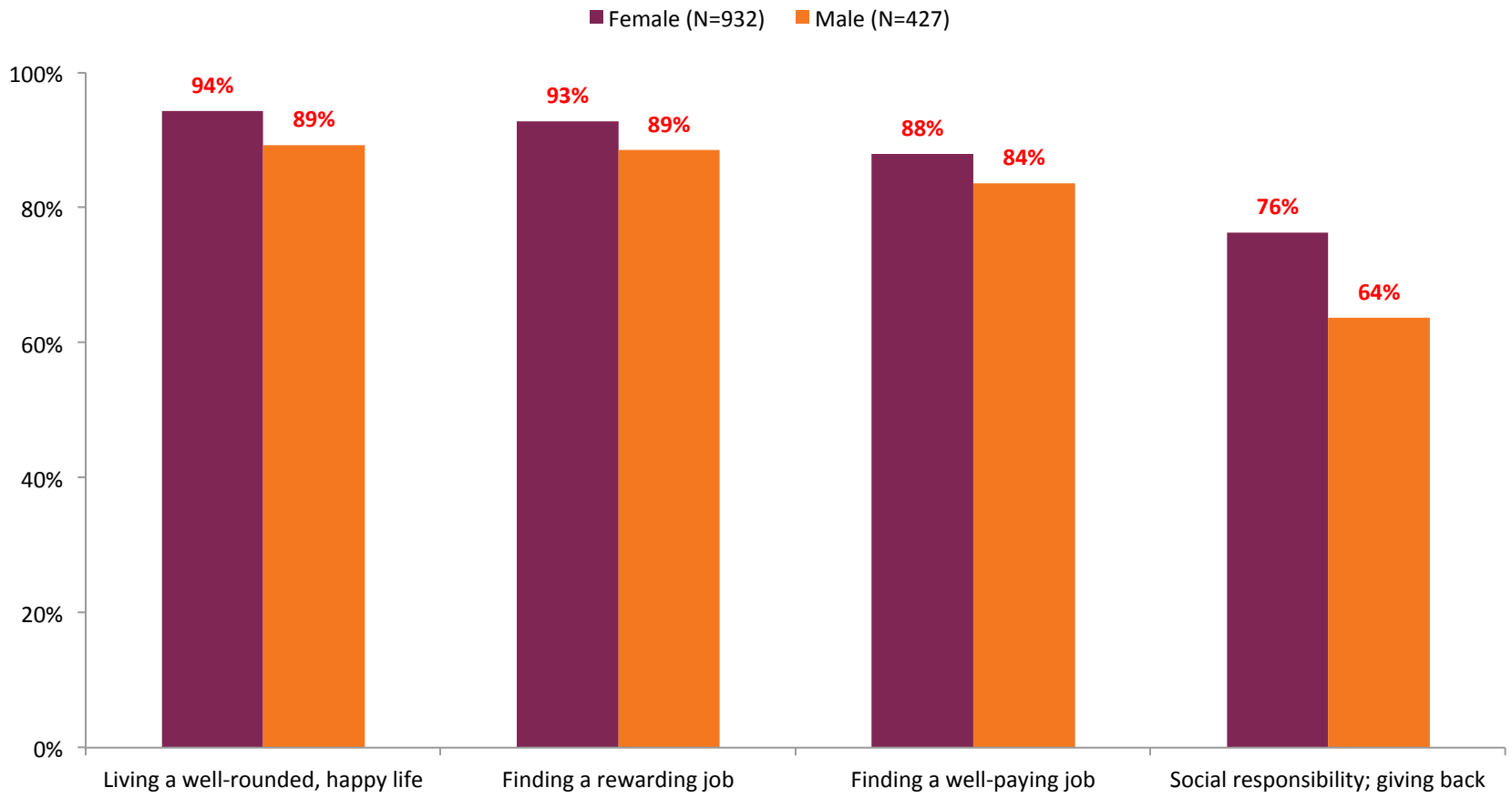


How important to you is planning for each of the following while you are in college?

Note: Percentages reflect respondents' "top 2" choices ("Extremely important" and "Very important"). "Being a good citizen" in 2014 & 2015 was changed to "Social responsibility; giving back" in 2016. Figures in red font are statistically significant different at $p < .05$

Career Planning – by Gender

Overall, females place significantly higher importance on all planning attributes compared to males.

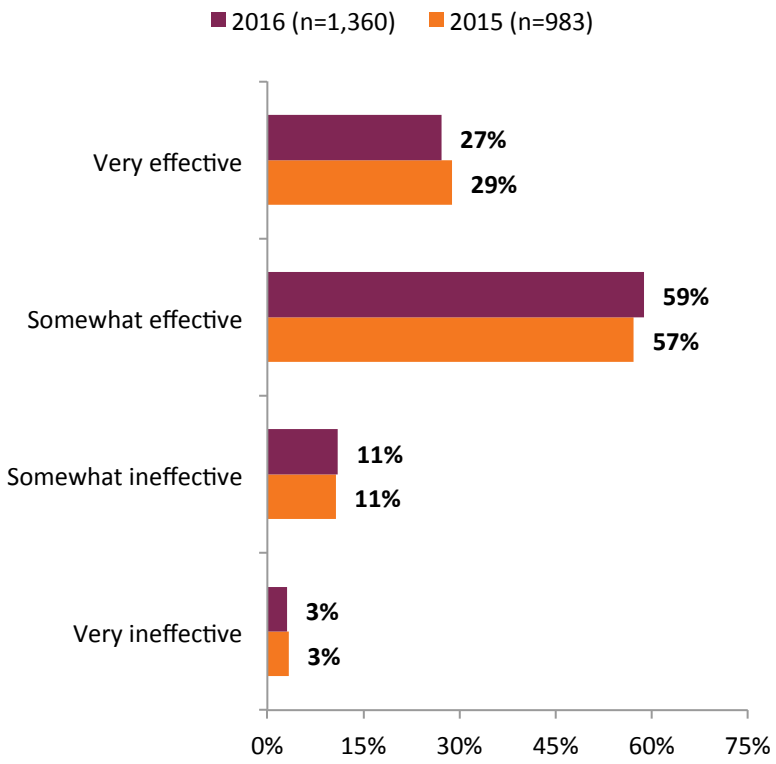


How important to you is planning for each of the following while you are in college?
Note: Percentages reflect respondents' "top 2" choices ("Extremely important" and "Very important").
Figures in red font are statistically significant different at p < .05

Career Planning

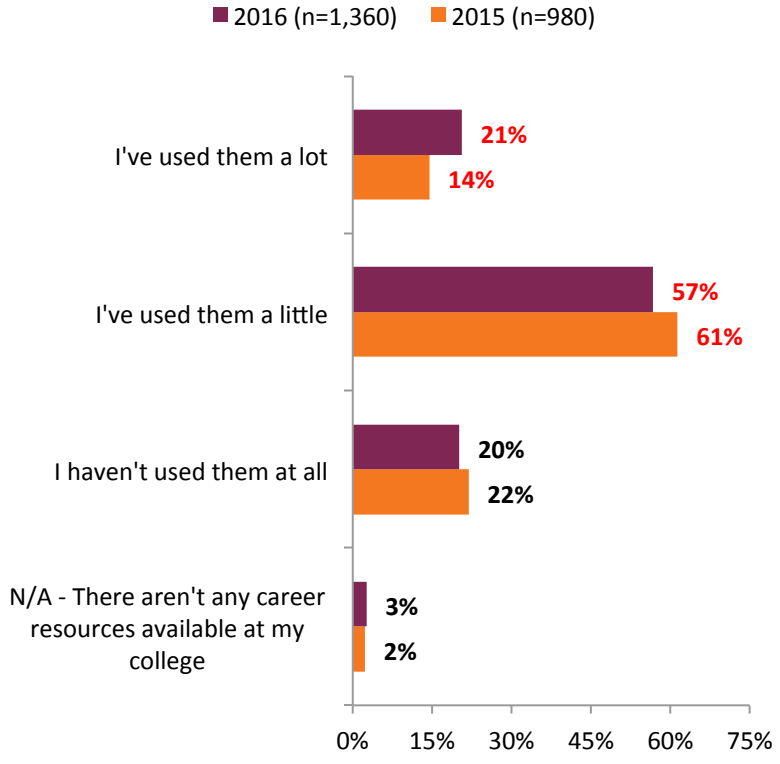
Similar to 2015, 86 percent of respondents believe available career resources at their colleges are at least somewhat effective. More than three-quarters of 2016 respondents (78%) also use available career resources, with 21 percent indicating they have used them "a lot," a significant increase from 2015. Only a fifth of respondents in 2016 have not used their college career resources at all.

Effectiveness of Career Resources



How effective are the career resources available at your college?

Usage Frequency of Career Resources

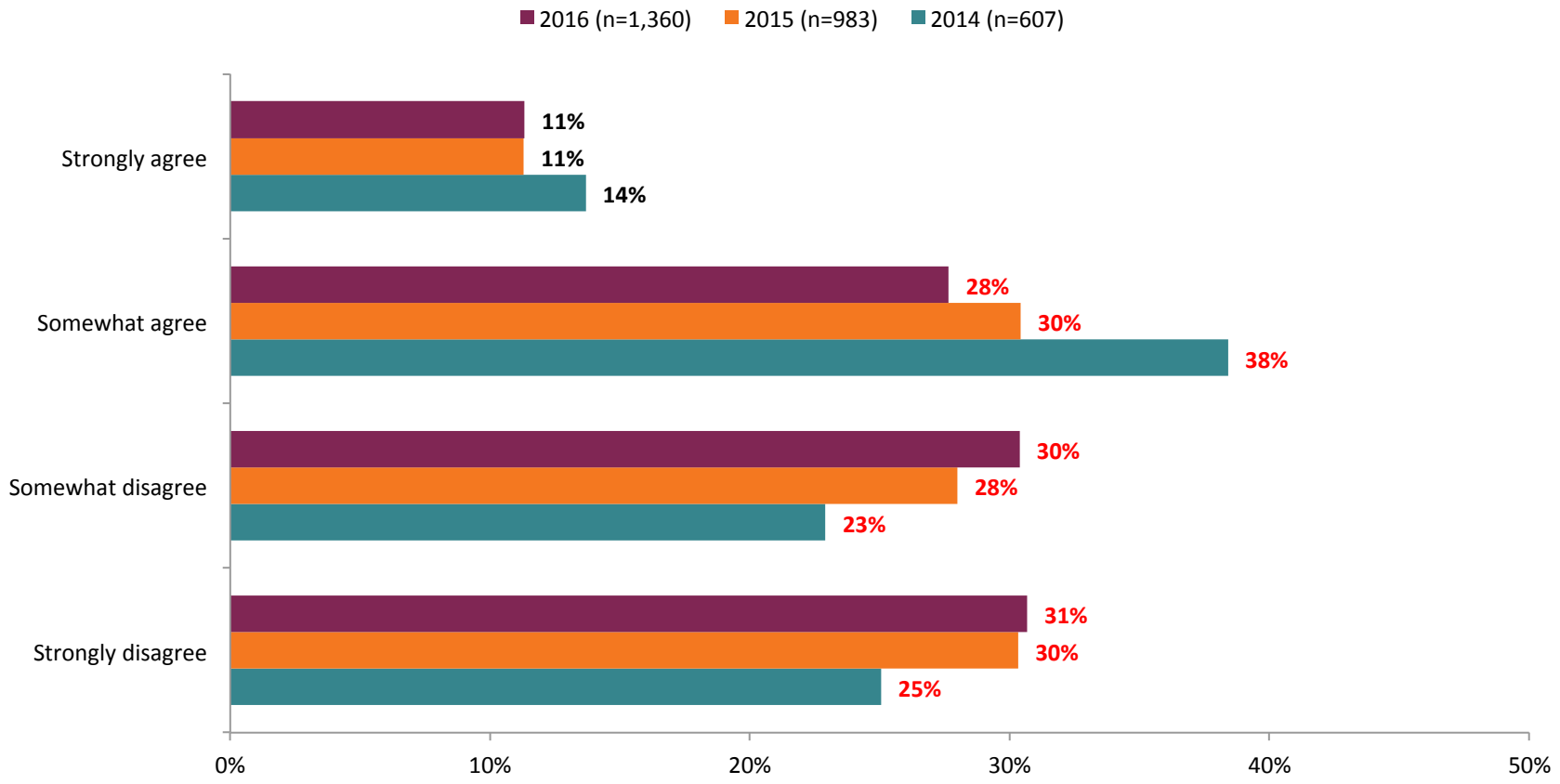


To what degree have you taken advantage of the career resources available at your college?

CAREER PERCEPTIONS & PREFERENCES

Career Perception

The number of respondents who *agree* with the statement "I'm happy with my major, but I'm not sure it will get me a job when I graduate" continues to decrease with a 13 percent difference between 2014 & 2016 and a 3 percent difference between 2015 & 2016. This suggests that respondents are now more likely to believe their major will help them with job prospects compared to previous years.

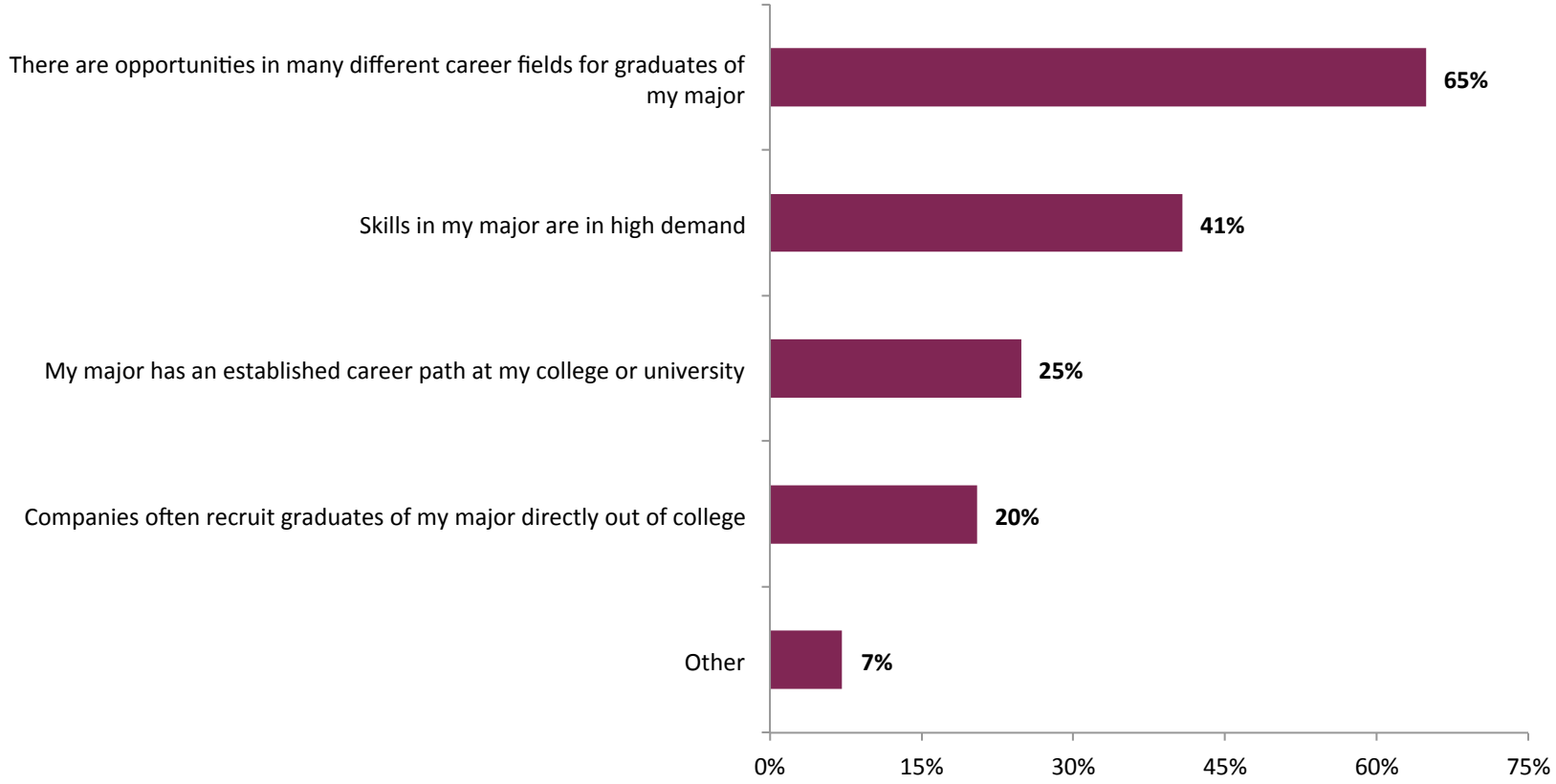


Please respond to the following statement: I'm happy with my major, but I'm not sure it will get me a job when I graduate.

Note: Figures in red font are statistically significant different at $p < .05$

Career Perception

Slightly less than two-thirds of respondents (65%) believe their current major will help them secure a job after graduation because there are opportunities in many different career fields for graduates of their major.



My current major will help me get a job after graduation because…
Note: Question not in 2014 & 2015 iteration.
Respondents that selected "Somewhat agree" or Strongly agree" to the statement, "I'm happy with my major, but I'm not sure it will get me a job when I graduate" were asked to answer this question. N=532

Career Perception, By Collegiate Status & Field of Major

Juniors report career opportunities in their major will be the biggest factor in attaining a job. Business and economic majors, along with social science majors, share the same thought, while STEM majors place significantly more emphasis on the high demand for skills in their major.

Collegiate Status	Freshman (N=134)	Sophomore (N=158)	Junior (N=110)	Senior (N=106)	In a masters or doctorate program (N=24)
There are opportunities in many different career fields for graduates of my major	60%	62%	74%	70%	50%
Skills in my major are in high demand	48%	43%	36%	35%	33%
My major has an established career path at my college or university	30%	25%	20%	22%	29%
Companies often recruit graduates of my major directly out of college	24%	21%	15%	22%	17%
Other	7%	9%	4%	8%	8%
Field of Major	**Arts and humanities (N=51)**	**Business and economics (N=196)**	**Social Sciences (N=58)**	**STEM field (N=105)**	**Other (N=122)**
There are opportunities in many different career fields for graduates of my major	65%	72%	69%	64%	52%
Skills in my major are in high demand	35%	40%	21%	49%	47%
My major has an established career path at my college or university	27%	23%	19%	31%	24%
Companies often recruit graduates of my major directly out of college	10%	24%	7%	30%	17%
Other	6%	5%	10%	4%	13%

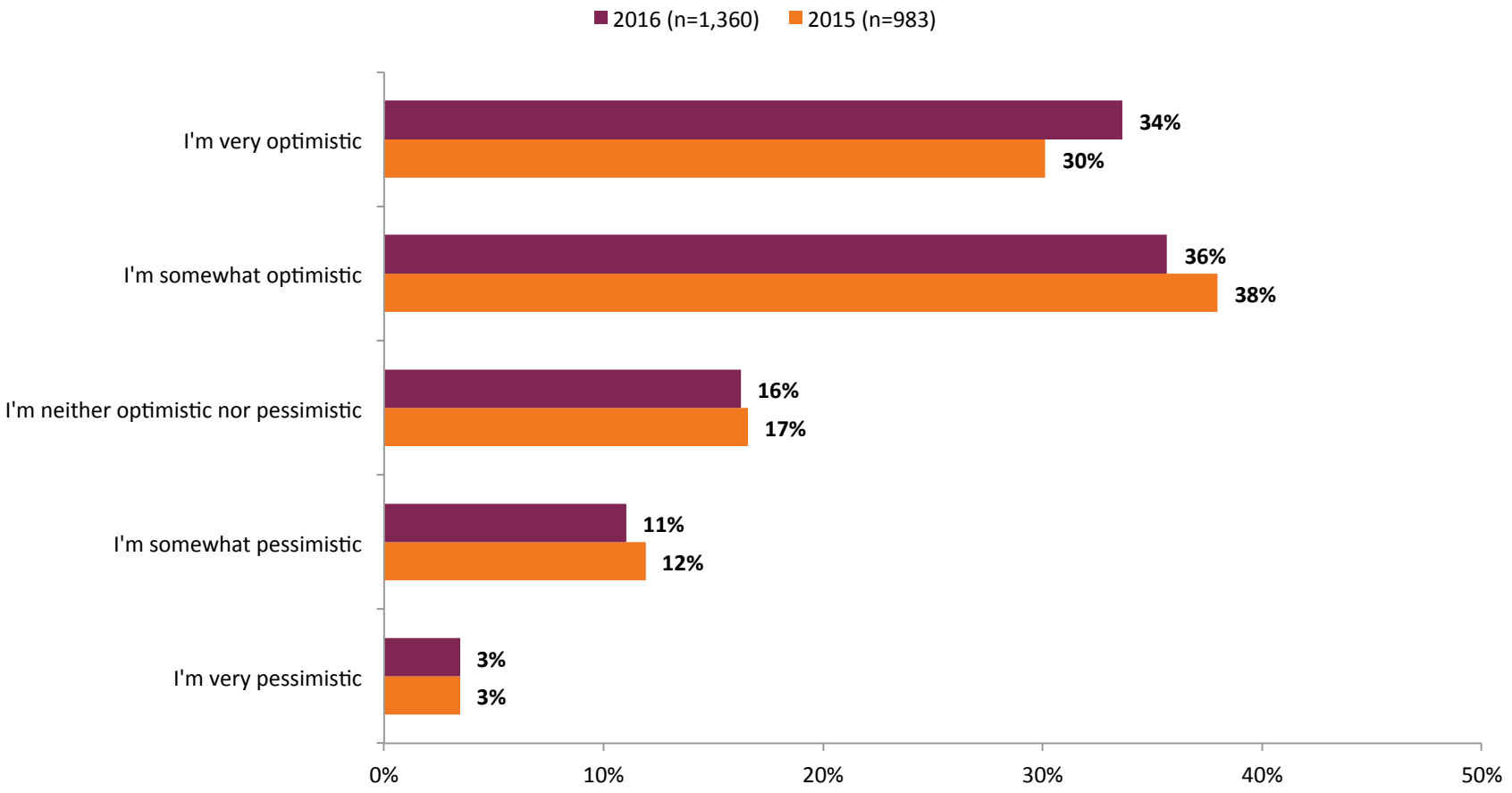
My current major will help me get a job after graduation because…

Note: Respondents that selected "Somewhat agree" or Strongly agree" to the statement, "I'm happy with my major, but I'm not sure it will get me a job when I graduate" were asked to answer this question.

Figures in red font indicate statistically significant different results within segments at $p < .05$

Career Perception

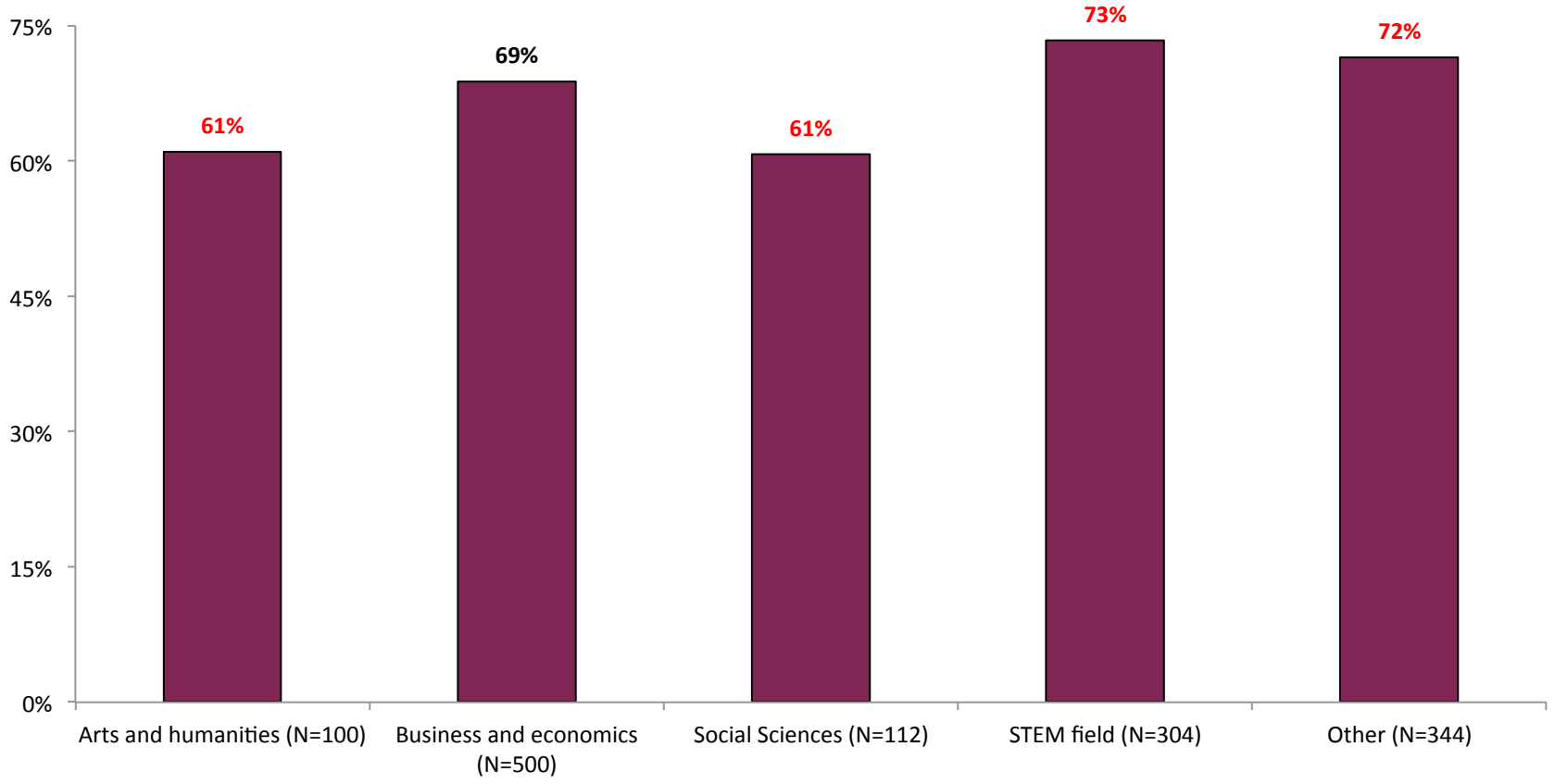
The majority of respondents continue to feel either somewhat or very optimistic about their job prospects in 2016 (70%).



How would you rate your feelings regarding your own prospects of getting a good job once you graduate?

Career Perception

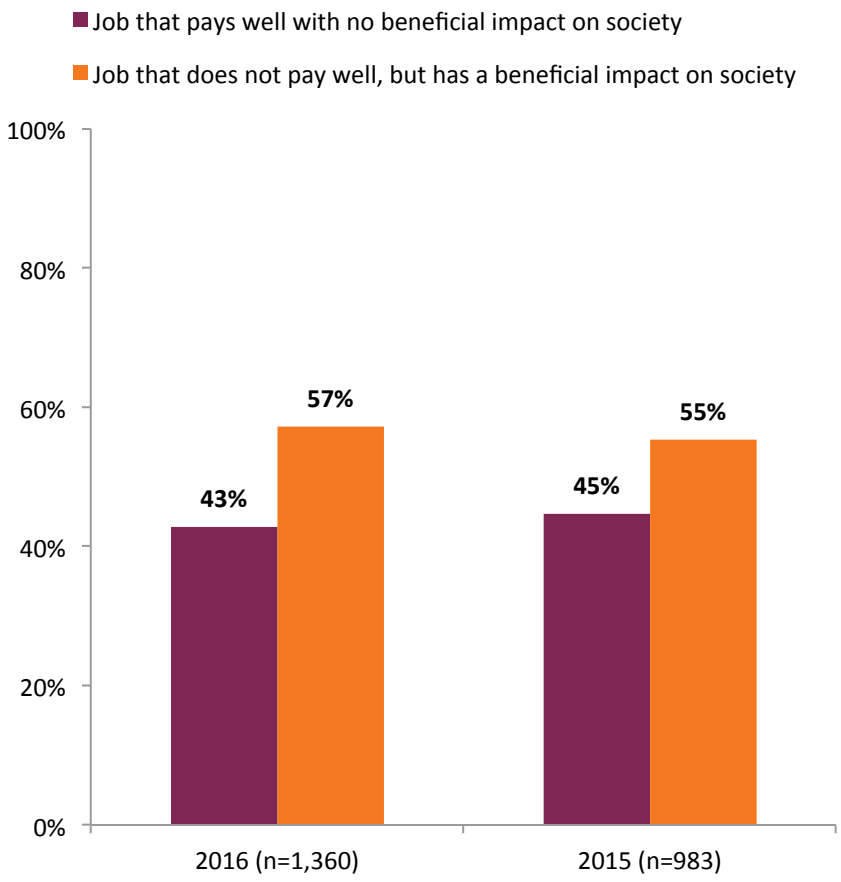
Optimism is significantly higher among STEM majors (72%) than arts and humanities majors (61%) as well as social science majors (61%).



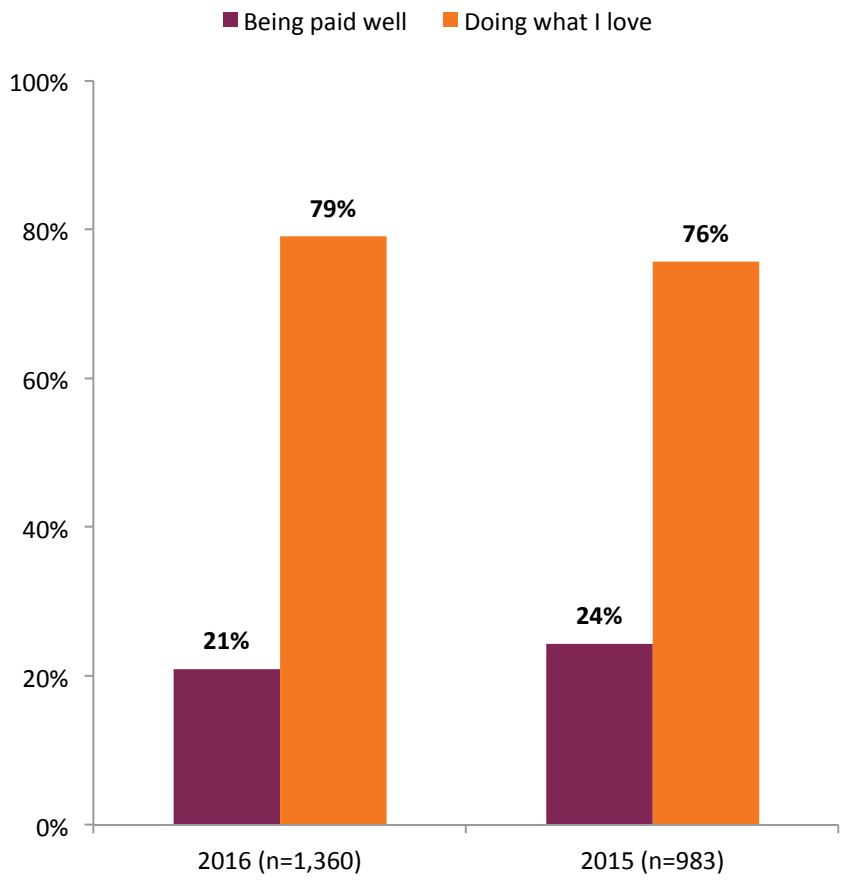
How would you rate your feelings regarding your own prospects of getting a good job once you graduate?
Note: Percentages reflect respondents' "top 2" choices ("Very optimistic" and "Somewhat optimistic").
Figures in red font are statistically significant different at $p < .05$. N=1,360

Career Preferences

In 2016, a narrow majority of respondents (57%) prefer a job that pays less but has a beneficial impact for society over a job that pays well with no beneficial impact for society. Similarly, around eighty percent of respondents prefer a job they love over being paid well.



Which of the following would you prefer?



Which is more important to you personally?

Career Preferences, by Segment 2016

Female respondents are statistically different from male respondents in terms of job preferences. Sixty-one percent of women would prefer a job that does not pays well but is beneficial to society as compared to 48 percent of men. Females also place a higher emphasis on doing what they love versus getting paid well. Business and economics majors, as well as graduate students, are the most likely to prefer a job that pays well with no beneficial impact on society. Respondents studying business put also less emphasis on doing what they love compared to other majors such as arts and humanities. Similarly, graduate students place a higher importance on income than undergraduates.

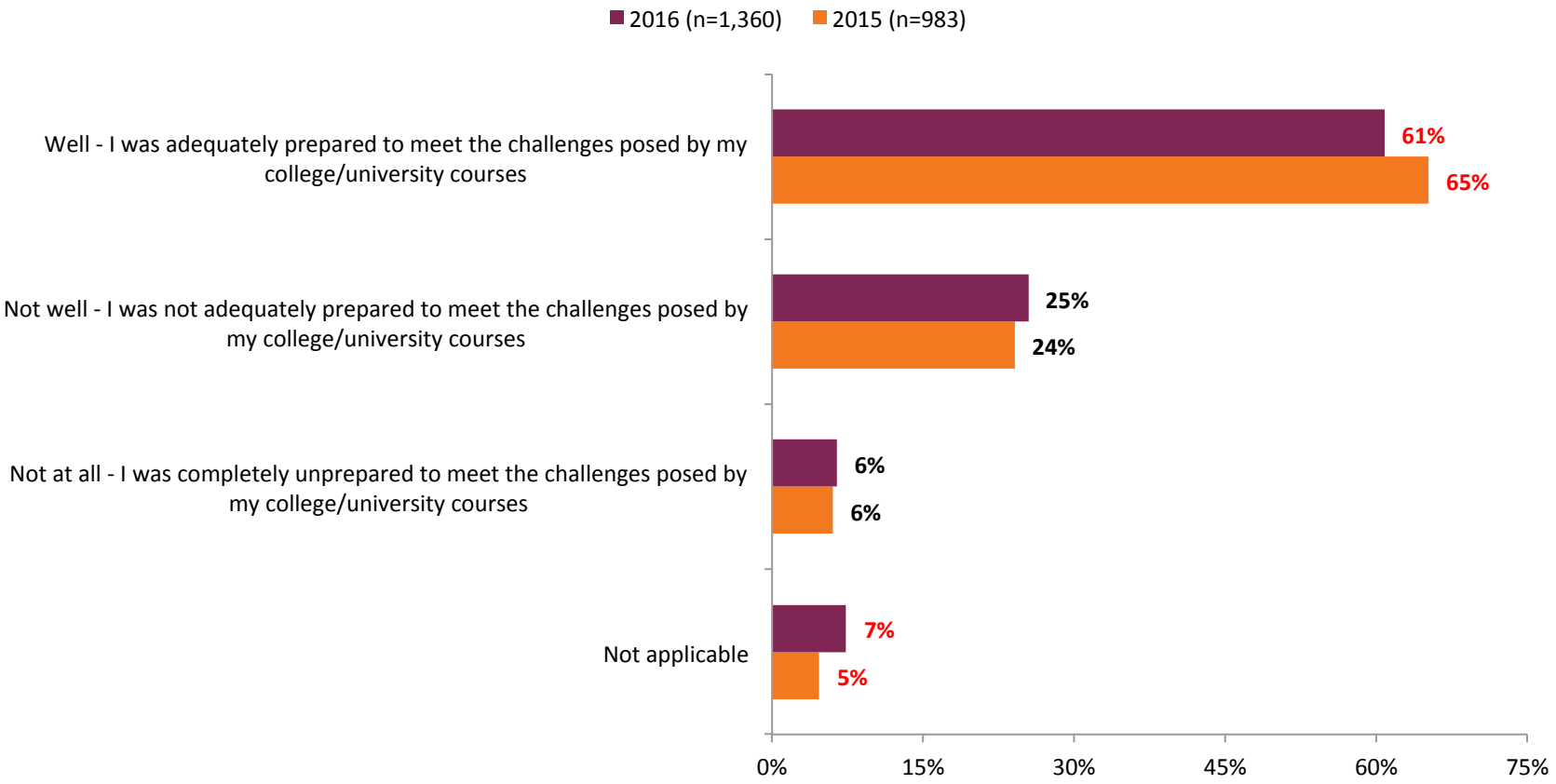
2016	Which of the following would you prefer?		Which is more important to you personally?	
Collegiate Status	**Job that does not pay well, but has a beneficial impact on society**	**Job that pays well with no beneficial impact on society**	**Being paid well**	**Doing what I love**
Freshman (N=362)	58%	42%	19%	81%
Sophomore (N=409)	56%	44%	21%	79%
Junior (N=291)	60%	40%	22%	78%
Senior (N=243)	58%	42%	21%	79%
In a masters or doctorate program (N=55)	45%	55%	35%	65%
Gender	**Job that does not pay well, but has a beneficial impact on society**	**Job that pays well with no beneficial impact on society**	**Being paid well**	**Doing what I love**
Female (N=932)	61%	39%	18%	82%
Male (N=427)	48%	52%	26%	74%
Field of Major	**Job that does not pay well, but has a beneficial impact on society**	**Job that pays well with no beneficial impact on society**	**Being paid well**	**Doing what I love**
Arts and humanities (N=100)	66%	34%	9%	91%
Business and economics (N=500)	48%	52%	28%	72%
Social Sciences (N=112)	71%	29%	20%	80%
STEM field (N=304)	59%	41%	21%	79%
Other (N=344)	62%	38%	15%	85%

Q.1 *Which of the following would you prefer?*
Q.2 *Which is more important to you personally?*
Figures in red font indicate statistically significant different results within segments at $p < .05$

COLLEGE REFLECTIONS

College Reflections – High School

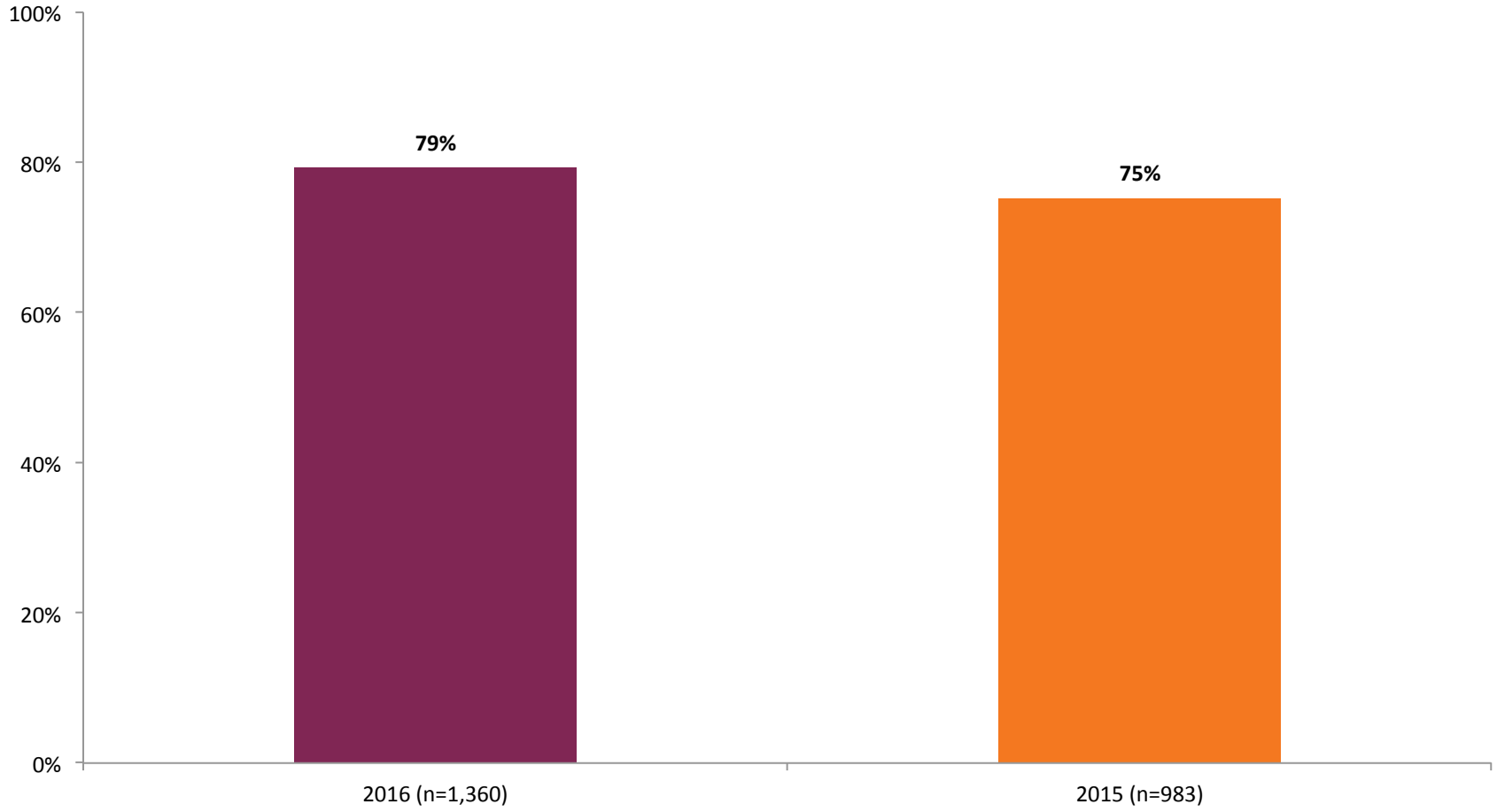
A significantly smaller margin of respondents in 2016 report being adequately prepared to meet challenges posed by their college/university courses based on their high school experience compared to 2015 responses.



How well did high school prepare you for your college or university program?
Figures in red font are statistically significant different at p < .05

College Reflections - Satisfaction

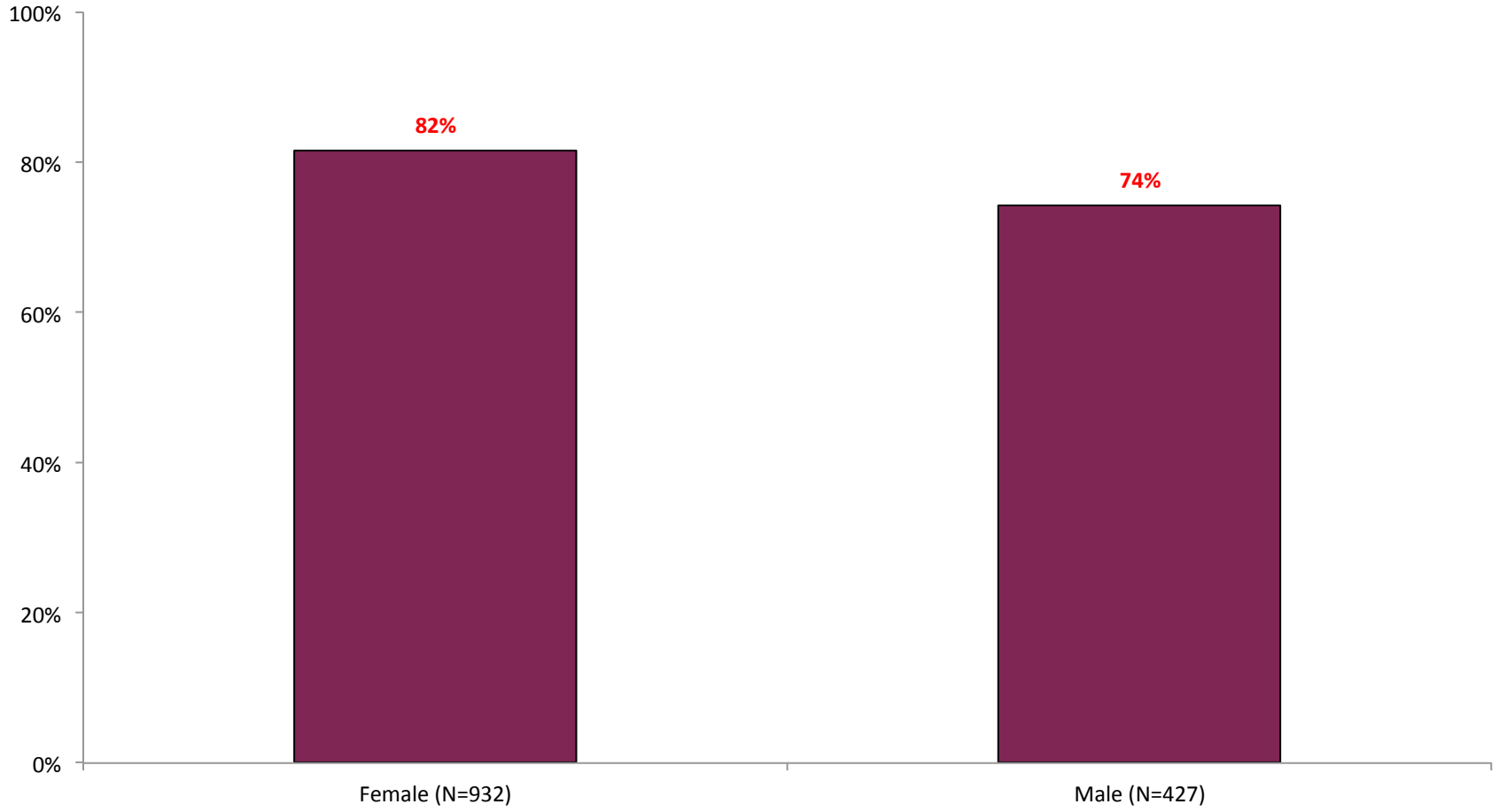
Reported satisfaction with college experience continues to significantly increase in 2016 (79%) compared to 2015 (75%).



Overall, how satisfied are you with your college experience?
Note: Percentages reflect respondents' "top 2" choices ("Very satisfied" and "Somewhat satisfied").

College Reflections – Satisfaction by Gender

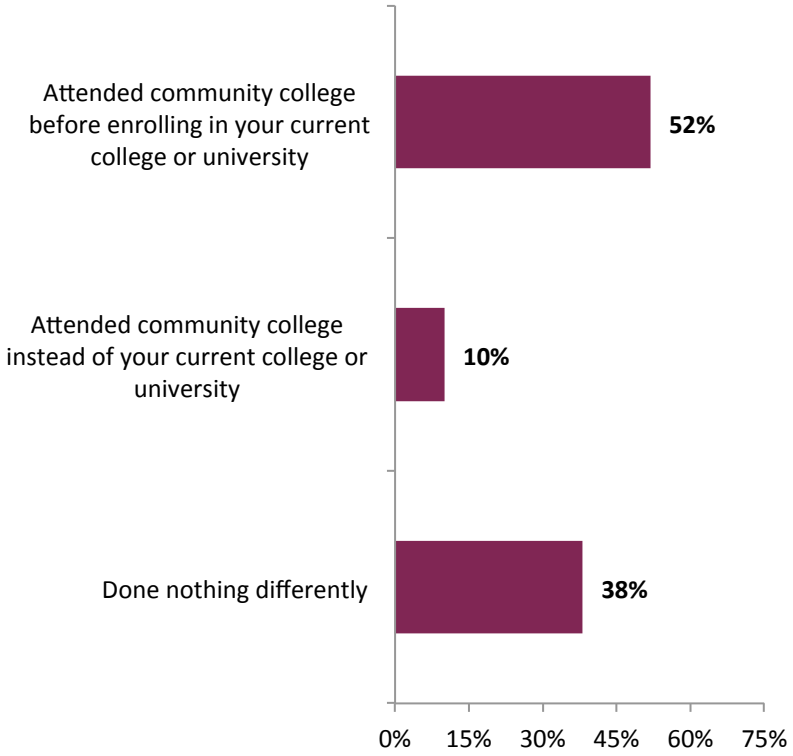
Females report significantly higher satisfaction with their college experience compared to males.



Overall, how satisfied are you with your college experience?
Note: Percentages reflect respondents' "top 2" choices ("Very satisfied" and "Somewhat satisfied").
Figures in red font are statistically significant different at p < .05. N=1,360

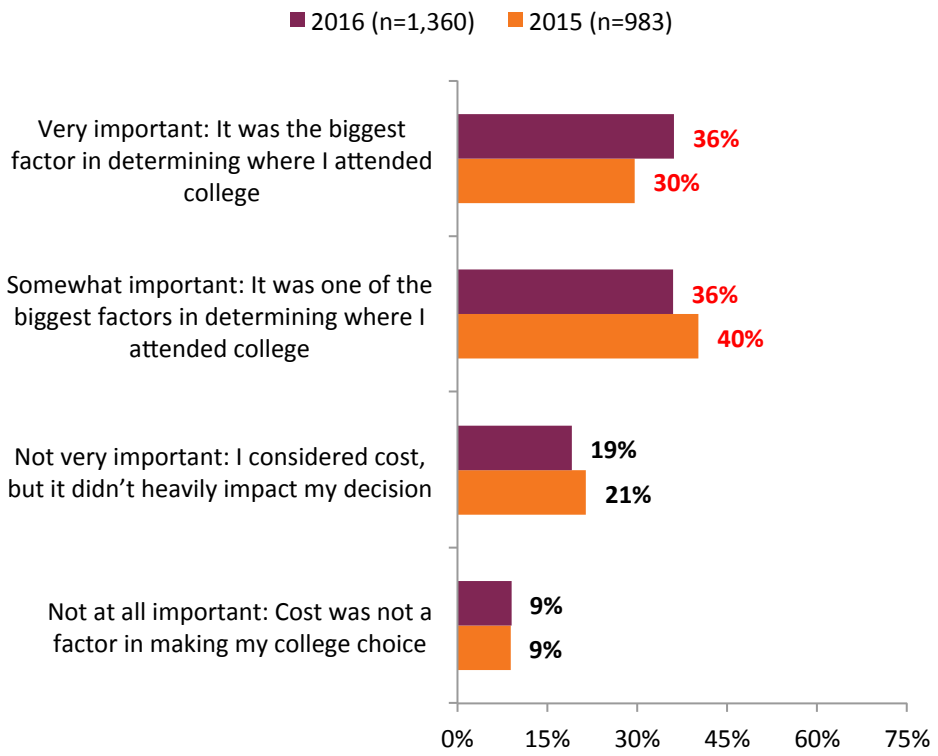
College Reflections - Cost

More than half of respondents (52%) state they would have attended community college first if two years of free community college were offered after high school. Seventy-two percent of respondents in 2016 consider cost to be one of the biggest factors in determining where to attend college, with a significantly larger margin of 2016 respondents (36%) stating cost is "very important" compared to 2015.



If two years of free community college were offered to you when you graduated from high school, you would have:

Note: Respondents who *did not* attend a community college were asked to answer this question. N=947

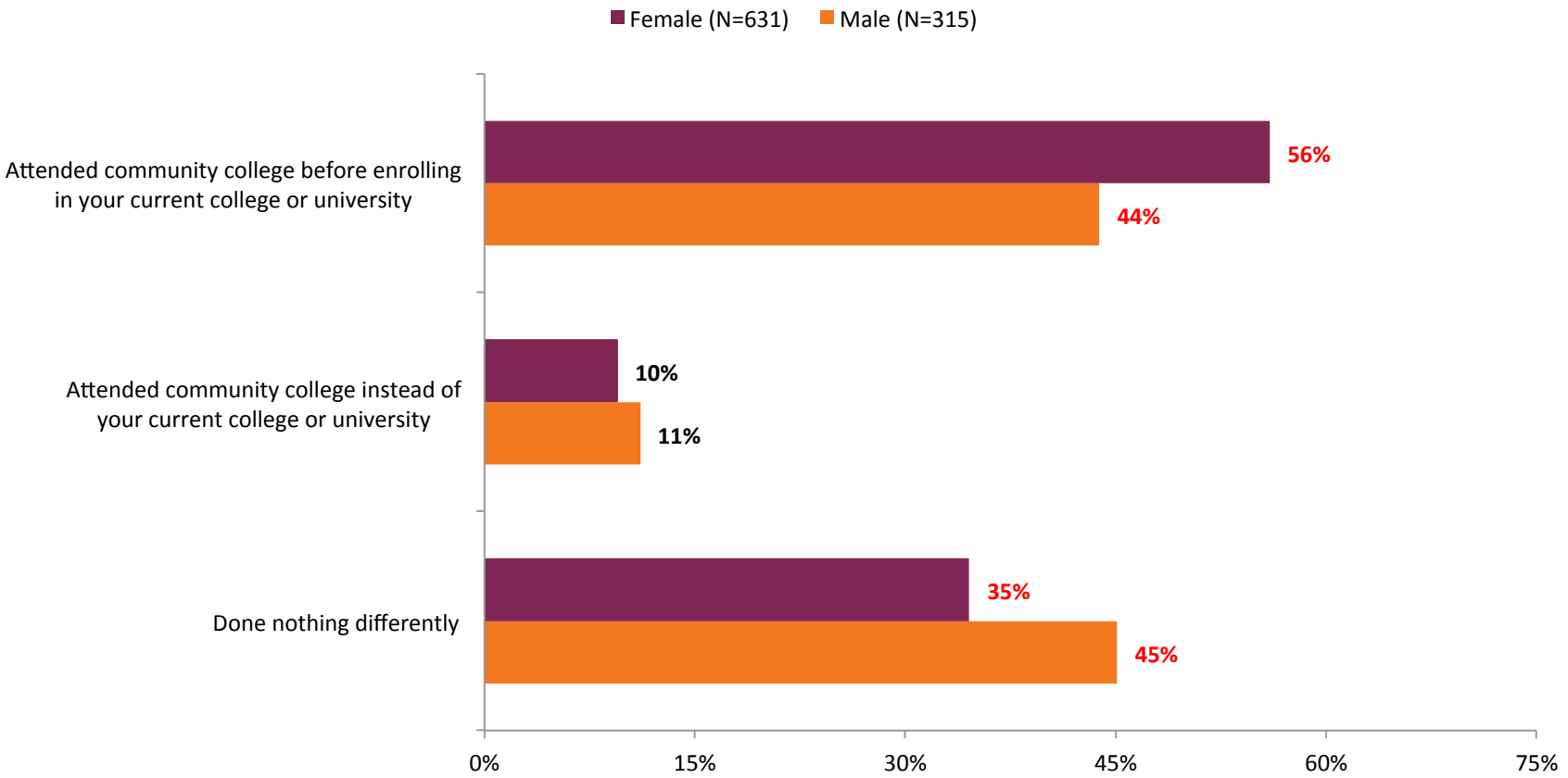


How important was cost to you when deciding which college you would attend?

Figures in red font are statistically significant different at p < .05

College Reflections – by Gender

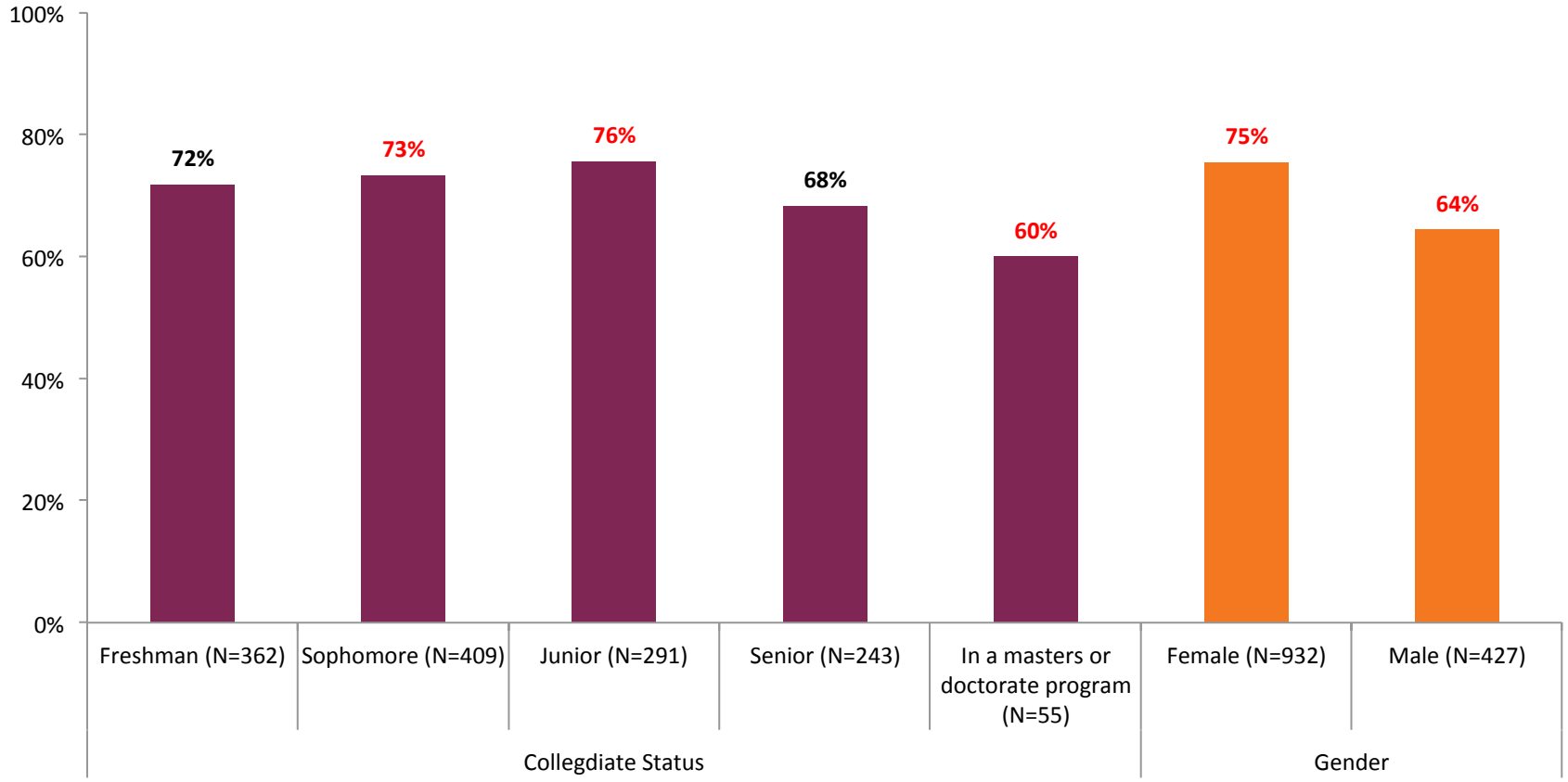
More than half of females (56%) would have attended community college before enrolling in their current college/university after graduating high school. Males are significantly more likely to report not changing anything.



If two years of free community college were offered to you when you graduated from high school, you would have:
Note: Respondents who *did not* attend a community college were asked to answer this question.
Figures in red font are statistically significant different at $p < .05$

College Reflections – Cost by Collegiate Status & Gender

Graduate students seem to attach less importance to costs when deciding where to go to college. Cost was an important factor for 60 percent of graduate students, significantly less than sophomores (73%) and juniors (76%). Cost is also significantly less important to males (64%) than females (75%).



How important was cost to you when deciding which college you would attend?
Note: Percentages reflect respondents' "top 2" choices ("Very important" and "Somewhat important").
Figures in red font indicate statistically significant different results within segments at p < .05. N=1,360

College Reflections

Respondents continue to attach the highest importance to academics, cost and value when deciding which college to attend. Student life, reputation, and job placement rates are less important to student decision making.

2016 (N=1,359)	1 - Most Important	2	3	4	5	6	7 - Least Important
Academics	20%	23%	22%	18%	10%	6%	2%
Cost	32%	18%	12%	9%	9%	10%	10%
Value: The quality of academics at the best price	15%	20%	23%	16%	14%	9%	4%
Flexible course options (e.g. remote, part-time, weekends)	13%	13%	13%	11%	14%	15%	20%
Prestige and reputation of the college and/or degree program	9%	12%	10%	16%	17%	19%	17%
Job placement rates/Internship availability	6%	8%	13%	19%	21%	24%	9%
Student life	6%	6%	8%	10%	15%	17%	38%

2015 (N=983)	1 – Most Important	2	3	4	5	6 – Least Important
Academics	24%	28%	23%	14%	8%	3%
Cost	27%	18%	13%	13%	13%	15%
Value: The quality of academics at the best price	23%	22%	22%	16%	11%	5%
Prestige and reputation of the college and/or degree program	12%	12%	16%	17%	23%	19%
Job placement rates/Internship availability	8%	10%	16%	25%	28%	13%
Student life	6%	9%	10%	15%	16%	44%

Which of the following factors was important to you when choosing a college to attend? Please rank in descending order from most important to least important.

Note: Scales and answer options differ from 2015 to 2016. Tables sorted by mean response.

DEMOGRAPHICS

Demographics – 2016 & 2015 Iterations

What is your collegiate status?	2016 (N=1,360)
Freshman	27%
Sophomore	30%
Junior	21%
Senior	18%
In a masters or doctorate program	4%
In what field is your major?	**2016 (N=1,360)**
Arts and humanities	7%
Business and economics	37%
Social sciences	8%
STEM field (science, technology, engineering, or math)	22%
Other (please specify)	25%
What type of college or university do you attend?	**2016 (N=1,305)**
2-year associate's program or technical school (not part of a community college)	4%
2-year community college	27%
4-year public university	48%
4-year private for-profit university	9%
4-year private non-profit university	11%

Demographics – 2016 & 2015 Iterations

What is your gender?	2016 (N=1,359)
Female	69%
Male	31%
Roughly how many undergrads are enrolled at your university?	**2016 (N=1,359)**
Under 5,000	23%
5,000 to 9,999	27%
10,000 to 19,999	21%
20,000 to 39,999	20%
40,000 or more	9%
What best describes your ethnicity?	**2016 (N=1,359)**
American Indian or Alaska Native	1%
Asian	12%
Black	16%
Hispanic or Latino	15%
Multiracial	4%
Native Hawaiian or Other Pacific Islander	1%
White	51%

APPENDIX

Margin of Error

When interpreting the results it is important to keep in mind the underlying margin of errors, which depend on the sample size, the confidence interval, and the population the sample is drawn from. Hanover uses the standard confidence interval of 95 percent and assumes an underlying population of 150,000 , which leads to the following margin of errors.

Iteration	Sample Size	Margin of error (rounded)
2014	607	4%
2015	983	3%
2016	1,360	3%

Margin of error with a significance level of 95 percent means that there is a 95 percent chance that the correct answer (i.e. the true but unobserved population parameter) is within the margin of error of the result obtained from the sample. Therefore, the true population proportion is 95% likely to fall within +-3 percent of the observed proportion from the 2016 and 2015 surveys. For the 2014 survey, the correct result will likely be within +-4 percent of the sample result. The 2016 and 2015 surveys are more precise in estimating the true parameters due to their larger sample sizes.

Statistical Significance Testing

Hanover uses the two-proportion z-test to do statistical significance testing. The z-test is appropriate to test for statistical significant differences across the 2014-2016 students populations because the three surveys consist of large, randomly drawn samples. In addition, it is feasible to assume that both samples are independent of each other and are normally distributed.

The starting point of the test is the null hypothesis, which states that the difference between the 2014-2016 unobserved population proportions equals zero.

$$\text{Null hypothesis: } P1 - P2 = 0 \rightarrow P1 = P2$$

$$\text{Alternative hypothesis: } P1 - P2 \neq 0 \rightarrow P1 \neq P2$$

To test if the null hypothesis holds true, one subtracts the proportion obtained from the first sample by the proportion taken from second sample and divide the difference by the combined standard error of the sampling distributions.

$$\text{Z-score} = (p1 - p2) \,/\, \text{standard error}$$

The higher the z-score the lower the p-value. If the p-value is below the standard significance level of 5 percent, than one can reject the null hypothesis. The proportions are therefore statistical significant different at the 5 percent significance level. This means the probability is 95 percent that there is a real and profound difference between two sample proportions from the samples. Put differently, it is unlikely that the two observed sample proportions just differ by random chance. Consequently, there should also be a significant difference between the actual, but unobserved, population proportions, i.e. students from 2016 should have real different preferences than students from 2015 based on the fact that the estimated (observed) sample proportions are statically significant different from each other.

Vice versa, if the p-value is larger than 5 percent, one cannot reject the null hypothesis and it is likely that the observed difference between two sample proportions just occurred by random chance.

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