Level Playing Field Institute

The Tilted Playing Field:
Hidden Bias in Information Technology Workplaces

September 2011

543 Howard St, 5th Floor, San Francisco, CA 94105 · www.lpfi.org

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Executive Summary

The vast underrepresentation of women and people of color in IT is most often attributed to racial and gender disparities within the science, technology, engineering, and mathematics (STEM) educational pipeline, despite research documenting hidden biases within workplaces that produce unequal outcomes by race and gender. While disparities in the STEM pipeline must be addressed, the multifaceted problem of underrepresentation within the IT sector will not be solved without also examining how company practices and culture impact the recruitment, hiring, workplace experiences, and retention of women and people of color.

To examine the underrepresentation of women and people of color in IT through a hidden bias framework, the Level Playing Field Institute (LPFI) conducted *The Tilted Playing Field: An Examination of Hidden Bias in Information Technology Workplaces* study. LPFI collected anonymous survey data from 645 engineers and managers at both large IT companies and small startups across the country.

Several important findings emerged from this study:

IT workplace experiences vary significantly by race, gender, and company size.

- Women and underrepresented people of color encounter negative workplace experiences (e.g., difficulty balancing work/family, exclusionary cliques) at rates significantly higher than their male and white counterparts.
- Women in large companies reported the highest rates of negative experiences of any group, even compared to women at startups. For example, 65% of women in large companies encountered exclusionary cliques, versus 26% of women in startups.
- Differences in workplace experiences between men and women were also present within startups with women encountering higher rates of bullying, difficulty balancing work and family, and homophobic jokes.

Negative workplace experiences lead to increased turnover in IT roles – a major cost to companies.

- Men in startups had the highest rates of job satisfaction of all groups (78%).
- Underrepresented people of color were least satisfied with their job, least satisfied with skill development opportunities, and most likely to leave the company in the upcoming year.
- Respondents who reported a higher number of negative workplace experiences were more likely to report wanting to leave their company within the next year, a significant cost to employers and a significant loss of talent for the sector.

Diversity is not a priority for gatekeepers.

- Women and underrepresented people of color were far more likely to believe in the importance of diverse representation on teams and to support company hiring practices to achieve diversity, than their white and male counterparts.
- Underrepresented people of color were nearly twice as likely as whites to be in favor of a company-wide practice to increase diversity (80% compared to 46%).
- 82% of men in startups believed their companies spent the "right amount of time" addressing diversity, while almost 40% of women believed not enough time was devoted.

The findings bring to light the substantial differences in workplace experiences based on race and gender that occur across large company and startup work environments and document the significant impact that negative workplace experiences have on job satisfaction and turnover. In order to effectively address the underrepresentation of women and people of color, there must be a deliberate effort to simultaneously address the STEM education pipeline in K-16 and to address the dynamics of IT workplaces that well-prepared candidates from diverse backgrounds will one day enter. Based on our findings, several recommendations to further address issues of underrepresentation and hidden bias include:

1. **Collaborate in meaningful ways with nonprofits, educational organizations, and corporations to develop a homegrown pool of diverse talent.**
2. **Address hidden biases and barriers within workplaces that disadvantage underrepresented groups.**
3. **Conduct research to both uncover hidden biases within the sector and examine efforts taken by companies to increase diversity.**
4. **Get the word out within your company, networks, and communities.**

To receive more information about *The Tilted Playing Field: An Examination of Hidden Bias in Information Technology Workplaces* study, the Level Playing Field Institute, or to receive a copy of the report, please call (415) 946-3030 or email *info@lpfi.org*.

Introduction

Science, Technology, Engineering, and Mathematics (STEM), and particularly Information and Communication Technology (ICT) are critically important sectors that significantly impact our nation's economic development and global competitiveness.[1] When examining current and future economic indicators, information technology and telecommunications companies are among the top revenue-grossing companies in the United States,[2] and computer/technology related occupations are projected to be among the fastest-growing and highest-paying occupations over the next 10 years.[3] Yet, women and people of color are vastly underrepresented within the information technology industry, and are far less likely to major in computer science, engineering, and related disciplines at the undergraduate and graduate level.[4] Women make up just 20% of all computer software engineers and computer programmers nationwide,[5] and African-Americans (7%) and Latinos (5%) make up an even smaller portion of the industry.[6] While the lack of women and underrepresented people of color within the sector is pervasive, there is also a simultaneous talent shortage and lack of highly qualified professionals to fill open positions, threatening to affect the growth and productivity of companies and pushing them to look outside of the United States for qualified workers to fill positions.[7]

Discussions about the lack of women and underrepresented people of color[8] within the information technology sector and the tech talent shortage have increased substantially in the last decade.[9] This underrepresentation has most commonly been attributed to racial and gender disparities within the K-16 STEM educational pipeline (e.g., coursetaking patterns, intended majors, test scores, graduation rates) which ultimately result in a small percentage of qualified women and people of color entering into the sector. As a result, the primary focus has been on improving K-16 STEM pipelines, with government, corporate, and philanthropic funding dedicated to these efforts.[10] Yet there has been less focus, attention, and efforts directed at the IT sector itself to determine whether additional factors unique to the daily operations of these workplaces contribute to the underrepresentation of people of color and women recruited, hired, and retained within the sector.

While gender and racial disparities within the K-16 pipeline are a major issue, the practices, policies, and culture within the sector must not be overlooked, and the underrepresentation in STEM will not be solved without the analyses of subtle or hidden biases in the workplace.

Hidden bias is conceptualized as a mechanism by which unequal outcomes and opportunities by race and gender occur, through both unconscious and implicit biases at the individual level and biases in the form of practices and policies that appear impartial but produce unequal outcomes. A hidden bias framework provides a structure for analyzing how unconscious biases at the individual level and in the form of practices and policies at the organizational level can: **(a)** unintentionally or unconsciously contribute to inequitable and biased work environments, and **(b)** negatively affect opportunities and outcomes for groups underrepresented within the IT industry.[11]

A large body of research has demonstrated that hidden biases (or more overt biases) may impact the opportunities and experiences of individuals from underrepresented groups within workplaces. Experimental research on organizational processes has demonstrated subtle yet significant biases against applicants with ethnic-sounding names,[12] accents,[13] and affiliation with LGBT organizations,[14] where these individuals were perceived as less qualified during interviews and were less likely to receive "call-backs" from resumes than their non-negatively stigmatized peers. Despite organizational processes that appear to be impartial (e.g., merit pay), research demonstrates that biases exist in the performance rewards process where women and people of color receive lower pay for the same level of performance in comparison to white males.[15]

When examining the impact that conscious and unconscious biases have on individuals, a key concept is that of "stereotype threat;" the stereotype threat framework describes the process by which the performance of members of negatively stigmatized groups is significantly diminished, due to fear of confirming negative stereotypes about their group. Thus in workplaces where women and people of color are vastly underrepresented, stereotype threat can negatively affect performance outcomes, and result in lower levels of performance than one has previously demonstrated, or is capable of demonstrating.[16] Additionally, perceptions of bias, unfairness, and the lack of company commitment to diversity and inclusion, as experienced by employees, can lead to disengagement, lowered job satisfaction, and increased turnover that can prove costly to companies. In a 2007 study, the Level Playing Field Institute (LPFI) examined employee workplace experiences and employee turnover, and found that subtle, negative workplace experiences, especially on a cumulative basis, cost companies an estimated $64 billion per year in expenses related to employee turnover.[17]

Taken together, this research suggests that the problem of underrepresentation of women and people of color in STEM fields is complex and multifaceted efforts must be implemented to remedy this problem. In addition to addressing underrepresentation through improving STEM educational pipelines, attention must also be paid to organizational dynamics at every level, from recruitment and hiring, to company culture, promotion/advancement, and retention. As companies strive to recruit and retain top talent and increase diversity, understanding employee perceptions of company culture and workplace dynamics is critical.

Overview of Study

Using the framework of hidden bias to examine the experiences of individuals within the IT sector and expand understanding about the lack of underrepresented people of color and women within the information technology industry, this study utilized a sample of IT engineers and managers to address the following research questions:

1 What beliefs are held by engineers and managers within the IT sector about the importance of workplace diversity, and the efforts made by their companies to address issues of diversity? Do these beliefs vary by demographic variables (e.g., race/ethnicity, gender, position, company type)?

2 How do IT employees experience their workplace environment and company culture? Do workplace experiences vary by demographic variables (e.g., race/ethnicity, gender, position, company type)?

3 What are the relationships between race and gender, workplace experiences, and job satisfaction?

Methods

This study included two methods of data collection to examine experiences of IT employees: **(1)** on-site data collection, where companies agreed to participate in the study and allowed their employees to voluntarily participate in the study, and **(2)** online data collection, where individual employees participated in the study independent of company participation. Approximately 100 large tech companies and small start-up companies primarily in the San Francisco Bay Area were contacted and invited to participate in the on-site portion of the study. A total of 9 companies signed on to participate in the on-site data collection.[18] Data was collected from volunteer participants within these companies using an anonymous web-based survey, both on-site and online (for companies with employees nationwide). To gain a larger and more diverse pool of respondents, survey links were then sent out to a wide range of tech forums, organizations, and individuals within the technology industry to recruit engineers and managers to participate in the online portion of data collection, where individuals responded to survey questions utilizing an anonymous online survey tool. Data collection for the study took place from November 2010 to February 2011.

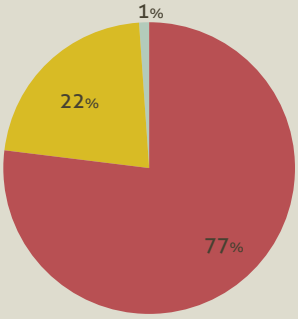
Each study participant viewed three "machinima" (machine animation using avatars) video clips depicting workplace interactions between avatars in hiring, performance review, and bonus review scenarios.[19] The participants then completed a survey consisting of roughly 100 items assessing: (a) Beliefs about workplace diversity and company diversity practices, (b) Workplace environment and company culture, (c) Overall job satisfaction and likelihood to leave the current company. The two scales used in the survey were: (1) Negative Work Experiences Scale (α=.72) consisting of seven items, and (2) Job Satisfaction Scale (α=.88) consisting of five items.[20] After conducting

Sample Demographics

Total: n=645

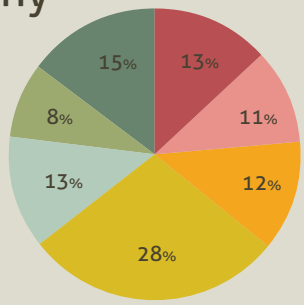
Gender

Male	493	77%
Female	140	22%
Transgendered	5	1%



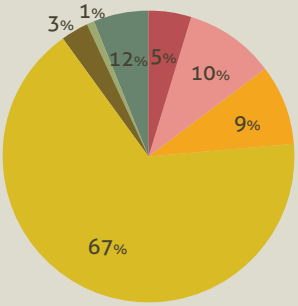
Time with Company

0–6 months	84	13%
7–12 months	68	11%
13–24 months	79	12%
2–4 years	182	28%
5–6 years	80	13%
7–10 years	53	8%
> 10 years	94	15%



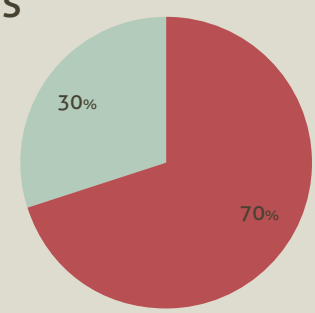
Race/Ethnicity

African American	29	5%
Asian	66	10%
Indian/S. Asian	56	9%
White	425	67%
Latino	17	3%
Native American	1	0%
Other	9	1%
Multiracial	36	6%



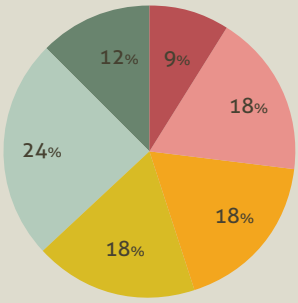
Citizenship Status

U.S. Citizen	448	70%
Non-U.S. Citizen	190	30%



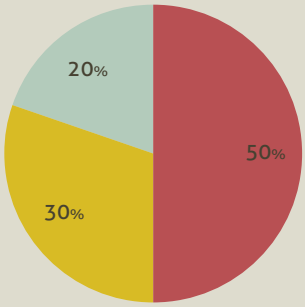
Age

< 25	58	9%
26–30	114	18%
31–35	116	18%
36–40	116	18%
41–50	156	24%
> 51	78	12%



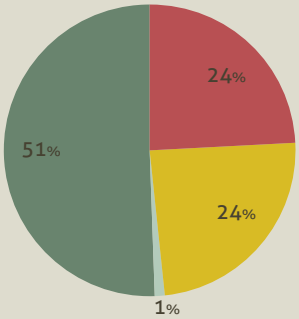
Current Position

Engineer	316	50%
Manager	191	30%
Other	123	20%



Company Size

Startup	157	24%
Small	155	24%
Not startup, <1K employees		
Medium	7	1%
1,001–5,000 employees		
Large	326	51%
> 5,000 employees		



Notes

Where number totals in demographic subcategories do not equal n=645, respondents declined to state. Percentages are rounded.

a rigorous data cleaning process, and eliminating potentially fraudulent responses, the resulting dataset consisted of 645 current IT employees participating in this study examining bias, fairness, and diversity within the information technology sector.[21]

Sample Demographics

The sample (n=645) was predominantly male (77%) and white (67%), with smaller representation from a range of other racial/ethnic groups, including Asian (10%), Indian (9%), Multiracial (6%), African-American (5%), and Latino (3%). Thirty percent of the sample were non-United States citizens. Engineers comprised 50 percent of the sample, followed by engineering managers (30%), and another 20 percent of respondents classified themselves as neither engineers nor managers, but held similarly relevant positions within IT companies (e.g., Developer, CTO, VP of Engineering). Approximately half of the participants in this study were employed at large companies (>5,000 employees), 25 percent were employed in small companies (<1,000 employees; not identified as a startup), and the remaining 25 percent were employed in startup companies. Respondents were fairly diverse in terms of age and length of time at their current job.

Perceptions and Beliefs about Workplace Diversity

Given the vast shortage of women and underrepresented people of color within the information technology workforce and the subsequent current demographic landscape of most IT companies, this study first sought to explore

Figure 1
Ethnic Diversity of Workplace

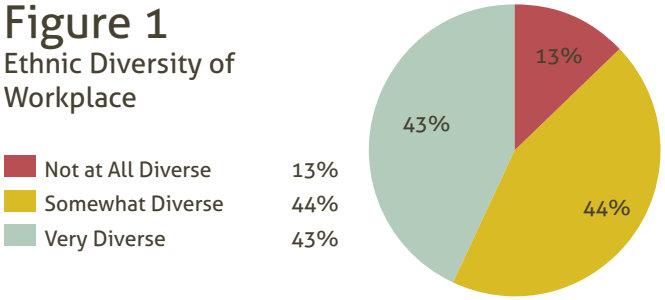


Figure 2
Gender Diversity of Workplace

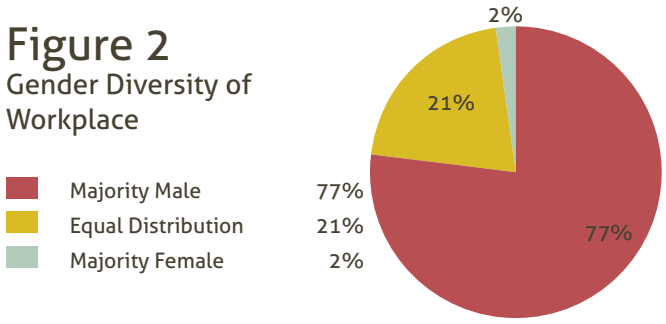
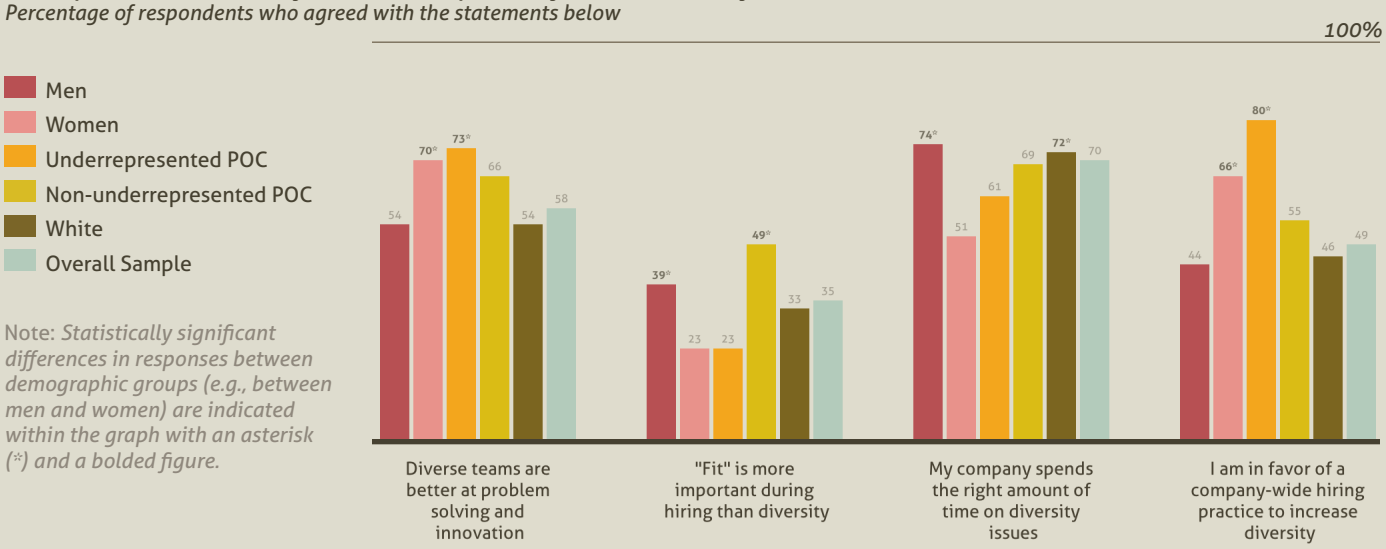


Figure 3
Perceptions of Diversity in the Workplace by Race/Ethnicity, Gender, and Position

Percentage of respondents who agreed with the statements below



Note: *Statistically significant differences in responses between demographic groups (e.g., between men and women) are indicated within the graph with an asterisk (*) and a bolded figure.*

respondent's perceptions about the importance of diversity, and beliefs about company demographics and practices to promote diversity.

Beliefs About the Value and Importance of Diversity

Despite the fact that the vast majority of the sample indicated that their work environments were predominantly male (77%) and that less than half (43%) described their work environment as "very diverse" with respect to race/ethnicity (figures 1 and 2), participants held very different views about the value of diversity and whether their companies should be working to achieve a more diverse work environment (Figure 3).

- Women and underrepresented people of color were significantly more likely to believe in the value of diverse teams for problem solving and innovation than were men and white respondents (70% and 73% compared to 54%).
- Only 23% of both women and underrepresented people of color believed that "fit" was a more important criterion than diversity in hiring; they were the least likely overall to ascribe to this belief, and most likely to believe diversity was more important.
- Underrepresented people of color were nearly twice as likely as whites to be in favor of a company-wide practice to increase diversity within their company (80% compared to 46%).

Beliefs About Company Diversity Practices

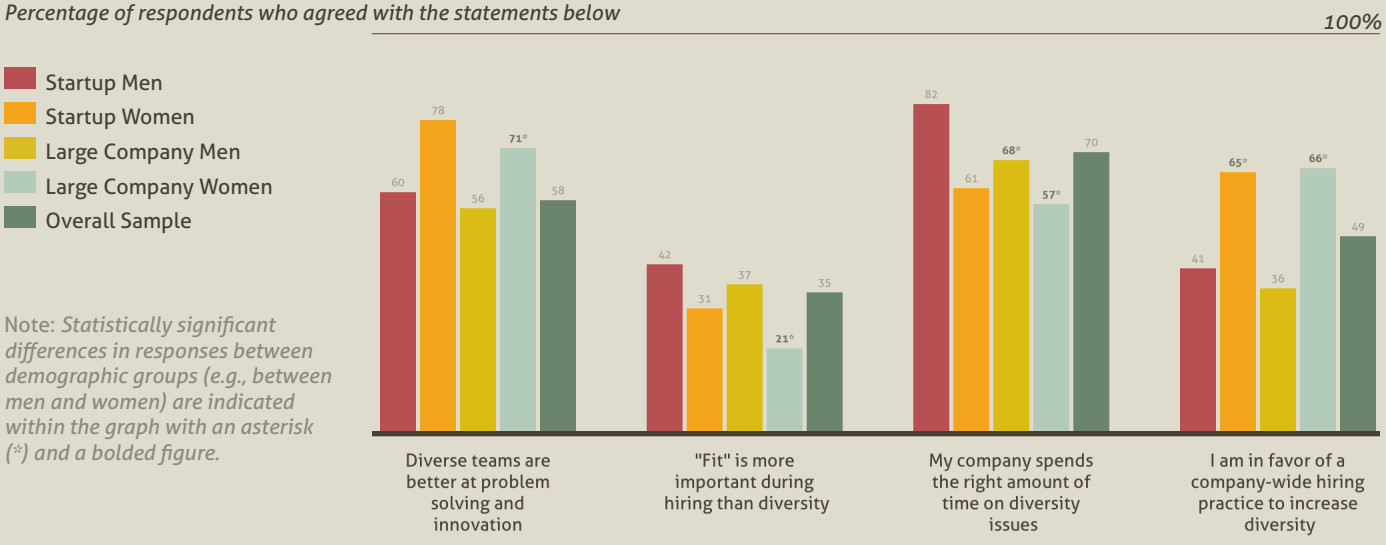
Respondents also had different levels of satisfaction with their company's commitment to diversity (in the amount of time spent addressing diversity issues in general, and in hiring practices; Figure 3 and 4).

- Male and white respondents were significantly more likely to believe that their company currently spends the right amount of time addressing issues of diversity (74% and 72%), while women (51%) and underrepresented people of color (61%) were the least likely agree with this statement.
- Fifty-one percent of underrepresented people of color were dissatisfied with the amount of weight given to increasing diversity during the hiring process, compared to 21% of whites. Similarly, 47% of women across the sample (compared to 17% of men) believed their company hiring practices did not give enough weight to increasing diversity in hiring, and they believed that other factors were weighed too heavily (e.g., connection to current employee, school applicant graduated from).
- The vast majority of men in startups believed their companies spent an adequate amount of time addressing diversity (82%). Almost 40% of women, however, believed not enough time was devoted to addressing company diversity. Additionally, women in startups were much more likely to endorse company-wide practices to increase diversity than their male counterparts in startups (65% versus 41%).

Figure 4

Perceptions of Diversity in the Workplace by Gender and Company Size

Percentage of respondents who agreed with the statements below

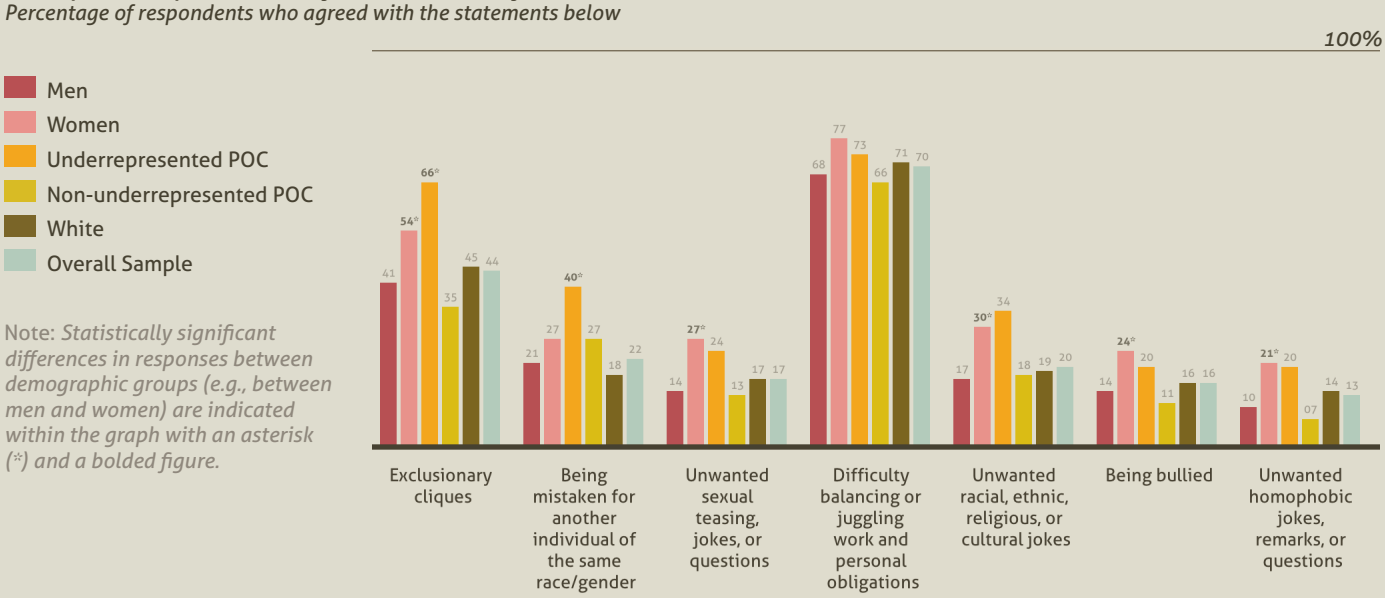


Note: *Statistically significant differences in responses between demographic groups (e.g., between men and women) are indicated within the graph with an asterisk (*) and a bolded figure.*

Figure 5

Workplace Experiences by Race/Ethnicity and Gender

Percentage of respondents who agreed with the statements below



Workplace Environment and Company Culture

This study also sought to provide a glimpse into the overall company culture and workplace experiences of individuals within the information technology industry, by examining the extent to which respondents encountered a set of negative workplace experiences within the past year of employment at their current company (Figures 5 and 6). Of specific interest were the experiences of individuals from gender and racial/ethnic groups which are underrepresented in the sector and within their workplaces to examine the relationship between race, gender, and negative workplace experiences.

Examining Workplace Experiences

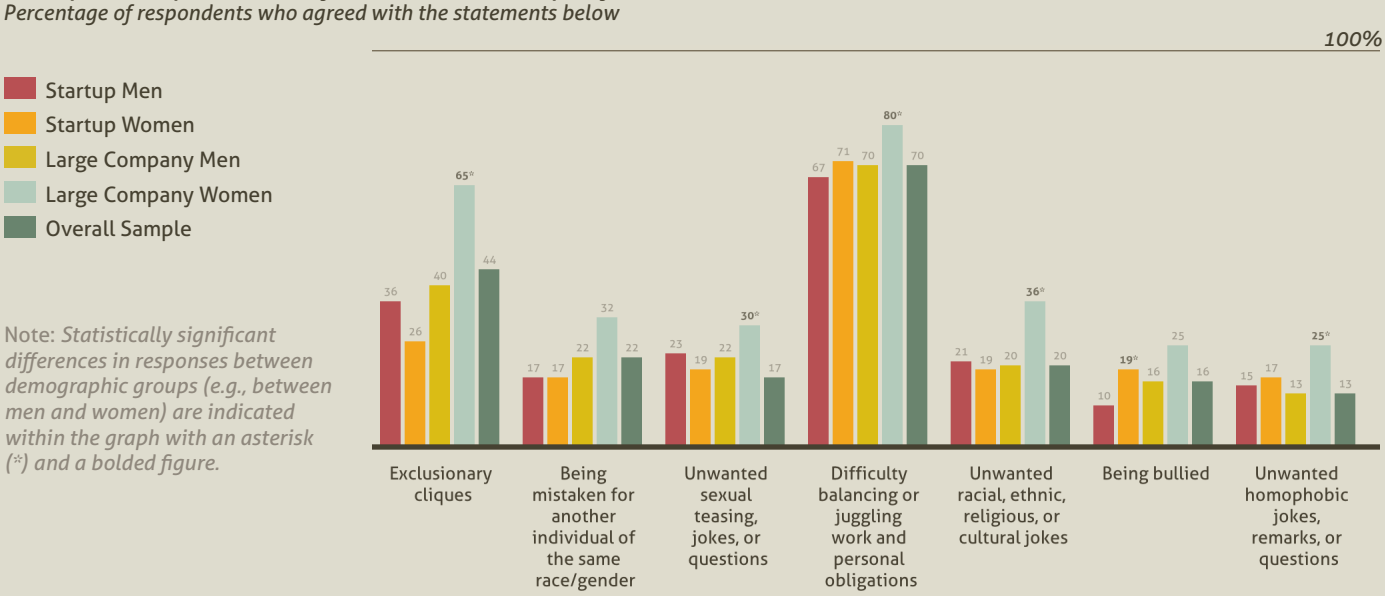
To examine the incidence rate of negative workplace experiences, participant responses were totaled for each of 7 items, and frequencies for each item were disaggregated by race and gender. Across the work environment, women were more likely than men to report negative workplace incidents, and women experienced/observed exclusionary cliques, unwanted sexual teasing, being bullied, and homophobic jokes at rates significantly higher than men. Specifically, women working in large company settings had the highest rates of negative experiences in the workplace.

- Exclusionary cliques were most often experienced/observed by women and underrepresented people of color, and were experienced at rates significantly higher than their male and white counterparts ($p<.05$).
- 65% of women in large company settings encountered exclusionary cliques, compared to just 26% of women in startups.
- 77% of women reported experiencing difficulty balancing work and family obligations, compared to 68% of men (this disparity is larger between men and women in large companies), suggesting that the majority of respondents face difficulty balancing work and family but this difficulty is greater for women.

Figure 6

Workplace Experiences by Gender and Company Size

Percentage of respondents who agreed with the statements below



Note: *Statistically significant differences in responses between demographic groups (e.g., between men and women) are indicated within the graph with an asterisk (*) and a bolded figure.*

Underrepresented people of color were also much more likely than both non-underrepresented people of color and whites to encounter negative experiences within the work environment. Underrepresented people of color reported the highest rates of exclusionary cliques (66%), being mistaken for other individuals of the same race or gender (40%), and unwanted racial/ethnic/religious/ cultural jokes (34%).

- Underrepresented people of color reported encountering unwanted racial/ethnic/religious/cultural jokes at a rate almost twice as high as non-underrepresented people of color and whites (34% compared to 18%, and 19%, respectively).

Exploring the Relationship Between Race, Gender, and Negative Workplace Experiences

To further explore the relationship between encountering negative workplace incidents and the race and gender of employees, the seven items assessing negative workplace experiences were summed together to form a Negative Work Experiences Scale (α=.72) and bivariate correlations were conducted.

- Being a woman was associated with more negative workplace experiences (r=0.17, p<.01)
- Being an underrepresented person of color was also associated with more negative workplace experiences (r=0.12, p<.01).
- Conversely, being white, a male, or a non-underrepresented person of color was associated with fewer negative workplace experiences (Appendix 1).

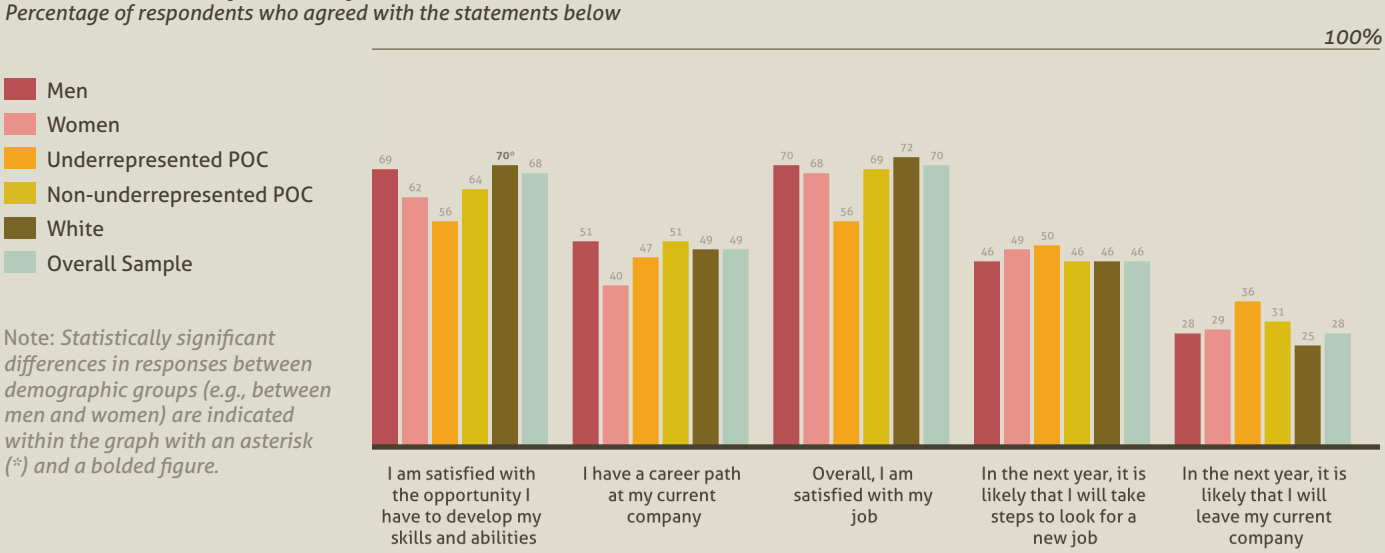
A regression analysis was then conducted to determine whether race and gender were significantly associated with negative workplace experiences, while controlling for other demographic variables.

- Female status and underrepresented racial/ethnic status were both significant predictors of negative workplace experiences suggesting that negative workplace experiences increase with membership in both demographic groups ($F(1,555)$=15.4, p<.00, and $F(1,555)$=7.47, p<.01; B=.68, SE=.18, p<.01 and B=.73, SE=.29, p<.05; Appendix 2).
- Female status and underrepresented racial/ethnic status predicted negative workplace experiences, even when controlling for age, position, and startup vs. non-startup environments ($R2$=.057, p<.00, $\Delta R2$ = .053; Appendix 3).

Figure 7

Job Satisfaction by Ethnicity and Gender

Percentage of respondents who agreed with the statements below

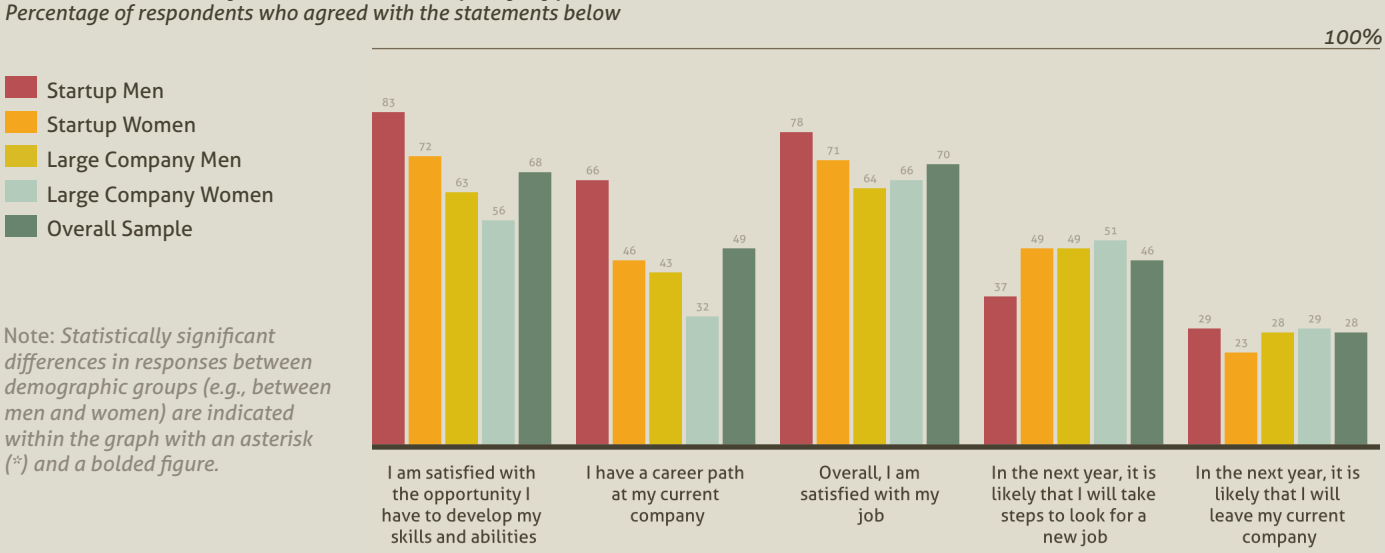


Note: *Statistically significant differences in responses between demographic groups (e.g., between men and women) are indicated within the graph with an asterisk (*) and a bolded figure.*

Figure 8

Job Satisfaction by Gender and Company Type

Percentage of respondents who agreed with the statements below



Note: *Statistically significant differences in responses between demographic groups (e.g., between men and women) are indicated within the graph with an asterisk (*) and a bolded figure.*

Overall Satisfaction with Current Job and Company

To begin to examine the cumulative impact of individuals' workplace experiences, respondents were assessed on current levels of job satisfaction (e.g., "I am satisfied with my current job") and likelihood to leave the company (e.g., "In the next year, how likely is it that you will: Take steps to look for a new job?). Across the sample, 70% of respondents indicated overall satisfaction with their jobs. However, differences in job satisfaction were seen between demographic groups, where levels of satisfaction varied by race/ethnicity, gender (Figure 7).

- Women were least likely to indicate that they had a career path with their current company (40%, compared to 51% of males).
- Underrepresented people of color were the least satisfied with their overall job (56%), least satisfied with the opportunities for growth and development within their company (56%), and most likely to leave the company in the upcoming year (36%).
- By contrast, whites reported the greatest overall job satisfaction compared to other groups (72%), and the least likelyhood of leave their company (25%).

Differences in job satisfaction also occurred across types of companies (startup vs. large company) and between men and women in both large IT companies and small technology startups (Figure 8). Employees at startup companies had higher overall levels of satisfaction with their job and were less likely to seek new employment than employees at large IT companies. This is consistent with the data demonstrating that fewer negative workplace incidents were experienced in the startup environment (previous section). While overall satisfaction was higher among startup employees, gender disparities were still present.

- Men in startups had the highest overall job satisfaction of all groups (78%); Women in startups were less satisfied than men (71%), but more satisfied than their male and female peers at large companies (64% and 66%, respectively).
- Men in startups were far more likely than women in startups to believe they had a career path with their company (66% compared to 46%); women in large companies were even less likely to indicate they had a career path (32%).

Exploring the Relationship Between Negative Workplace Experiences and Job Satisfaction

The data revealing variation in job satisfaction (by race and gender) and variation in negative workplace experiences (by race and gender) suggests that relationships may exist between "underrepresented" group membership, encountering negative incidents in the work environment, and demographic differences in job satisfaction. To further explore these relationships, the five items assessing job satisfaction were summed together to form a Job Satisfaction scale (α=.88; two items reverse-coded) and bivariate correlation and regression analyses were conducted.

- No significant relationships were observed between race, gender and job satisfaction, and female status and underrepresented racial/ethnic status were alone not significant predictors of job satisfaction (Appendix 4 and 5).
- Negative workplace experiences, however, were significantly negatively related to job satisfaction, and negative workplace experiences significantly predicted overall job satisfaction ($F(1,481)=46.67$, $p<.00$, $B=-.76$, $p<.00$; Appendix 6).

Although race and gender were not direct predictors of job satisfaction, they were significant predictors of negative workplace experiences, which in turn significantly predicted a decrease in job satisfaction.

Summary

Several important findings emerged from this study examining the experiences and perceptions of employees within the IT sector that have implications for understanding (and ultimately seeking to improve) the lack of women and underrepresented people of color within the sector.

1 **Despite widespread underrepresentation of women and people of color within the sector, diversity is not regarded as a priority.** Members of the majority (whites, and males) were much more likely to overlook the importance of diversity, while underrepresented groups both valued diversity and were dissatisfied with the amount of time their company devoted to increasing diversity. The implications of these varied beliefs are important to note: majority group members were also much less likely to endorse company practices to increase diversity, and within their position as majority group members, have much more power to maintain the status quo, instead of strive for increased diversity.

2 **Although IT firms often view themselves as meritocratic, day-to-day workplace experiences vary significantly by race and gender.** Across the work environment, women (specifically women in large company settings) and underrepresented people of color were much more likely than their counterparts to encounter exclusionary cliques, unwanted sexual teasing, bullying, and homophobic jokes. Female status and underrepresented racial/ethnic status were both significant predictors of negative workplace experiences, while being white, a male, or a non-underrepresented person of color was associated with a decrease in negative workplace experiences. This suggests that there are unique elements of the workplace and culture that are unwelcoming to diverse members and that create negative experiences for underrepresented individuals. These experiences result in an uneven and unequal playing field rather than a meritocracy.

3 **Workplace experiences directly impact job satisfaction and turnover.** Across all demographic groups, whites were the most satisfied with their job and least likely to leave their company, while underrepresented people of color were least satisfied with their job, least satisfied with development opportunities, and most likely to leave their company. Also, employees at startup companies had higher overall levels of satisfaction than employees at large IT companies. These data mimicked the pattern of relationships found between negative workplace experiences and race and gender, where whites and males encountered fewer negative experiences within the workplace. While a direct relationship between race, gender, and job satisfaction was not established, an increase in negative workplace experiences significantly predicted a decrease in overall job satisfaction. This suggests that not only will IT companies have difficulty attracting diverse talent due to small numbers in the pipeline, but that once diverse employees are recruited, they tend to have far more negative experiences within the work environment which directly impact satisfaction, performance, and retention within these workplaces.

These findings indicate numerous ways in which hidden biases operate within IT environments and can impact the opportunities, experiences, and outcomes of engineers and managers from diverse backgrounds. These findings also provide evidence to suggest that the problem of underrepresentation by race and gender is complex and requires multifaceted solutions.

Recommendations

Several recommendations to further address issues of diversity and underrepresentation of women and people of color within Information Technology include:

1. **Conduct research to both uncover hidden biases within the IT sector and examine the effectiveness of efforts taken by companies to increase diversity.** It's hard to change what you don't know. Companies must collect and analyze data – disaggregated by individual characteristics such as gender, race/ethnicity, and organizational characteristics such as position – to see how they are related to exclusionary experiences, job satisfaction/engagement, and retention. Organizations must use these data to continually inform and improve practices. Many companies currently hesitate to participate in research involving the analysis of employee demographics and experiences due to fears of lawsuits. The annual costs of disengagement and unwanted turnover are 10x greater than all the gender and race discrimination settlements.

2. **Address hidden biases and barriers within workplaces that disadvantage underrepresented groups.** Too many of the criteria for hiring and promoting talent are subjective, based on what is familiar and comfortable rather than being truly objective. Too few opportunities are taken to formulate and solidify a true approach to valuing and increasing diverse talent. A growing body of research confirms what neuroscience tells us: the human brain is wired to be biased. This can serve as the basis of a unifying approach—but only if individual employees, managers, and entire companies take steps to mitigate their biases. Companies need to ensure that their practices don't inadvertently solidify hidden biases into hidden barriers and should engage in ongoing internal assessments of their practices, policies, and culture.

3. **Collaborate in meaningful ways with nonprofits, educational organizations, and corporations to develop a homegrown pool of diverse talent.** Investments in the education of a new generation of talent to support the rapidly expanding sector will have a dual impact on the future success of IT companies and the outcomes of diverse communities. Ideas for collaborations range from funding STEM programs to providing mentorship and internship opportunities for young scholars.

4. **Get the word out within your company, networks, and communities.** Subtle biases and exclusionary practices need to become safer topics of conversation. Companies must provide individuals ways to contribute to these conversations and spearhead efforts to improve practices. Colleagues need to find ways to create teams that inspire everyone to give their best efforts. Individuals at all levels within the tech community have the opportunity to contribute to this important conversation and improve both diversity and ultimately outcomes for tech companies.

Limitations

While this study yielded numerous findings with implications for improving opportunities and outcomes for underrepresented groups within the IT sector, there are several limitations which must be addressed. This study reports on the experiences/perceptions of a relatively small sample of employees within IT and limits the generalizability of these findings to the broader IT sector. Due to the lack of women and underrepresented people of color within the IT sector, this sample is also predominantly white and male, providing only a glimpse into the experiences of women and people of color across the sector. Thus, these data may or may not be representative of diverse IT employees across the country. In addition, the willingness of the nine self-selected companies to participate in the study, may indicate more of a company commitment to addressing diversity than companies who declined participation or were not recruited to participate. Differences in company commitment to diversity could impact company culture and employee perceptions and experiences, and may positively skew the results. Future analyses should assess company commitment to diversity as a separate control variable, in order to control for this factor when analyzing outcomes. Finally, while precautions were taken to prevent fraudulent responses on the anonymous internet survey and rigorous data cleaning was conducted to eliminate fraudulent responses, there is an inherent limitation in conducting internet surveys where you have less knowledge and control over the respondents and the survey taking process. In sum, this research provides compelling findings, but must be replicated with a larger and more diverse sample of engineers and managers across the IT sector. While it was difficult to obtain company participation, the limited data within this report suggests that it would benefit IT companies to participate in research, analyze company data, and conduct their own internal surveys to examine employees' experiences and perceptions of company culture and practices, in order to implement comprehensive solutions to remedy the underrepresentation of women and people of color within their companies and within the sector.

End Notes

1 This report focuses specifically on the information technology sector. Our working definition of "Information Technology" and the industries that comprise the sector is based upon the parameters described by the Organisation for Economic Co-operation and Development (OECD), which includes information and communication technology manufacturing, trade, and services. See link for full definition: **http://www.oecd.org/dataoecd/25/52/43281062.pdf**. This report utilizes the words information technology, information and communications technology, IT, and tech interchangeably to describe this sector and related industries.

2 DuBow, W. (2011). *NCWIT Scorecard: A report on the status of women in Information Technology*. Boulder: NCWIT; CNN Money Top 500 Companies **http://money.cnn.com/magazines/fortune/global500/2011/countries/US.html**

3 U.S. Department of Labor, U.S. Bureau of Labor Statistics (BLS) (2009). *Employment Projections Program* U.S. Department of Labor, **http://www.bls.gov/emp/ep_table_102.htm**; U.S. Bureau of Labor Statistics (2008). *Occupations with the Highest Median Annual Wages* **http://www.bls.gov/oco/oohinfo_faq.htm#earn4**.

4 U.S. Department of Commerce (2011). *Women in STEM: A Gender Gap to Innovation* **http://www.esa.doc.gov/sites/default/files/reports/documents/womeninstemagaptoinnovation8311.pdf** National Science Foundation (2010). *Science and Engineering Indicators: Higher Education in Science and Engineering* **http://www.nsf.gov/statistics/seind10/c2/c2s3.htm**

5 DuBow, W. (2011). *NCWIT Scorecard: A report on the status of women in Information Technology*. Boulder: NCWIT (Primary Source: U.S. Department of Labor, Bureau of Labor Statistics, annual averages, 2009).

6 Mercury News (2006). *Blacks, Latinos and Women Losing Ground at Silicon Valley Tech Companies*.

7 Johnston, K. (July 28, 2011). *In high-tech, another kind of job crunch*. The Boston Globe. **http://www.boston.com/business/technology/articles/2011/07/28/state_business_leaders_aim_to_replenish_pool_of_tech_workers/** ManpowerGroup (2010). *Annual Talent Shortage Survey* **http://files.**

shareholder.com/downloads/MAN/1347742051x0x469531/7f71c882-c104-449b-9642-af56b66c1e6d/2011_Talent_Shortage_Survey_US.pdf
Startup Visas: More Startups! More Jobs! **http://startupvisa.com/**.

8 For the purposes of this report, we utilize the term "underrepresented people of color" to describe the racial/ethnic minority groups that are underrepresented within the IT sector (e.g., African-American, Latino, Native American) as compared to "non-underrepresented people of color" (e.g., Asian, East Indian). We differentiate between "underrepresented" and "non-underrepresented" people of color to explore distinct differences in experiences between groups of people of color who are racial minorities in the national context, but who are and are not underrepresented within their workplace context.

9 Mercury News (2006). *Blacks, Latinos and Women Losing Ground at Silicon Valley Tech Companies*. **http://www.siliconvalley.com/news/ci_14383730**
Wadhwa, V. 2010. *Addressing the Dearth of Female Entrepreneurs* **http://www.businessinsider.com/female-entrepreneurs-are-different-in-a-good-way-2010-2**

10 Change the Equation and the 'Educate to Innovate' Campaign **http://www.whitehouse.gov/the-press-office/2010/09/16/president-obama-announce-major-expansion-educate-innovate-campaign-impro**

11 Hidden bias is conceptualized as a mechanism by which unequal outcomes and opportunities by race and gender occur, through both unconscious and implicit biases at the individual level and biases in the form of practices and policies that appear impartial but produce unequal outcomes. The hidden bias framework draws upon a substantial body of research from neuroscience, psychology, sociology, law, and other fields that demonstrate unconscious influences on behavior and unintended outcomes of policies/practices. Hidden bias differs from discrimination in that discrimination involves the conscious action of excluding or restricting members of one group from opportunities based on demographic characteristics of race, class, gender, sexual orientation, disability status, among others. In legal discrimination cases, the discriminatory action must be proven.

12 Bertrand, M. and Mullainathan, S. 2004. *"Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination."* The American Economic Review, 94(4), 1-31.

13 Segrest Purkiss, S., Perrewe, P., Gillespie, T., Mayes, B., & Ferris, G. (2006). *Implicit sources of bias in employment interview judgments and decisions. Organizational Behavior and Human Decision Processes*, 101(2), 152-167.

14 Tilcsik, Andras (2011). *Pride and prejudice in hiring discrimination in the United States*. American Journal of Sociology, 117(2), xxx-xxx.

15 Castilla, E. (2008). *Gender, race, and meritocracy in organizational careers*. American Journal of Sociology, 113(6), 1479-1526.

16 Steele, C. M., & Aronson, J. (1995). *Stereotype threat and the intellectual test performance of African Americans*. Journal of Personality and Social Psychology, 69(5), 797-811
Walton, G. & Spencer, S. (2009). *Latent ability: Grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students*. Psychological Science, 20(9), 1132-1139.

17 Level Playing Field Institute (2007). *The Corporate Leavers Survey: The Cost of Employee Turnover Solely Due to Unfairness in the Workplace*. **https://www.lpfi.org/sites/default/files/corporate-leavers-survey.pdf**
CommonGood Careers & Level Playing Field Institute (2011). *The Voice of Nonprofit Talent: Perceptions of Diversity in the Workplace* **https://www.lpfi.org/sites/default/files/voice_of_nonprofit_talent.pdf**.

18 Many companies expressed interest in the study, but for a variety of reasons declined participation. A frequently cited concern of many tech companies was that company-specific data could be used to initiate discrimination lawsuits against the company. It is important to note that LPFI took several precautions to protect employee and company data. Data were collected anonymously and data collected within this study examined workplace experiences that do not rise to the threshold of qualification for legal discrimination (but have been shown to impact employee retention and cost companies ten times as much as discrimination cases.

19 The topics and scripts for the machinima videos arose from LPFI's previous Corporate Leavers research project which examined experiences of diverse individuals who left their place of employment due to perceived unfairness. Common themes in the quantitative research findings and in focus groups comprised of large tech company human resource and diversity managers, and employee resource group representatives, were developed into scripts. The scripts were then circulated to a group of engineers and managers for accuracy, validity, and feedback before being finalized.

20 Negative Work Experiences Scale (α =.72), 7 items, with sample items including, "In the past year, I have experienced... (1) exclusionary cliques, (2) being bullied, etc." All items are coded on a 2-point dichotomous scale, where 1=experienced, 0=did not experience. These items were developed from qualitative and quantitative data from the 2007 Corporate Leavers Survey. Job Satisfaction Scale (α =.88), 5 items, with sample items including, "I am satisfied with the opportunity I have to develop my skills and abilities," and "In the next year it is likely that I will leave my company (R)." All items are coded on a 5-point Likert scale, with responses ranging from from extremely unsatisfied to extremely satisfied. Two items were reverse-coded.

21 To test for missing, incomplete, and erroneous data, the following procedures were completed: (a) 3 test questions were included in survey to assess if respondents watched videos and to flag individuals randomly marking responses, (b) established a "reasonable" estimate of time it takes to complete the survey, flagged all responses that fell short of allotted time, (c) conducted quality control checks on company names, ensuring names listed were legitimate companies and flagging all others. All potentially fraudulent data was removed, resulting in a clean sample of 645 participants.

Note: Chi-square significance tests were conducted to determine whether responses differed significantly by subgroup. A Pearson's chi-square probability of <0.05 was used to determine statistically significant differences. Differences that were not statistically significant were still reported in order to shed light on important response patterns that may have otherwise been overlooked if solely focusing on statistical significance in reponses.

Technical Appendix

Appendix 1.

Bivariate Correlations: Race, Gender, and Negative Workplace Experiences

Variable	R	Sig.
Male	-0.18**	.00
Female	0.17**	.00
Underrepresented	0.12**	.01
Non-underrepresented	-0.09*	.04
White	-0.01	.89

*p < .05, **p < .01
Note: Gender and Race were re-coded from categorical variables into dummy variables.

Appendix 2.

Regression Analysis: Race, Gender, and Negative Workplace Experiences

	B	SE	t	R^2
Dependent Variable:				
Negative Workplace Experiences				.038
Female	.68	.18	3.80**	
Underrepresented POC	.73	.29	2.5*	

*p < .05, **p < .01

Appendix 3.

Regression Analysis: Control + Race, Gender, and Negative Workplace Experiences

	F	Sig.	R^2	ΔR^2
Dependent Variable:				
Negative Workplace Experiences				
Model 1 (control)	0.66	.58	.01	—
Model 2 (control + predictors)	5.25	.00**	.06	.05

Model 1 = Age, Position, Startup
Model 2 = Age, Position, Startup, Female, Underrepresented POC
*p < .05, **p < .01

Appendix 4.

Bivariate Correlation: Race, Gender, and Job Satisfaction

Variable	R	Sig.
Male	.063	.14
Female	-.065	.13
Underrepresented	-.044	.31
Non-underrepresented	-.036	.41
White	.063	.14

*p < .05, **p < .01
Note: Gender and Race were re-coded from categorical variables into dummy variables.

Appendix 5.

Race, Gender, and Job Satisfaction

	B	SE	t	R^2
Dependent Variable:				
Job Satisfaction				.006
Female	-.75	.80	-.94	
Underrepresented POC	-.68	.46	-1.48	

*p < .05, **p < .01

Appendix 6.

Negative Workplace Experiences and Job Satisfaction

	B	SE	t	R^2
Dependent Variable:				
Job Satisfaction				.09
Negative Workplace Experience	-.76	.11	-6.8	

*p < .05, **p < .01

About the Level Playing Field Institute

Level Playing Field Institute is a San Francisco-based nonprofit that promotes innovative approaches to fairness in education and the workplace by removing barriers to full participation. LPFI runs three programs to work towards this vision. Their Summer Math and Science Honors (SMASH) Academy provides rigorous STEM curriculum and college preparation for high potential students of color in under-resourced schools through a residential college program at UC Berkeley and Stanford. They also operate a college scholarship and mentorship program and conduct research in K-12, post-secondary, and workplace contexts to understand and mitigate hidden biases and barriers for under-represented groups.

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