

WORKERS' PREDICTIONS OF WORK AUTOMATION: WHICH WORKERS ARE CONCERNED
ABOUT AUTOMATION VULNERABILITY?

A Thesis

Presented to

The Faculty of the Department

of Sociology

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

By

Laura M. Livesey

August, 2019

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ABSTRACT

Workforce automation occurs when machines replace human workers. Recently, new developments in artificial intelligence (AI) and computer and information technologies allow for automation in many industries and occupations, which may threaten workers' subjective expectations of job security. Much research indicates that perceived job insecurity, the subjective feeling that one is at risk of losing their job, is problematic at the personal and societal level. Perceived job insecurity can lead to diminished work performance and dedication to work organizations, poor mental and physical health of workers, and a myriad of other detrimental outcomes. Research also indicates that the incidence of perceived job insecurity is especially prevalent among racial/ethnic minority workers and, increasingly, among women. Currently, there is little research on the link between workers' perceptions of job security regarding the threat of automation—a concept I refer to as automation-based job insecurity—and most studies do not examine the relationship between marginality (like being a racial/ethnic minority or female worker) and the experience of automation-based job insecurity. In a series of binary logistic regression models I used data from the PEW Research Center from their 2015 study, *Internet, Science, & Technology Project*, to examine how secure racial/ethnic minority and female workers feel in their jobs considering the threat of automation, relative to their White and male counterparts. In this study, I use three different conceptualizations of automation-based insecurity. Generally, I find that Latino and Black workers have higher incidences of automation-based job insecurity than Whites. However, my results indicate that there is no difference in reports of automation-based job insecurity between women and men. The findings from this research suggest that

racial/ethnic status is important when it comes to working individuals' perceptions of job insecurity considering the threat of automation. I also find that the effects for race are somewhat lessened after accounting for workplace characteristics such as work sector and activities performed on the job.

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INTRODUCTION

The term job insecurity describes a situation where working people feel vulnerable to job loss (Greenhalgh and Rosenblatt 1984). Job insecurity has increased for workers around the world (Chang and Chen 2008; Kalleberg and Marsden 2012; Mauno and Kinnenan 1999, 2002; Patel, Devaraj, Hicks and Wornell 2018; Yang and Zheng 2015) and an extensive body of literature exists on job insecurity and its negative consequences at the personal and societal levels (De Witte 1999; Fullerton and Anderson 2013; Gaunt and Benjamin 2007; Rosenblatt, Talmud, and Ruvio 1999). This literature shows that some studies find disparities in perceptions of job insecurity between racial/ethnic minorities and Whites, and between men and women (De Witte 1999; Kuroki 2016; Muano and Kinnenunen 1999, 2002; Wilson and Mossakowski 2009, 2012; Wilson, McNulty, and Bishin 2006).

Recently, more research considers the role of automation in the contemporary workforce and some specifically explore the possibility of future job displacement by machines and computer programs (Autor 2014; Autor, Levy, and Murnane 2003; Bughin, Lund, and Remes 2016; Chui, Manyika, and Miremadi 2015; Frey and Osbourne 2013; Jaumotte, Lall, and Papageorgiou 2013; Polansky 2015; Rotman 2014; Stevens 2016; Wajcman 2017; Wyatt and Hecker 2006). Automation is an influential factor in the modern workforce and some research indicates that it can have negative consequences for employment and social equality (Bresnahan, Brynjolfsson, and Hitt 2002; Danaher 2016; Frey and Osbourne 2013; Wheeler 2005). This work explores how the threat of automation comes into play with perceived job insecurity by analyzing what workers think about the security of their own job considering the threat of automation (McKinsey Global Institute

2017; Patel et al. 2018; Popescu, Petrescu, Sabie, and Musat 2018; Pew Research Center 2016; Vieitez, De La Torre Carcia, and Rodriguez 2001).

Job insecurity incited by the fear of replacement by computers or machines—a concept I refer to as automation-based job insecurity—is underexplored in the literature. Currently, there exists a dearth of academic studies on the topic as most of the automation-based job insecurity research is conducted by think tanks and private companies looking to analyze the economic or organizational impacts of perceptions of such insecurity (Americanstaffing.net 2017; Gallup 2018; NPR 2018; Parker, Morin, and Horowitz 2019; Smith 2016; Smith and Anderson 2017; Young 2017). Furthermore, the studies that exist on this topic are limited because they neglect to consider the relationship between ascriptive characteristics, such as race and gender, and automation-based job insecurity. Previous studies primarily focus on differences in workers’ perceptions of automation and job security considering qualities such as age, human capital (education level and income), and workplace characteristics, like sector and activities performed at work. In this study, I examine the sociodemographic characteristics of race and gender, as well as the personal and workplace characteristics incorporated in previous research on this topic. Furthermore, I examine these workplace characteristics to test if they account for the effects of race and gender.

In this study I use the marginalized worker perspective as a conceptual framework to analyze the relationship between sociodemographic characteristics of race and gender and the incidence of experiencing automation-based job insecurity (Hite 2007; Mundra, Moellner, and Lopze-Aqueres 1995; Wilson and Mossakowski 2009). Because much of the workplace automation literature considers how workplace characteristics—human capital, work sector, working as a manual laborer, and performing certain job tasks—impact automation-based job

insecurity, I also include these variables to examine if they account for or explain away the effects of race and gender on workers' attitudes about automation. Using the framework of the marginalized worker perspective, I answer three central research questions. First, what is the relationship between racial/ethnic minority status and the incidence of experiencing automation-based job insecurity? Second, what is the relationship between gender and the incidence of experiencing automation-based job insecurity? Third, what is the relationship between workplace characteristics (e.g. type of work sector and tasks performed on the job) and the incidence of experiencing automation-based job insecurity, and do these characteristics account for the relationship between race/ethnicity, gender, and automation-based insecurity?

I expect that both racial/ethnic minorities and female employees will be more likely to report experiencing automation-based job insecurity. I also expect that workplace characteristics will account for at least some of the relationship between race/ethnicity, gender, and perceptions of automation-based job insecurity, as racial/ethnic minorities and women experience a variety of adverse work characteristics. Some research finds that racial/ethnic minority and women workers report higher levels of job insecurity than Whites and men, therefore I consider these important factors for better understanding the relationship between these sociodemographic traits and automation-based job insecurity. Moreover, much research suggests that workplace characteristics are also important elements which influence the incidence of experiencing job insecurity. Thus, I also include workplace characteristics in this study.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Job Insecurity

The concept of job insecurity comes from both the study of organizations and theories of job security (Llosa, Menedez-Espina, Agullo-Tomas, and Rodriguez-Suarez 2018). Job security is the condition where workers feel confident they are not at risk of losing their employment (Kim and Knesebeck 2016). On the other hand, job insecurity is the condition where workers lack feelings of personal job security and are frustrated by this lack of certainty (Greenhalgh and Rosenblatt 1984). Two forms of job insecurity are discussed in the literature—objective job insecurity and subjective job insecurity. The former is associated with observable “structural variables” such as an organization’s successes or shortcomings in the labor market, or the overall climate of the economy (Llosa et al. 2018:212). Conversely, perceived job insecurity considers workers’ personal experiences and involves their perceptions “in a job situation” regarding the potential loss of their own job (Greenhalgh and Rosenblatt 1984:440; Hellgren and Naswall 2003). Experiences of subjective (perceived) job insecurity is the focus of this study as previous research indicates that race/ethnicity, and sometimes gender, are linked to perceptions of subjective job insecurity (Yang and Zheng 2015).

I use Van Vuuren’s (1990) conceptualization of job insecurity because she focuses on three facets that are highly relevant to a study of job insecurity and perceived threats of automation. First, she contends that job insecurity is a “subjective experience or perception” on behalf of the worker, indicating that fear of job loss varies between employees on an individual basis (De Witte 1999:155). Second, she asserts that job insecurity entails workers feeling unsure about the future security of their employment. Van Vuuren’s emphasis on

future uncertainties is important to my study because her definition of job insecurity refers to workers feeling they may become obsolete in their jobs. For example, she distinguishes between feeling unsure of the future existence of one's job and feeling destined to become inessential in one's job. The latter is a situation where workers feel confident that their skill set is expendable and can plan for eventual dismissal (Hartley, Jacobson, and Van Vuuren 1990). The third component of her definition asserts that insecure workers will acknowledge that their job may not exist in its current form in the future (Hartley, Jacobson, and Van Vuuren 1990). This aspect is especially important when analyzing worker perceptions of automation because much of the extant literature examines whether workers think their job will exist in its current form in the future. Van Vuuren also delineates between internal/controllable and external/uncontrollable determinants of job insecurity. The former includes personal traits like race, age, level of education, and amount of work experience while the latter accounts for social occurrences like workplace demands on education, government policies, new technology, and the economic situation (Van Vuuren 1991). I would like to note that some of these determinants, according to Van Vurren, are mutually exclusive (they belong to only one category of possibilities) while others are not. For instance, age and race represent both internal and uncontrollable personal traits, whereas education level and work experience are internal characteristics which are not necessarily beyond an individual's control. That is, level of education and amount of work experience can change in an individual's lifetime.

An important factor to consider about the relationship between the modern labor market and perceived job insecurity is the decline of lifetime employment and long term job tenure, and the rise of flexible contingent and part time work that has occurred since the

1970s. Lifetime employment and job tenure are similar concepts referring to extended stints of employment, usually at the same firm. On the contrary, flexible contingent and part time work refer to employment situations where the worker-employee agreement recognizes that employees are not expected to remain in a position for a long time period, nor are they necessarily expected to work full time or receive worker benefits. Some economists argue that the decline of lifetime employment and the rise of contingent and temporary work (especially in the private sector) contribute to perceived job insecurity (Farber 2008, 2010; Stone 2012). Furthermore, a great deal of research finds that wages have stagnated since the 1970s (Economic Policy Institute 2015; Pew 2018) and some believe that stagnating wages also contribute to perceived job insecurity (Geishecker 2009; Shapiro and Stiglitz 1984). I believe that in addition to falling lifetime employment, rising contingent and part time work, and stagnant wages, workplace automation may also contribute to perceived job insecurity among workers.

The Personal and Social Consequences of Job Insecurity. At the personal level, job insecurity is linked to increased feelings of frustration and stress (De Witte 1999; Fullerton and Anderson 2013; Reichert and Tauchmann 2017). In turn, the stress from job insecurity is associated with poor mental and physical health outcomes, problematic social behavior which impacts family dynamics, negative coping strategies, and even passing down negative views of work and occupations to one's children (Barling, Dupe and Hepburn 1998; Ferrie 1997; Fullerton and Anderson 2013; Larson, Wilson, and Beley 1994; Patel et al. 2018; Reichert and Tauchmann 2017; Vieitez et al. 2001). Additionally, job insecurity is detrimental to individuals' sense of well-being by disconnecting them from feelings of control, a lack of which is linked to depression, feelings of helplessness, and threatens

individuals' sense of financial and social security which are important for maintaining personal wellbeing (De Witte 1999; Gilbert 2009; Reisel, Tahira, Probst, Chia, Maloels, and Konig 2010).

At the societal level, perceived job insecurity has implications for social inequality and economic stability through its connection to reduced worker bargaining power, decreased wages across industries, depressed spending and excessive saving, to name a few (Geishecker 2009; Grace, Salvatier, Dafoe, Zhang, and Evans 2017; Shapiro and Stiglitz 1984; Kuroki 2015; Reichert and Tauchmann 2017; Wheeler 2005). Job insecurity also has implications for work organizations via its association with reduced worker attendance, diminished employee productivity, commitment to and trust in their work organization, as well as increased adverse behavior at work (Kuroki 2015; Reisel, Chia, Probst, and Maloles 2010; Wilson and Mossakowski 2009).

Automation-Based Job Insecurity. Many factors can cause an individual to worry about losing their job. This study considers only one aspect of job insecurity—workforce automation. Workforce automation occurs when machines replace human workers (Kristal 2013). I use the term automation-based job insecurity to describe individuals who believe their jobs are vulnerable to automation and worry about eventual replacement by machines or computer programs in their line of work.

Some research suggests there is a growing risk of automation in the contemporary workforce which may lead to swelling numbers of displaced workers and elevated social inequality (Acemoglu, Daron, and Autor 2012; Bresnahan, Brynjolfsson, and Hitt 2002; Chui, Manyika, and Miremadi 2015; Danaher 2017; Frey and Osbourne 2013; Jaumotte, Florence, Subir Lall, and Chris Papageorgiou 2013; McAfee and Brynjolfsson 2016; Patel et

al. 2018; Popescu et al. 2018). Regarding automation and job insecurity, some argue that the risk of automation is detrimental to an employee's sense of job security and causes job insecurity induced stress which is known to have several personal and social consequences, as noted above (Patel et al. 2018; Van Vuuren and Klandermans 1991; Vieitez et al. 2001). Indeed, the perception of job insecurity is considered "one of the more stressful burdens that an employee can shoulder" (Reisel et al. 2010:2) and, in some cases, is found to be more harmful to a worker's personal wellbeing and work satisfaction than the actual experience of losing one's job (Borra and Gomes-Garcia 2014).

Workforce automation falls under Van Vuuren's category of external/uncontrollable determinants of job insecurity. As such, automation is not a force workers can control, but rather one they must endure if their job becomes automated and no longer requires the same amount of human attention. However, innovations from new technology associated with automation can generate a situation where jobs are both eliminated and created (Acemoglu and Autor 2012; Autor 2015; Bughin, Lund, and Remes 2016; Bresnahan, Brynjolfsson and Hitt 2002; Campa 2014; Chui, Manyika, and Miremadi 2015; Danaher 2017; McAfee and Brynjolfsson 2016; Wajcman 2008, 2017). Some anticipate that new technologies have the potential to create jobs with less monotony and more intrinsically fulfilling properties, but will require education that individuals working in jobs considered susceptible to automation do not necessarily have (Acemoglu and Autor 2000; Autor 2014, 2015; Frey and Osborne 2013; Grace et al. 2017; McAfee and Brynjolfsson 2016; Patel et al. 2018; Wheeler 2005).

The amount and type of education one acquires are characteristics which can change in an individual's lifetime (Van Vurren 1991). Fortunately, the acquisition of education and training can provide a mechanism for better quality of one's work-life (Becker 1993;

Marimuthu, Arokiasamy, and Ismail 2009). Therefore, it is possible that individuals suffering from automation-based job insecurity may use additional education to combat feelings of stress at the personal level. For example, if individuals believe that jobs exist which are more resilient to automation than the ones they currently have, they may experience less job insecurity induced stress if they acquire the education and training required to occupy those jobs.

It is important to know if some demographic groups of workers suffer from experiencing perceive automation-based job insecurity more than others in order to help these populations increase their quality of life. For instance, if we know that racial minorities and women suffer more from automation-based job insecurity than Whites and men, then policy makers can focus efforts on creating programs that might help these individuals acquire the credentials to obtain jobs they believe are resilient to automation. At the social level, if it turns out to be the case that many jobs become automated and leave behind an obsolete workforce in numerous industries, then this research can help policymakers create pathways for these workers to train for new-technology-generated jobs that may also benefit social equality and the economy.

Furthermore, examining workers' reports of automation-based job insecurity and their predictions of future workforce automation can provide insight into upcoming labor market conditions involving automation. Some studies demonstrate that workers' perceptions of job insecurity, and their predictions of future events in the labor market, can align with actual labor market events, especially job loss (Kuroki 2015; Linz and Semykina 2008; Schmidt 2000). Greene (2000) finds evidence suggesting workers' perceptions of job security are associated with occurrences in the labor market, such as unemployment. Therefore, it is

possible that workers' perceptions of job security and their predictions of future workforce automation could be accurate indicators of events to come and provide a good measure for predicting future workforce automation. However, despite any anticipated connections between workers' forecasts of events in the labor market and actual labor market outcomes, the incidence of perceived job insecurity is linked to real consequences for individuals and organizations and it is vital to better understand if automation contributes to perceived job insecurity among workers.

Studies of Perceived Automation-Based Job Insecurity. Little academic work exists on perceived automation-based job insecurity and most of this research is conducted by private companies and think tanks. Much of the extant research indicates that most workers do not currently experience automation-based job insecurity (Americanstaffing.net 2017; Gallup 2018; NPR 2018; Parker, Morin, and Horowitz 2019; Smith 2016; Smith and Anderson 2017; Young 2017). For instance, one study by the Pew Research Center (2016) measures workers' current levels of perceived automation-based job insecurity and finds that only 11 percent (N=1100) of workers report worrying about the possibility of losing their own job to a machine (Smith 2016). Other Pew Research studies examine how workers view the effects of technology on jobs in the future, especially jobs in their line of work, and produce similar results. A Pew report from 2017 reveals that just 30 percent of workers (N=2510) report thinking their own jobs will be performed by robots in their lifetime (Smith and Anderson 2017), while a more recent Pew report (2019) uncovers that only 36 percent of workers say they think their job will automate in 30 years (Parker et al. 2019).

Many other studies by think tanks and private companies reveal similar findings. In a study of workers' automation-based job insecurity, a poll by National Public Radio/Marist

(2018) identifies that 90 percent of workers (N=974) say they are not concerned about being replaced in their jobs by machines (Selyukh 2018). Interestingly, this study corroborates other research which finds that, of workers who do claim to experience automation-based job insecurity, the racial/ethnic demographic breakdown is such that White workers experience the lowest levels of automation-based job insecurity, Black workers experience the second highest levels of automation-based job insecurity, and Hispanic workers exhibit the very highest levels of anxiety about being automated out of their own job. Results from one Gallop Poll (2018) measures automation-based job insecurity and identifies that only 23 percent of American workers (N=2871) report experiencing some level of automation-based job insecurity (Northeastern 2018). Another survey by the American Staffing Association (2017) identifies workers experiencing automation-based job insecurity and demonstrates that 73 percent (N=1154) say they do not experience feelings of concern about being replaced in their own job by machines (Snyder 2017). Finally, a study by Ipsos Public Affairs (2017) examines perceptions of automation-based job insecurity and reveals that only 30 percent (N=1676) of workers report concern about losing their job to automation (Young 2017). Although most workers appear unconcerned about automation, considering the growing development and application of new workplace technologies, it is important to better understand workers who report experiencing automation-based job insecurity. It is also crucial to continue studying this population because more workers may suffer from this kind of job insecurity as workplace technologies advance.

The Marginalized Worker Perspective

The theoretical framework for this study is based on the marginalized worker perspective. The marginalized worker perspective emerged from studies revealing that Blacks and Latinos working as professionals and managers (in White owned and managed organizations) experience adverse social-psychological effects, compared to their White coworkers with similar levels of human capital and occupational positions, because they perceive racial discrimination on behalf of their supervisors (Hite 2007; Mundra, Moellner, and Lopze-Aqueres 1995; Wilson and Mossakowski 2009). This perspective highlights the sources of racial and gender disparities in perceived job insecurity specifically at the privileged occupational level. Although my study considers an expanded population of employed individuals working at any occupational level, this theory is still applicable to the core demographic of racial/ethnic and female workers as they still represent significant traits within this theory.

The marginalized worker perspective contends that Black and Hispanic workers see racial discrimination in the workplace as a result of subtle employer processes like biased worker performance assessments and allocation of work assignments. In their study of perceptions of job insecurity among racial/ethnic minorities at the professional and managerial level, Wilson and Mossakowski (2009) find that, compared to their White and male counterparts, African American and Latino men and women report higher levels of job insecurity.

Essentially, the marginalized worker perspective expects that Black and Latino workers are more likely to experience feelings of job insecurity relative to their White counterparts, and I extend this perspective to consider the case of automation-based

insecurity as well (Wilson and Mossakowski 2009). I derive several hypotheses from this perspective (discussed in detail below) as it focuses on the effects of race and gender on perceived job insecurity and because it controls for human capital variables. In this study, I use the marginalized worker perspective, and the literature which documents racial/ethnic and gender disparities in perceived job insecurity, to examine whether racial/ethnic and gender disparities exist in worker perceptions of automation-based job insecurity. To my knowledge, the extant literature does not explore if these disparities exist considering workers' views of automation as a threat to their job security. This perspective also contends that race and gender are important variables which influence perceived job insecurity. Therefore, I anticipate that my findings will provide support for the marginalized worker perspective and that racial/ethnic and women workers (at any occupational level) will express greater feelings of job insecurity incited by fear of automation than their White and male counterparts.

The Racial Disparity in Perceived Job Insecurity. Many studies demonstrate that a racial disparity exists in perceived job insecurity. I apply this to the context of automation-based insecurity, specifically. Much research finds that racial/ethnic minorities, especially Black workers, have significantly higher levels of job insecurity than their White counterparts (Elman and O'Rand 2002; Yang and Zheng 2015) even when their work credentials are comparable to those of White workers (Hirsh and Lyons 2010; Manski and Straub 2000; Wilson et al. 2006; Wilson and Mossakowski 2009). This research indicates that even when minority workers acquire higher levels of education, extensive work experience, and hold a professional/managerial job—all characteristics considered to protect individuals against feelings of job insecurity—they still experience higher levels of perceived

job insecurity than their White correlates (De Witte 1999; Gallie, Felstead, Green, and Inanc 2017; Lavaysse, Probst, and Arena 2018; Sverke, Hellgren, and Naswall, Lindfors, and Sverke 2012; Wilson and Mossakowski 2009).

Hirsh and Lyons (2010) examine the impact of “social status, job characteristics, and workplace context” (269) on the relationship between perceived racial workplace discrimination and race. Their research suggests race impacts perceptions of racial discrimination at work as they find that Black and Hispanic workers are more likely to report more feelings of racial discrimination, compared to whites, even when controlling for “job and organizational” variables (269). Similar to other scholarly opinions about modern practices of racial discrimination at work (Bielby 2000; Margolis 2010; Wilson 1987), these authors assert that perceived racial discrimination in the workplace remains a persistent problem in the post-civil rights era as racial discrimination in the labor market has “taken on a new form” of actions compared to workplace discrimination in the pre-civil rights era (270). They contend that, in the modern labor market, it is the norm for discrimination to emerge from “everyday interactions and workplace structures” (270) rather than through overt employer actions to prevent racial minorities from achieving employment opportunities equal to Whites. They suggest that these daily interactions and workplace structures strongly influence employees’ perceptions of racial discrimination and can generate feelings of job insecurity. This view coincides with Avery, McKay, and Wilson’s (2008) study of perceived sex and race based discrimination in the workplace. Avery and colleagues contend that racial/ethnic minorities have lower social group status relative to Whites. They insist it is more likely that racial/ethnic minority workers should exhibit heightened awareness of discriminatory treatment and perceive more race based discrimination at work based on their

research findings revealing that Black and Hispanic employees perceive more racial/ethnic discrimination compared to Whites (Avery et al. 2005). Research by Fullerton and Anderson (2013) helps to highlight the connection between perceptions of racial discrimination at work and feelings of job insecurity. Their findings identify an association between perceived racial discrimination, heightened levels of job insecurity among racial minorities, and negative health outcomes by showing that perceived racial discrimination in the workplace is an antecedent of job insecurity for racial/ethnic minority employees.

In his study of changing trends of perceived job insecurity among Black and White American workers, Kuroki (2016) finds that job insecurity increased for both Black and White workers between 1977-2012. His study also suggests that feelings of job insecurity have gone up substantially more for Black workers, compared to Whites, when accounting for variables such as “gender, age group, educational attainment, occupation and industry” and reactions to regional unemployment rates (290). Kuroki’s outcomes indicate that “black male workers, older black workers, and black high school graduates” experienced a growing sense of job insecurity over the last 30 plus years compared to their White counterparts, even despite growing feelings of job insecurity among Whites (290). Overall, Kuroski’s findings suggest that while job insecurity has increased for both Black and White workers since the 1970s, perceptions of job insecurity are still more prevalent among Black workers compared to Whites. He also discovers that higher levels of Black worker job insecurity are positively associated with higher incidents of involuntary job loss for Black workers—thereby providing further evidence that worker perceptions can align with labor market realities.

As previously mentioned, some studies demonstrate that factors which seem like they might help reduce racial disparities in perceived job insecurity do not provide a strong

enough buffer to significantly narrow the racial perception gap. Many studies indicate that observable characteristics such as human capital (education and work experience), workplace characteristics (e.g. skill level and job performed job tasks), and organizational status (e.g. professional/managerial position and organizational hierarchy status) do not eliminate the racial disparity in perceived job insecurity (Becker 1993; Schmidt 2000; Wilson and Mossakowski 2009; Yang and Zheng 2015). For instance, some research indicates that Black workers' experiences of perceived job insecurity "has remained at least twice that of Whites over the last two decades" despite their increased participation in the labor market and access to privileged occupations that were less available in the pre-civils rights era (Hirsh and Lyons 2010; Yang and Zheng 2015:484).

In their work on perceived job insecurity among workers at the firm level, Yang and Zheng (2015) find that (compared to White workers) racial minority workers exhibit higher levels of distrust of their superiors and employers, a population which is disproportionately White and male (Elvira and Zatzick 2002). They discover that the presence of Layoff Prevention Commitments—verbal expressions from employers asserting their commitment to “preventing layoffs as much as is possible”(483)—have adverse effects on minority workers' feelings of job security and can exacerbate the racial disparity in perceived job insecurity at the firm level. In this case, the introduction of LPCs, policies said to be created with the goal of alleviating employees' feelings of job insecurity, increased concerns of job loss for minority workers but decreased these feelings among White workers. Similar to previous research, these authors point out that job insecurity has increased for all workers, but maintain that higher levels of perceived job insecurity remain more prevalent among racial minorities due to their socially “disadvantaged positions” germane to their racial status (484).

While these authors do not propose a specific explanation for this racial disparity in perceived job insecurity, they speculate that Black employees experience heightened feelings of job insecurity in the presence of firm level LPCs due to perceptions of racial discrimination from employers and expectations that these policies are primarily created to protect White workers who more closely resemble their managers and supervisors. Yhang and Zheng propose that Black employees' negative interpretations of these policies may be related to other researchers' findings suggesting that Black workers do not believe that their White superiors have their best interest in mind, and, as a result, experience perceived discrimination even when their work positions, human capital, and type of work sector are comparable to Whites (Wilson et al. 2006; Wilson and Mossakowski 2009, 2012).

Addressing a possible contributor to racial disparity in perceived job insecurity, some examine the role of racial discrimination in the workplace. For instance, in their study about racial bias in supervisory ratings, Stauffer and Buckley (2005) find evidence suggesting that performance evaluations of Black employees are significantly and practically lower when assessed by White supervisors. They discover that employees' racial characteristics, rather than the supervisor's, is the most important factor for performance evaluations. In their study, both Black and White supervisors provide similar feedback on evaluations, except under conditions where a Black employee is rated by a White supervisor (Stauffer and Buckley 2005).

When it comes to personal level consequences of job insecurity, higher levels of job insecurity generate more of the associated negative outcomes for racial/ethnic minorities. Much research indicates that racial/ethnic minorities experience more job insecurity, and experience this feeling for longer periods of time, compared to Whites (Fullerton and

Wallace 2007; Manski and Straub 2000; Wilson et al. 2006; Wilson and Mossakowski 2009). In turn, extensive experiences of perceived job insecurity can have significant associations with disparities in health between racial minority and White workers. Fullerton and Anderson (2013) reveal that racial disparity in perceptions of job insecurity contributes to racial inequality in health outcomes. They find that Black and Hispanic workers have higher levels of job insecurity, and higher self-reports of poor health, than their White counterparts (Fullerton and Anderson 2013). Kallegerb and Marsden (2013) uncover that Black workers place the most subjective value on financial and job security, yet are one of the groups most susceptible to “job, employability, and economic insecurity”, which can also generate consequences for one’s mental health (Kallegerb and Marsden 2013:255).

The literature on prevalent feelings of job insecurity among racial/ethnic minorities indicates that the negative effects of job insecurity pose serious threats to the physical and mental wellbeing of this population of workers compared to their White counterparts. Given the marginalized worker perspective and the extant work on the racial disparity in perceived job insecurity, I anticipate this will be the case regarding automation-based job insecurity as well. In accordance with previous research findings of racial disparities in perceived job insecurity, I hypothesize that:

H1: Racial/ethnic minority workers, as compared to White workers, will be more concerned that their employers will use machines or computer programs to replace them at work.

The Gender Disparity in Perceived Job Insecurity. A number of prior studies of perceived job insecurity focus on the prevalence and effects of job insecurity among male workers—a circumstance considered by some as resultant from “the pattern of full-time

employment without interruption [being a] predominantly a male pattern” (Rosenblatt et al. 1999:3). However, recent studies of perceived job insecurity find that paid work has become increasingly important for women on the global level (Lewis 2001; Mauno and Kinnunen 1999; 2002) and more research investigates whether disparities in levels, and effects, of perceived job insecurity exist between men and women (Adekiya 2018; Bleidorn et al. 2015; Browne and Mirsa 2003; De Witte 1999; Gaunt and Benjamin 2007; Lewis 2001; Mauno and Kinnunen 2002; Rosenblatt et al. 1999).

In the United States, women comprise approximately 51.4 percent of labor market workers (Bureau of Labor Statistics 2017) and approximately 42 percent of households are headed by female primary earners (Glynn 2014). However, studies examining the moderating effects of gender on perceived job insecurity find mixed results as to whether men or women experience higher levels of perceived job insecurity (Cheng and Chan 2015). Some studies suggest men are more prone to experiencing perceived job insecurity, especially in certain contexts (Conger, Lorenz, Edler, Simons, and Ziaojia 1993; De Witte 1999; Rosenblatt et al. 1999). For instance, Rosenblatt and colleagues (1999) find that, among Israeli educators, male teachers experience higher levels of job insecurity than women. In his study of Belgian plant workers, De Witte (1999) contends that De Goede and Masassen’s (1998) role theory partially explains his finding that men experience more perceived job insecurity (and experience more of its associated psychological distress) than women. Role theory posits that men traditionally occupy the household breadwinner role and views the breadwinner role as linked to heightened awareness of the consequences of job loss among men, which, in turn leads men to experience more feelings of job insecurity compared to women. Conversely, role theory views women’s traditional family roles as protective against perceived job

insecurity because it assumes women prioritize the domestic realm over their position in the labor market (De Witte 1999).

On the other hand, in their meta-analysis of the literature on experiences of job insecurity, Cheng and Chan (2008) find that gender is not a significant predictor of perceived job insecurity and that there is no difference between men and women's reports in perceived job insecurity. However, some research contradicts their findings and indicates that women experience higher levels of perceived job insecurity, and suffer from more of its consequential effects (Gaunt and Benjamin 2007; Mauno and Kinnunen 1999; 2002). For example, in their study of Finnish employees, Mauno and Kinnunen (1999) find that gender impacts differences of effects of dis-wellbeing between men and women, as female employees report more "long-lasting job stressor(s)" from perceived job insecurity than men (147). Specifically, they find that female respondents who experience job insecurity "were more likely [than men] to experience a high level of job exhaustion and negative work spillover into parenthood" in the year after reporting their initial feelings of job insecurity (158). In another study of Finnish workers, Mauno and Kinnunen (2002) find gender as an important component of perceived job insecurity. They discover that among dual-earner couples women experience more perceived job insecurity than their male partners.

Additionally, in their research considering how gender affects job insecurity, Gaunt and Benjamin (2007) find that traditional men (who retain the breadwinner role) have little job related stress compared to traditional women (who maintain a primarily domestic role). However, they discover that type of gendered roles are related to experiencing job insecurity as both egalitarian men and women (men and women who equally participate in breadwinning and domestic responsibilities) report comparable levels of job insecurity

(Gaunt and Benjamin 2007). In their research of how race and gender affect perceived job insecurity, Wilson and Mossakowski (2009) find that Black and Hispanic men and women are more likely to experience perceived job insecurity compared to Whites, and that racial/ethnic minority female workers are more likely to experience increased feelings of job insecurity compared to their White female coworkers. They also find that their “supplementary t-test analyses indicate that women fear job loss to a greater extent than men” (364). Their results suggest that both race and gender are predictor variables of high levels of perceived job insecurity, and that racial/ethnic minority men and women workers experience a higher incidence of perceived job insecurity compared to Whites, even after controlling for human capital and social economic status.

In sum, findings of the relationship between gender and perceptions of job insecurity are mixed. However, the fact remains that much research demonstrates perceived job insecurity as linked to substantial consequences for personal health and wellbeing, and consequential for organizations. In this study, I take seriously the suggestion by Wilson and Mossakowski (2009) that “racial/ethnic discrimination in the workplace can be gendered and more research should examine its implications of job insecurity” (368). Therefore, I analyze whether a gendered disparity in perceived automation-based job insecurity exists. Including a gender variable may provide a better understanding as to whether gender increases the likelihood (of either male or female) workers to report higher levels of concern that a machine or computer program will replace them in their own job or to think that jobs (their own and otherwise) will be susceptible to automation in the future. Accordingly, I have developed the following hypothesis:

H2: Female workers, as compared to male workers, will be more concerned that their employers will use machines or computer programs to replace them at work. If it turns out that one gender category of workers is more vulnerable to automation-based job insecurity than another, we will have a better understanding of whether the threat of automation is a growing source of job insecurity among female or male workers in the digital era.

Perceived Automation-Based Job Insecurity and Workplace Characteristics. In addition to race and gender, we may consider other workplace characteristics as relevant to automation-based job insecurity. Workplace aspects may lessen the relationship between marginalized demographic characteristics and workers' attitudes about workforce automation. While studies of automation-based job insecurity find that most workers are not currently concerned about technological unemployment, they do indicate that workplace characteristics currently influence perceptions of automation-based job insecurity among employed individuals. For instance, research demonstrates that working in primarily manual labor positions is significantly associated with the incidence of being concerned one's job will automate in the future (Smith 2016). Research also denotes that performing repetitive tasks on the job is associated with experiencing higher levels of automation-based job insecurity relative to those who perform non-repetitive tasks.

Further, research indicates that many racial/ethnic minority and women workers perform manual labor and repetitive tasks at work (Spalter-Roth and Lowenthal 2005). Additionally, studies also suggest that racial/ethnic minorities and women have higher levels of job insecurity than their counterparts, therefore this study considers race and gender as important factors which are underexplored in the literature on technology as an antecedent of

perceived job insecurity. In this study, I consider race and gender to provide a lens which the story of perceived automation-based job insecurity can be analyzed and better understood. Since workplace variables have also been shown to impact the incidence of experiencing perceived job insecurity, I propose the following hypothesis about the relationship between workplace variables and the tendency to experience automation-based job insecurity:

H3: Individuals working as manual laborers, and those performing primarily repetitive tasks at work, as compared to non-manual workers and those who do not perform primarily repetitive tasks at work, will be more concerned that their employers will use machines or computer programs to replace them at work, and that workplace characteristics will account for the association between race/ethnicity, gender, and automation-based insecurity.

Some anticipate that the development and implementation of workplace technologies will continue to grow. If workers also anticipate this threat, there is potential for growing job insecurity among workers incited by the threat of automation. Researchers and scholars should know if technology is a significant cause of job insecurity, especially for racial minority and women workers who (a) are concentrated in manual labor and low level service jobs that require performing repetitive tasks at work; and (b) sometimes report higher levels of perceived job insecurity than their racial and gender counterparts, and suffer considerably from its effects.

DATA AND METHODS

Data

I use data from a 2015 survey conducted by the PEW Research Center from their *Internet, Science, & Technology Project* to investigate the relationships between race, gender, and automation-based job insecurity, measured here in three different ways. The survey includes a random digit dial sample of landline and cellphone numbers in 50 U.S. states and the District of Columbia to interview adults 18 years and older. This sample consists of full time and part time workers who are not self-employed. Dropping cases due to missing data (8 percent of the sample) yielded a sample of 884 individuals from 18 to 83 years of age. I use this dataset because it contains a specific survey question to measure perceived automation-based job insecurity (regarding their own jobs) among working Americans. This survey also contains questions asking respondents about their level of concern that machines or computer programs will replace human workers in the future. Thus, the survey is a useful tool for measuring workers' reports of automation-based job insecurity due to the fear that technological devices or artificially intelligent (AI) programs may replace human workers.

This dataset also contains two survey questions which measure American workers' predictions of future workplace automation. This allows for a nuanced analysis of the various ways we can think about and conceptualize automation-based job insecurity. Furthermore, this dataset permits for an analysis of the paradox in worker's perceptions regarding the common finding that many employed individuals report thinking most jobs currently done by humans will be performed by machines in the next 50 years, but that their own jobs will still exist in its current form (details below).

Dependent Variables

Automation-Based Job Insecurity. As mentioned above, I include three main items as dependent variables meant to capture the various facets of automation-based job insecurity. The first item measures job insecurity more directly by framing such insecurity as a concern of employed individuals which they experience right now, in the present, based on their current job. Here, in a similar method to which the literature on job insecurity measures perceived job insecurity, automation-based job insecurity is operationalized as a one-item indicator that identifies levels concern about personal job displacement by machines or computer programs. The survey question is phrased as follows: “How concerned, if at all, are you about potentially losing your job because your employer uses machines or computer programs to replace human workers?” Respondents are asked to describe their level of agreement on a 4-point Likert-type scale (1=“very concerned”, 2=“somewhat concerned”, 3=“not too concerned”, 4=“not concerned at all”). I dichotomize participant answers and combine them into a single binary measure because answer categories on either side of the spectrum are very similar. For instance, most respondents report that they do not experience automation-based job insecurity right now, in the present. Therefore, I recode answers to this question as 1=concerned about losing my job to machines or computer programs right now, in the present, and 0=not concerned about losing my job to machines or computer programs right now, in the present. I dichotomize this answer to focus on workers currently worried about losing their jobs to machines or computer programs and to examine patterns among these individuals.

Future Automation: Predictions of Automation of One’s Job in 50 Years. I also include two models accounting for worker concerns about automation in the future. These

models measure both respondents' concern that their own job will automate in 50 years, as well as their attitudes about whether most jobs, in general, will automate in 50 years. The first of these two questions measures respondents' level of concern that their own job will automate in 50 years. I include this measure because much of the current automation literature explores whether workers are concerned their job will exist in its current form in 50 years and still require the same level of human performance it currently does. This first survey question asks: "Thinking about the job or occupation that you work in now, how likely do you think it is that it will exist in its current form in 50 years?" Respondents are asked to describe their level of agreement on a 4-point Likert-type scale (1="definitely will exist", 2="probably will exist", 3="probably will NOT exist", 4="definitely will NOT exist"). As with the first dependent variable, I dichotomize participant answers and combine them into a single binary measure. I chose this strategy because answer categories on either side of the spectrum are very similar and because most respondents report they are not concerned their jobs will automate in 50 years. Therefore, I recode these questions as 1=concerned my job will automate in 50 years, 0=not concerned my job will automate in 50 years. Similar to my approach with the first dependent variable, I dichotomize this answer to focus on workers currently worried their jobs will automate in the future and to explore patterns among these individuals.

Future Automation: Predictions of Automation of Most Jobs in 50 Years. The automation literature also explores workers' predictions of future workforce automation considering jobs in which they do not work, or, jobs in general. Therefore, I include one item on workforce automation as the dependent variable for the third set of statistical models. This item determines how respondents foresee the likelihood that machines or computer programs

will replace many human workers in the future. The survey question asks respondents: “Overall, how likely do you think it is that in the next 50 years, robots and computers will do much of the work currently done by humans?” Respondents are asked to describe their level of agreement on a 4-point Likert-type scale (1=“definitely happen, 2=“probably happen”, 3=“probably will NOT happen, 4=“definitely will NOT happen”). As with the previous dependent variables, I also dichotomize participant answers and combine them into a single binary measure. I did this because, as with the previous dependent variables, answer categories on either side of the spectrum are similar. For instance, most respondents indicate thinking most jobs currently done by humans will be performed by machines or computers in 50 years. Therefore, I recode answers to these questions as 1=think most jobs will automate in 50 years, 0=do not think most job will automate in 50 years.

Additionally, the current automation literature reveals a paradox among employed individuals’ perceptions of workforce automation. As previously stated, other research has shown that most working people report thinking much of the work currently done by humans will be performed by machines or computer programs in 50 years. However, many employed individuals also say they do not think the type of work they do will automate in 50 years. I tried to explain this paradox by examining a fourth dependent variable constructed from the last two dependent variables regarding future automation prediction. For this analysis, I subtracted the second dependent variable from the third dependent variable to create an outcome comprised of workers who report thinking jobs (in general) are more likely to automate in 50 years, but who also express thinking their current jobs will be secure in 50 years. In other words, I focus on examining respondents who say they think most jobs will automate in the future, but believe their own job will remain the same. The models did not

yield many significant findings, especially with regard to my hypotheses on race/ethnicity and gender from the extant theory. It seems as though the ascribed and achieved characteristics discussed in this analysis do little to explain the paradox. Therefore, I do not report these findings in the tables or discuss them in the results section. Future work should consider this paradox and explore additional factors that could account for it.

Independent Variables

Sociodemographic Characteristics. I include three primary sociodemographic characteristics in this study. The original questionnaire includes many items that could help explain workers' perceptions of automation-based job insecurity, but I chose to concentrate on demographic variables of race and gender because they indicate how marginalized status might influence workers' perceptions of automation-based job insecurity. Age is also incorporated as a control.

For race/ethnicity, the original questionnaire is modeled after the U.S. Census items and contains two questions to identify race/ethnicity. The first question asks about race specifically and provides the following response options: White, Black or African-America, Asian or Pacific Islander, Mixed race, Native American/American Indian, Other, Don't know, and Refused. Another binary question asks about ethnic identification and whether respondents identify as Hispanic or Latino. For the race/ethnicity variables, I combine these two questions and re-code them into a set of dichotomous variables for non-Latino White (1=White, 0=else), non-Latino Black (1=Black, 0=else), Latino (1=Latino, 0=else), and non-Latino Other (1=Other, 0=else). The "other" racial category includes respondents who are of Asian or Pacific Islander, mixed race, Native American/American Indian or some other

racial/ethnic background. The number of respondents in these categories are too small to analyze separately, therefore I combine them together in an “other” category. Combined, these groups comprise only 5.53% of the sample. I use White as the reference category for this independent variable. I code the second sociodemographic characteristic, gender, as dichotomous for female (1=female and 0=male). Finally, I include a control variable for age where respondents fall into one of nine categories: 18-28; 29-38; 39-48; 49-58; 59-68; 69-78; 79-88; 89-96; 97 or older. I treat this variable as continuous.

Human Capital Characteristics. I also include variables accounting for achieved characteristics, education and income. For education, as the most relevant split in the literature on workplace conditions is between those with a college education and those without, I dichotomize the variable into a single binary measure for college educated, where 1=four-year degree or higher and 0=less than a four-year degree. I also include a variable accounting for income. The original survey treats this variable as continuous where respondents fall into one of nine categories: less than \$10,000; 10 to under \$20,000; 20 to under \$30,000; 30 to under \$40,000; 40 to under \$50,000; 50 to under \$75,000; 75 to under \$100,000; 100 to under \$150,000; \$150,000 or more. However, I recode these income categories into thousands of dollars.

Job/Labor Market Characteristics. I analyze several job characteristics in this study. First, I include a variable identifying specifics about work sector. I recode the variable for work sector as 1=public sector, 0=else. I also include a set of variables for type of work characteristics performed on the job. These are asked as a series of yes/no questions, and thus, I dichotomize all variables for work characteristics with dummy variables. First, jobs involving manual labor are coded as 1=manual labor, 0=else. Second, jobs requiring

customer service are coded as 1=customer service, 0=else. Third, jobs requiring the use of special and technical skills are coded as 1=technical skills, 0=else. Fourth, jobs requiring creativity are coded as 1=creative, 0=else. Finally, I include jobs requiring performance of repetitive tasks and code them as 1=repetitive, 0=else.

Analytical Strategy

Because I recode the three dependent variables into dichotomous outcomes, I estimate a series of binary logistic regression models. This is the appropriate modeling strategy for binary categorical dependent variables. As such, I use binary logistic regression models to analyze the relationships between the independent variables and the dependent variables of perceived automation-based job insecurity, the incidence of being concerned one's job will automate in 50 years, and the incidence of workers being concerned most jobs will automate in 50 years. I introduce variables as sets in order to build models accounting for the factors described above.

I create three sets of six statistical models to analyze the relationships between the independent and dependent variables. I design one set for each of my three dependent variables in the order discussed above. The first model looks at the effects of race and gender on the dependent variables. The subsequent models include these variables but I introduce them as sets alongside additional independent variables to see how they alter the coefficients for race and gender. In the second model I add human capital characteristics of college and income. In the third, I analyze the relationship between race, gender, and work sector (public versus private) and the dependent variables. In the fourth and fifth models I consider how workplace characteristics relate to the outcome variables but separate manual labor and

workplace tasks into two models in order to remain consistent with the structure of the original survey questions. The fourth model includes race and gender, and accounts for manual labor job tasks by itself as prior work demonstrates that this is an important indicator of job insecurity. In the fifth model sets I examine the relationship between gender and race, and variables for workplace characteristics accounting for customer service, special/technical activities, creativity, and repetitive tasks performed at work. The sixth model sets account for the full model which analyze the effects of all the independent variables on the dependent variables. I also tested for multicollinearity to ensure that none of my chosen variables were too highly correlated in any of the models.

RESULTS

Table 1 contains the descriptive statistics for all the variables I use in my six sets of statistical models.

Table 1
Descriptive Statistics for Variables Used in Statistical Models

Variable Name	Mean	SD	Range	Description
<i>Dependent Variables</i>				
Perceived Automation-Based Job Insecurity	0.09	0.29	0-1	Describes R's level of automation-based job insecurity 1 = Concerned about losing their job to machines right now, in the present, 0 = Not concerned about losing their job to machines right now, in the present
Prediction of Future Existence of One's Job	0.81	0.39	0-1	Describes R's level of concern that their own job will automate in 50 years 1 = Concerned their job will automate in 50 years, 0 = Not concerned their job will automate in 50 years
Prediction of Future Automation of Most Jobs	0.60	0.49	0-1	Describes R's level of concern that most jobs will automate in 50 years 1 = Concerned most jobs will automate in 50 years, 0 = Not concerned most jobs will automate in 50 years
<i>Independent Variables</i>				
Race				
White (reference)	0.68	0.47	0-1	1 = White, 0 = else
Black	0.11	0.32	0-1	1 = Black, 0 = else
Latino	0.15	0.35	0-1	1 = Latino, 0 = else
Other	0.06	0.23	0-1	1 = Other, 0 = else
Female	0.43	0.50	0-1	1 = female, 0 = male

Table 1
(Continued)

Age	42.4	14.15	18-83	Respondent age in years
Human Capital				
College	0.50	0.50	0-1	1 = Four year college degree or more, 0 = Less than a four year college degree
Income	71.5	45.14	1-9	Income in thousands of dollars
Public Sector	0.28	0.45	0-1	1 = Public sector, 0 = Else
Workplace Characteristics				
Manual Labor	0.40	0.49	0-1	1 = Job requires performing manual labor, 0 = Job does not require performing manual labor
Customer Service	0.76	0.43	0-1	1 = Job requires performing customer service, 0 = Job does not require performing customer service
Special/Technical	0.71	0.45	0-1	1 = Job requires performing special or technical skills, 0 = Job does not requires performing special or technical skills
Creative	0.77	0.42	0-1	1 = Job requires performing creative work 0 = Job does not require performing creative work
Repetitive	0.63	0.48	0-1	1 = Job requires performing repetitive work, 2 = Job does not require performing repetitive work

Note. N = 884 Data from the 2015 Pew Survey: Internet, Science, & Technology Project

Table 2 contains results from the binary logistic models examining the relationship between the independent variables and the incidence of workers reporting they experience

automation-based job insecurity. Table 3 shows results from the binary logistic models analyzing the relationships between the independent variables and the incidence of workers reporting concern that their job will not exist in its current form in the future—that the human component in their line of work will automate in 50 years. Finally, Table 4 identifies results from the binary logistic models analyzing the relationship between the independent variables and the incidence of workers saying they think most jobs currently done by humans will be performed by machines or computer programs in 50 years.

Automation-based Job Insecurity

First, reviewing results from Model 1 in Table 2 on the net effects of race/ethnicity and gender, the regression model demonstrates that race is related to a greater incidence of workers reporting they experience automation-based job insecurity. However, these results show that gender is not significantly related to the incidence of experiencing automation-based job insecurity. Model 1 reveals that when compared to Whites, both Latino and Black workers are significantly more likely to experience automation-based job insecurity. Specifically, being Latino, as compared to White, increases the odds of experiencing automation-based job insecurity by a factor of 12.014 (1,101.4%), a substantively large effect. Being Black also has a sizable effect in that it increases the odds of experiencing automation-based job insecurity by a factor of 2.30 (130%) when compared to Whites

Table 2
Coefficients, (Standard Errors), and Odds Ratios from Binary Logit Models of Experiencing Automation-Based Job Insecurity

Variable Name	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Socio-demographic Characteristics		Human Capital		Public Sector		Manual Labor		Workplace Characteristics		Full Model	
	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR
Race												
White (reference)												
Black	0.833* (.405)	2.3	0.579 (.414)	1.202	0.852* (.406)	2.345	0.750 (.408)	2.117	0.793 (.409)	2.21	0.538 (.418)	1.713
Latino	2.486*** (.287)	12.014	0.2117*** (.301)	2.118	2.463*** (.289)	11.740	2.274*** (.293)	9.716	2.426*** (.296)	11.312	2.112*** (.308)	8.272
Other race	0.778 (.565)	2.177	0.902 (.574)	1.230	0.779 (.565)	2.179	0.806 (.568)	2.240	0.925 (.572)	2.523	0.958 (.581)	2.608
Age	.011 (.009)	1.012	0.020* (.009)	1.321	0.012 (.009)	1.012	0.013 (.009)	1.013	0.014 (.010)	1.014	0.19 (.010)	1.019
Female	-0.111 (.255)	0.895	-0.174 (.260)	0.917	-0.074 (.259)		0.012 (.260)	1.011	-0.103 (.264)	0.902	-0.103 (.280)	0.902
Human Capital												
College				0.856 (.299)								0.982 (.336)
Income				0.978 (.004)								0.988 (.304)
Public sector					-0.231 (.314)	0.794						1.011 (.337)
Workplace Characteristics												
Manual Labor												
Customer Service							.854** (.267)	2.348		0.706	.383 (.311)	1.467
Special/Technical									-0.349 (.286)		-0.220 (.296)	0.802
Creative									-0.259 (.274)	0.772	-0.050 (.284)	0.951
Repetitive									0.136 (.303)	1.146	0.142 (.305)	1.152
									0.935** (.304)	2.548	0.728* (.319)	2.072
Pseudo R ²	0.147		0.182		0.148		0.166		0.17		0.198	
AIC	478.045		462.422		479.491		469.555		473.374		466.104	
BIC	506.752		500.698		512.982		503.047		521.219		533.087	

N=884 Data from the 2015 Pew Survey: Internet, Science, & Technology.
 β = Logit coefficient. SE = Standard error. OR = Odds ratio (factor change).
The pseudo R² represents the calculation for McFadden's R².
*p < .05, ** p < .01, *** p < .001 (two tailed).

Model 2 incorporates variables of human capital (education and income). Of these, only income is significantly related to automation-based job insecurity. Regarding income, higher incomes are associated with a decrease in the odds of reporting automation-based job insecurity by a factor of 0.978 (or 2.2%), net of race/ethnicity and gender. Moreover, the inclusion of these variables lessens the rather large coefficients for race/ethnicity in the first model. The Black coefficient drops to non-significance with the presence of these variables, indicating that income accounts for the significant association between being Black and experiencing automation-based insecurity. The coefficient for being Latino is also now somewhat smaller. With the inclusion of these variables being Latino, as compared to being White, increases the odds of experiencing automation-based job insecurity by a factor of 2.118 (111.8%), which is still significant and a rather sizable effect.

The next three models include a variety of workplace variables as described above. Model 3 includes a variable for work sector (public versus private sector). This variable itself is not significant and does little to alter the relationship between race/ethnicity and the outcome. Model 4 includes a variable for whether respondents perform manual labor. This variable is significantly related to the outcome, meaning workers who perform manual labor are likely to report higher perceived automation-based job insecurity. That is, being a manual laborer, as compared to those who are not manual laborers, is related to an increase in perceived automation-based job insecurity by a factor of 2.348 (or 134.8%). Moreover, the inclusion of the manual labor variable in the model slightly reduces the size of the effects for Black and Latino, as compared to the first model. For instance, the coefficient for Black drops to non-significance again as it did in the human capital model (Model 3). Finally, examining the effects of other workplace characteristics (Model 5), only one of this set of

variables is significantly related to the outcome. The results demonstrate that for workers performing repetitive tasks on the job, compared to those who perform non-repetitive tasks, the odds of experiencing automation-based job insecurity increases by a factor of 2.548 (154.8%), a substantially large effect size. These variables again slightly lessens the effects of race/ethnicity, as compared to Model 1, though this is somewhat less with a percentage reduction in the coefficient size of only 4.8% for Blacks and 2.4% for Latinos. Though this is a small percentage reduction, the coefficient for Black again drops to non-significance.

In the final, full model (Model 6), a similar pattern holds. In this case, coefficients for Latino, income, and repetitive tasks are all significant as in previous models. However, here, the coefficient for Black drops to non-significance net of all of these other human capital and workplace characteristics. This is a similar result to several of the previous models. The coefficient for Latino is smaller when compared Model 1 with the gross effects of race/ethnicity, but remains substantively large in the full model. As in the reduced models, income is significant and negatively related to insecurity, and the dummy variable for repetitive tasks on the job is significant and positively related to the outcome.

Future Automation: Predictions of Automation of One's Job in 50 Years

Table 3 presents results of the binary logistic regression analysis for workers concerned that in 50 years their job will not exist in its current form and will no longer require the level of human activity they currently perform.

The first model analyzes how race and gender relate to workers' concerns that their job will automate in 50 years. The results of Model 1 show that neither race nor gender impact the likelihood of workers to report concern that their job will likely automate in 50 years. However, results of Model 1 do indicate age as a significant and positive predictor for

the likeliness of reporting concern that one's job will not exist in its current form in 50 years. This is notable, as age was not significant in any of the models for the first dependent variable which inquire about workers' perceived automation-based job insecurity right now, in the present. Specifically, for each additional category of age, the odds of thinking one's job will be susceptible to automation in the future increases by a factor of 1.023 (2.3%), which is only a modest effect. In other words, with age, workers are more likely to report thinking their current job will be susceptible to automation in the future.

Model 2 incorporates the independent variables for human capital (education and income). In this model, aside from age, none of the variables are related to the incidence of workers reporting they are concerned their job will automate in 50 years.

The next 3 models include a variety of workplace variables. As with the previous analysis, Model 3 includes the public sector variable. The results indicate that working in the public sector significantly impacts the likelihood of thinking one's job will automate in 50 years. Working in the public sector is negatively associated with the outcome variable and decreases the odds that workers will report concern that their job will automate in 50 years by a factor of 0.659 (34.1%). Model 4 introduces the variable of performing primarily manual labor on the job. The results indicate that being a manual laborer, as compared to being a non-manual laborer, increases the odds of thinking one's job will automate in 50 years by a factor of 1.918 (91.8%). This effect size indicates this variable as a moderate predictor for the likelihood of manual workers to report concern that their job's human component will automate in the future. Also, in this model, the Black coefficient becomes significant and positive, indicating a suppression effect with manual labor.

Table 3
Coefficients, (Standard Errors), and Odds Ratios from Binary Logit Models of Experiencing Concern that One's Job Will
Automated in 50 Years

Variable Name	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Socio-demographic Characteristics			Human Capital			Public Sector			Manual Labor			Workplace Characteristics			Full Model		
	β (SE)	OR		β (SE)	OR		β (SE)	OR		β (SE)	OR		β (SE)	OR		β (SE)	OR	
Race																		
White (reference)																		
Black	0.459 (.257)	1.582		0.503 (.261)	1.653		0.497 (.259)	1.644		0.527* (.260)	1.964		0.496 (.259)	1.642		0.637* (.268)	1.892	
Latino	-.164 (.261)	1.178		0.271 (.270)	1.312		0.123 (.262)	1.131		0.356 (.270)	1.427		0.132 (.265)	1.142		0.337 (.278)	1.401	
Other race	-.284 (.454)	.753		-.316 (.456)	0.729		-.284 (.455)	0.753		-.318 (.457)	0.728		-.280 (.457)	0.756		-.292 (.461)	0.747	
Age	0.223*** (.006)	1.023		0.021** (.007)	1.021		0.024*** (.006)	1.024		0.021** (.007)	1.021		0.002* (.007)	1.023		0.022** (.007)	1.022	
Female	.076 (.175)	1.079		0.085 (.177)	1.089		0.146 (.179)	1.158		0.014 (.177)	1.014		0.119 (.179)	1.126		0.125 (.188)	1.134	
Human Capital																		
College				0.252 (.190)	1.287											0.181 (.215)	1.198	
Income				0.001 (.002)	1.001											0.001 (.002)	1.001	
Public sector							-.418* (.209)	0.659								-.535* (.220)	0.586	
Workplace Characteristics																		
Manual Labor										.651** (.198)	1.918					.742** (.232)	2.100	
Customer Service													-.344 (.202)	0.709		-.369 (.205)	0.692	
Special/Technical													0.209 (.208)	1.233		0.062 (.214)	1.064	
Creative													-.131 (.218)	0.877		-.084 (.223)	0.919	
Repetitive													0.176 (.187)	1.193		0.365 (.199)	1.441	
Pseudo R ²	0.02			0.023			0.025			0.033			0.026			0.05		
AIC	849.046			849.921			846.878			839.679			852.049			839.427		
BIC	877.705			888.133			880.313			873.114			899.814			906.298		

Note: N=884 Data from the 2015 Pew Survey: Internet, Science, & Technology.
 β = Logit coefficient. SE = Standard error. OR = Odds ratio (factor change).
The pseudo R² represents the calculation for McFadden's R².
*p < .05, ** p < .01, *** p < .001 (two tailed).

In particular, being Black, as compared to White, increases the odds of thinking one's job will automate in the future by a factor of 1.964 (96.4%), net of the dummy variable for manual labor. Model 5 includes variables for workplace characteristics other than performing manual labor tasks. However, none of these variables are significant. Model 6, the full model incorporates all independent variables and reveals that the coefficients for Black, age, working in the public sector, and manual labor are all significantly associated with the incidence of being concerned that one's job will automate in 50 years. This is similar to results in the previous models. Working in the public sector significantly decreases the odds of worrying that one's job will automate in 50 years by a factor of .586 (41.4%), a moderately significant effect size. Once again, working as a manual laborer is associated with a significant increase in thinking one's job will automate in 50 years. Working as a manual laborer increases the odds of experiencing this concern by a factor of 2.100 (110%), indicating that working as a manual laborer is a moderately significant indicator of experiencing concern that one's job will automate in 50 years.

Future Automation: Predictions of Automation of Most Jobs in 50 Years

Table 4 contains results from the binary logistic models analyzing the relationship between the independent variables and the incidence of reporting concern that most jobs currently done by humans will be performed by machines or computers in 50 years.

First, looking at the results from Model 1 on the net effects of race/ethnicity and gender, the model shows that race, both Black and Latino, is related to a greater incidence of workers reporting they think most jobs will automate in the future. Compared to Whites, Black and Latino workers are more likely to think most jobs will automate in 50 years.

Table 4
Coefficients, (Standard Errors), and Odds Ratios from Binary Logit Models of Experiencing Concern that Most Future Jobs will be Automated

Variable Name	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Socio-demographic Characteristics		Human Capital		Public Sector		Manual Labor		Workplace Characteristics		Full Model	
	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR
Race												
White (reference)												
Black	0.575* (.253)	1.777	0.609* (.238)	1.839	0.617* (.237)	1.854	0.569* (.235)	1.766	0.603* (.237)	1.828	0.680** (.240)	1.973
Latino	0.691*** (.217)	1.997	0.688** (.224)	1.989	0.644** (.218)	1.905	0.671** (.220)	1.957	0.662** (.220)	1.938	0.666** (.228)	1.947
Other race	0.356 (.316)	1.427	0.371 (.317)	1.450	0.355 (.317)	1.426	0.360 (.316)	1.434	0.372 (.318)	1.451	0.366 (.320)	1.442
Age	0.000 (.005)	1.000	-0.000 (.005)	1.000	0.001 (.005)	1.001	0.000 (.005)	1.000	0.000 (.005)	1.000	-0.000 (.005)	1.000
Female	-0.159 (.141)	0.853	-0.132 (.143)	0.876	-0.089 (.145)	0.915	-0.151 (.142)	0.860	-0.130 (.145)	0.878	-0.047 (.150)	0.954
Human Capital												
College			-0.308* (.152)	0.735							-0.211 (.174)	0.810
Income			0.003 (.002)	1.003							0.003 (.002)	1.003
Public sector					-0.421** (.158)	0.657					-0.337* (.166)	0.714
Workplace Characteristics												
Manual Labor							-0.073 (.149)	.930			.031 (.178)	1.032
Customer Service									-0.303 (.172)	0.739	-0.291 (.173)	0.748
Special/Technical									0.162 (.164)	1.176	.172 (.167)	1.188
Creative									-0.164 (.178)	0.848	-0.132 (.181)	0.876
Repetitive									0.194 (.149)	1.215	0.159 (.157)	1.172
Pseudo R ²	0.01		0.02		0.02		0.02		0.021		0.03	
AIC	1165.288		1165.382		1160.231		1167.047		1166.558		1165.850	
BIC	1193.913		1201.548		1193.627		1200.443		1214.266		1232.641	

Note: N=884, Data from the 2015 Pew Survey: Internet, Science, & Technology.

β = Logit coefficient. SE = Standard error. OR = Odds ratio (factor change).

The pseudo R² represents the calculation for McFadden's R².

*p < .05, ** p < .01, *** p < .001 (two tailed).

Being Black has a sizeable effect; it increases the odds of the outcome variable by a factor of 1.777 (77.7%). Being Latino increases the odds of the outcome variable by a factor of 1.997 (99.7%), also a substantively large effect. However, once again, these results show that gender is not significantly related to the incidence of reporting concern that most jobs will automate in 50 years.

Model 2 incorporates variables of human capital (education and income). Of these, education is significantly associated with the outcome, but not income as it was with the first dependent variable. The results indicate having a college degree is negatively associated with being concerned most jobs will automate in 50 years. That is, the results for having a college degree indicate a decrease in the odds of thinking most jobs will automate in 50 years by a factor of .735 (26.5%). The variables for race/ethnicity are still significant in this model, and the presence of human capital variables only slightly changes the size of the race/ethnicity coefficients as compared to Model 1.

Model 3 includes the variable for working in the public sector. In this model, race/ethnicity and the public sector variables are significantly related to reporting concern that most future jobs will automate in 50 years. The public sector variable is significantly and negatively associated with the outcome variable, indicating that working in the public sector decreases the odds of thinking most future jobs will automate in 50 years by a factor of .657 (34.3%). Further, the presence of the public sector variable does little to reduce the relationship between the race/ethnicity variables and the outcome variable compared to Model 1. Model 4 includes the variable for manual labor, but this variable itself is not significant and does not notably lessen the relationship between race/ethnicity and the outcome variable. Model 5 includes the variables for tasks performed on the job. None of

these variables are significant and they do not significantly alter the racial/ethnic effects compared to Model 1. However, the racial/ethnic variables are still significantly associated with reporting concern that most jobs will automate in 50 years. In the final, full model (Model 6), as with the previous models, the racial/ethnicity and public sector variables are all significantly associated with the outcome variable. Here, though, the effect of college education is no longer significant. As with the previous models, their inclusion does not substantially reduce the effect sizes for race/ethnicity. In the full model, which includes all workplace and human capital characteristics, these effects remain substantively large.

DISCUSSION

The main goal of this study was to investigate the relationship between race/ethnicity, gender, and workers reporting the incidence of experiencing automation-based job insecurity—the fear one will be replaced in their job by machines or computer programs. Since much of the work automation literature explores how workers think technology will impact jobs in the future, I also analyze the relationship between race, gender, and predictions of future workforce automation among working Americans. I place specific focus on two marginalized ascribed characteristics, race/ethnicity and gender, which the previous automation literature largely ignores. Furthermore, I examine the relationship between workers' race and gender and the incidence of experiencing automation-based job insecurity in three ways: (a) reports of concern that one's own job will likely automate right now, in the present time; (b) reports of the incidence of experiencing concern that one's job will automate in 50 years; and (c) reports of the incidence of experiencing concern that most jobs currently done by humans will be performed by machines or computer programs in 50 years.

Experiences of Automation-based Job Insecurity

My findings indicate that being a racial/ethnic minority leads to a significant increase in the likelihood of reporting that one experiences automation-based job insecurity. This result supports Hypothesis 1. Both Black and Latino workers are more likely to report thinking their jobs are vulnerable to automation right now, in the present, with particularly strong effects for Latinos. This finding coincides with research demonstrating that racial/ethnic minority workers have significantly higher levels of perceived job insecurity (generally, not specific to automation). However, here, I also demonstrate that this same sense of insecurity may carry over to perceived job insecurity based on fears of automation. This finding also supports the aspect of the marginalized worker perspective contending that Black and Latino workers experience more job insecurity, compared to Whites, even when controlling for human capital and occupational status (Borowczyk-Martins, Bradley, and Tarasonis 2018; Devaraj, Quigley, and Patel 2018; Wilson and Mossakowski 2009). I speculate that research evidence indicating that perceptions of racial discrimination in the workplace is a continuing problem in the United States provides one possible explanation for the racial disparity in perceptions of automation-based job insecurity which my results produced, though this is not directly tested here.

My results reveal that gender is not significantly related to reporting concern that one will be displaced by technology in their own job. Therefore, for this dependent variable, I do not find support for Hypothesis 2. The research evidence on the relationship between gender and perceived job insecurity is less clear, and previous work demonstrates mixed findings as noted above. My analysis supports research asserting that a worker's gender does not influence their likeliness of experiencing perceived job insecurity (Cheng and Chan 2008).

By extension, my analysis fails to support research maintaining that gender is related to job insecurity (De Witte 1999; Gaunt and Benjamin 2007; Mauno and Kinnunen 1999; 2002; Rosenblatt et al. 1999; Wilson and Mossakowski 2009).

However, some of the previously mentioned research which finds gender as significantly related to experiencing job insecurity suggests gender perception disparities of job insecurity may be related to cultural contexts and its possible influence on gender experiences at work in specific societies (Mauno and Kinnunen 1999). For instance, some of the previously noted studies of non-American workers (e.g. Finnish and Israeli workers) find gender as significantly related to disparities in perceived job insecurity. It is possible that the cultural context (e.g. society and global location) in which workers' perceived job insecurity is measured may impact whether gender is an antecedent of experiencing perceived job insecurity. Future research should consider this factor when investigating gender and the incidence of experiencing job insecurity.

My analysis of workplace characteristics indicates that being a manual laborer and performing repetitive tasks on the job are both significantly related to reporting concern that one might be replaced by machines or computer programs at work. Therefore, I find support for Hypothesis 3. Additionally, this finding supports research maintaining that workplace characteristics lessens the relationship between workers' racial/ethnic status and their attitudes about workforce automation (Parker et al. 2019; Smith 2016; Smith and Anderson 2017). Additionally, my results indicate that income also has a significant effect on the likelihood of experiencing automation-based job insecurity. I find that individuals making higher salaries are less likely to report worrying about losing their job to machines or computer programs right now, in the present. Furthermore, the effects of race are somewhat

reduced by the presence of income and workplace variables, a result which coincides with evidence in the literature indicating that income, and the type of tasks performed at work, are associated with experiencing automation-based job insecurity (Parker et al. 2019; Smith 2016; Smith and Anderson 2017). Therefore, workplace and human capital characteristics appear to at least partially account for the effect of race/ethnicity and perceived automation-based job insecurity. This is consonant with the marginalized worker perspective, though, which contends that minority workers are more susceptible to experiencing undesirable workplace characteristics (Wilson and Mossakowski 2009), and here, this appears to extend to characteristics that make one feel more insecure in the workplace from the threat of automation.

Future Automation: Predictions of One's Job in 50 Years

Findings from my second regression analysis explore the incidence of workers reporting concern that their job will automate in 50 years. These results reveal that race is somewhat related to the concern that one may be replaced by machines or computer programs in the future. Black workers are the only racial group, as compared to Whites, to experience this concern about the future existence of the job they currently hold. However, this only holds true in the models accounting for manual labor workers, providing only partial support for Hypothesis 1 for this dependent variable. The impact of race for this outcome is only significant in the presence of certain workplace characteristics. This finding may provide further evidence that workplace variables influence racial/ethnic minority and female workers' perceptions of job insecurity, since much of these populations are disproportionately concentrated in low level service jobs. However, as with results for the

findings of my first regression analysis, gender is not significantly associated with reports of experiencing concern that one's job will automate in 50 years. This again indicates lack of support for Hypothesis 2 for this measure of automation-based job insecurity.

Future Automation: Predictions of Automation of Most Jobs in 50 Years

Findings from the final conceptualization of job insecurity examine the relationship between race, gender, and the incidence of reporting concern that most jobs currently done by humans will be performed by machines or computer programs in 50 years. My findings demonstrate that being Black or Latino increases the likelihood of reporting concern that in 50 years most jobs will automate. This provides further support for Hypothesis 1 for this dependent variable. However, once again, my results reveal that gender is not significantly related to the outcome of the reporting concern that most jobs will automate in 50 years and my findings fail to support Hypothesis 2. Additionally, in these models only one workplace variable seems to be associated with the incidence of reporting concern that most jobs currently done by humans will automate in 50 years—the variable for the public versus private sector split. Furthermore, unlike with the first dependent variable, the introduction of these variables does little to lessen the effect of race/ethnicity. Therefore, my results only provide partial support for Hypothesis 3 for this measure of automation-based job insecurity.

Limitations of the Data

One limitation of this study is that it provides only a preliminary endeavor to examine the racial/ethnic and gender disparities in perceptions of automation-based job insecurity. Workers' perceived fear of losing their jobs to machines or computer programs is a new line of inquiry in the job insecurity literature. Future studies should employ more academic based research in order to achieve more comprehensive analyses of the possible antecedents of automation-based job insecurity, and to match the amount of non-academic studies on this topic. Developing more academic studies on this subject will permit for a more well-rounded understanding of how demographic characteristics, in addition to workplace characteristics, relate to the fear that one will lose their job to machines or computer programs. The current body of literature is primarily restricted to research conducted by think tanks and private companies and this research does not often discuss the relationship between the incidence of experiencing automation-based job insecurity and ascribed characteristics of race and gender. Rather, the bulk of this research focuses on the relationship between workplace characteristics and workers' experiences of automation-based job insecurity. A vast body of research indicates that demographic characteristics of race and gender are significantly related to perceived job insecurity, therefore I contend that creating more academic studies on the incidence of perceived automation-based job insecurity will fill this gap in the literature and provide a closer look at the relationship between race, gender, and the tendency for workers to experience automation-based job insecurity.

Another limitation of this study, and arguably a product of the topic's recent consideration in public inquiry, is that it is only cross-sectional in design and provides only a snapshot of worker perceptions during a time of rapidly growing digital development.

Overall, studies of anxiety of workforce automation in the last few years demonstrate that most workers are not concerned about losing their job to machines or computer programs (Americanstaffing.net 2017; Gallup 2018; NPR 2018; Parker, Morin, and Horowitz 2019; Smith 2016, 2017; Smith and Anderson 2017; Young 2017). This pattern in the literature is consistent when measuring workers' perceptions of automation regarding the continued existence of one's job in both the present and the future. One possible reason for this lack of concern may be a period effect. Contemporary automation perception research relies on studies conducted in the modern digital era (Americanstaffing.net 2017; Gallup 2018; NPR 2018; Parker, Morin, and Horowitz 2019; Smith 2016, 2017; Smith and Anderson 2017; Young 2017) where computer and information technologies pervade home and work life. However, the development and application of new technology in the workforce (e.g. new digital platforms for alternative work arrangements such as ridesharing or distance education) may impact workers' perceptions of the possibility of technological unemployment. Further, increased presence of workplace technology may influence the impact of race and gender on the incidence of experiencing automation-based job insecurity. The last few years have yielded more public and academic discussion about the ability of new technology to change workplace dynamics across a variety of industries (McAfee and Brynjolfsson 2010; Vietez et al. 2001; Wajcman 2008, 2017; Wyatt and Hecker 2006). For example, the development of autonomous cars, janitor robots, smart shelving systems, and cashier-less grocery stores stimulated more public debate about the possibility of technological unemployment among low level service workers (Popescu et al. 2018; Rotman 2014; Selyukh 2018). At the same time, technological developments in areas such as accounting, medicine (e.g. medical telecommunications and imaging), and law sparked more public discussion about the

potentially displacing effects of new technology on high level service workers (Acemoglu and Autor 2012; Autor 2015; McAfee and Brynjolfsson 2016; Wheeler 2005). Advances in workplace technologies, and increased public discussion about their potential impact on the labor market, may lead to increased heightened awareness among workers regarding the possibility of technological unemployment. In turn, this may generate increased feelings of automation-based job insecurity among workers across a range of industries and occupations. Future research should utilize longitudinal research designs to evaluate the findings from this study, and to investigate if automation-based job insecurity is a growing job stressor in our increasingly digitized society.

CONCLUSION

This study contributes to both the job insecurity and workforce automation literature by providing insight into the experiences of automation-based job insecurity among American workers. Specifically, this study contributes to the extant literatures on automation and perceived job insecurity by analyzing the relationship between race/ethnicity and the incidence of experiencing automation-based job insecurity. Results from this study indicate that, even though gender does not significantly influence the tendency to report concern about losing one's job to machines or computers, being a racial/ethnic minority is significantly associated with workers reporting they experience automation-based job insecurity (for multiple measurements of automation-based job insecurity) even after controlling for human capital and workplace characteristics. To my knowledge, the relationship between race, gender, and the incidence of being concerned about losing one's job to machines or computers has not been examined by any previous research. Therefore,

this study makes a contribution by linking the marginalized status of race/ethnicity to the outcome of reporting high levels of job insecurity when considering the threat of automation. It also provides a springboard for future research to consider race as an important factor when considering perceived automation-based job insecurity in an increasingly digitized world.

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