

Applying Behavioral Insights to Inform Job Search

Evaluating Effects of a Behaviorally Informed Intervention on Job Search Online in West Michigan

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Executive Summary

In January 2021, 6.9 million job openings were available in the United States and 10.9 million people were classified as unemployed, suggesting that job seekers were not being efficiently matched to job opportunities (U.S. Bureau of Labor Statistics 2021a, 2021b). Some of these factors may have been due to the COVID-19 pandemic, or if job seekers perceived the available opportunities to be unsafe or incompatible with the demands on their time or location. However, similar labor market inefficiencies were widespread even before COVID-19. Research on the most recent previous recession, in 2009, has found that one factor behind unemployment is mismatch between the sectors in which unemployed workers search for new positions and those in which vacancies are posted by employers (Sahin et al. 2014). This suggests that behaviorally informed strategies that allow job seekers to easily access and quickly review available job opportunities could improve the job-finding rate.

The U.S. Department of Labor (DOL), Employment and Training Administration (ETA), Office of Workforce Investment (OWI) supports state and local workforce agencies in providing information to help job seekers successfully search for work. As part of this support, OWI asked the DOL Chief Evaluation Office (CEO) and the DOL Behavioral Interventions (DOL BI) team to explore whether applications of behavioral science could improve the usefulness of the information that job seekers use when searching for positions, investing in training, and considering career options. Because of the central role that workforce agencies play in matching job seekers to open positions, CEO and the DOL BI team partnered with West Michigan Works! (WMW), a workforce agency in Michigan, to explore whether behaviorally informed job postings can improve job search success.

Problem and Study Motivation

Prior research has demonstrated the potential for behaviorally informed strategies to improve the rate at which job seekers find jobs (Spera et al. 1994, Van Hooft and Noordzij, 2009, Altmann et al. 2018). However, much is still unknown about how to most effectively design behavioral interventions to improve job search. To build our understanding of how to effectively use behavioral insights to improve job search, we designed and tested an intervention aimed at improving job search in a specific context—the WMW Weekly Hot Jobs! web page. To do this, the research team performed a behavioral diagnosis on the web page, identifying key places that cognitive biases may impact search behavior. We then worked to develop an intervention designed to target these biases.

The process of searching for a job online requires job seekers to sift through large quantities of listings across many sites to identify opportunities that may meet their needs. This can lead to *information overload*, which describes a situation where there is so much relevant information that it is not plausible for someone to review (Bawden and Robinson 2020). As a result, people take shortcuts to quickly determine which and how many job listings to carefully evaluate. While some of these shortcuts may be based on rational cost-benefit analyses, often they are subject to behavioral distortions. The research team identified three behavioral barriers that are likely to arise from information overload during job search, and that we believed were likely to be impacting job seekers on the WMW Weekly Hot Jobs! site.

- **Status quo bias.** Status quo bias describes the tendency of people to rely on prior experience and stay in their comfort zone of familiar opportunities, rather than exploring new ones (Samuelson and Zeckhauser 1988).

- **Identity mismatch.** Identity mismatch occurs when someone perceives that their identity is not consistent with the social perceptions of a group (Rodríguez-García et al. 2021). For this study, we consider identity mismatch to be at play when a person perceives that their identity does not align with the industry culture or qualities needed to succeed in an occupation.
- **Hassle factors.** Hassle factors are aspects of a process that seem like minor inconveniences to those who designed it, but which nonetheless dissuade users from engaging the way designers intend (Bertrand et al. 2004).

Program partner and setting

WMW is the workforce agency covering seven counties in West Michigan: Allegan, Barry, Ionia, Kent, Montcalm, Muskegon, and Ottawa. Except for the Detroit metropolitan area, the WMW area is the most densely populated region in Michigan (State of Michigan 2020). WMW aims to promote economic growth in West Michigan by connecting job seekers with employers and developing the local workforce to meet employers' needs. It does this by providing a range of services and supports to employers, employees, and job seekers. The local labor market was strong in West Michigan at the time of the experiment, with unemployment rates in the region at approximately 3.9 percent during the experimental period between August 2021 and March 2022 (U.S. DOL Bureau of Labor Statistics 2022). The suspension of work search requirements for Michigan unemployment insurance (UI) recipients during the pandemic ended in March 2021, and additional UI benefits funded through the American Rescue Plan Act ended in September 2021, leading to added urgency among unemployed job seekers.¹ Despite this, the WMW staff reported that employers were struggling to fill positions. WMW also observed that the COVID-19 pandemic had changed job seekers' preferences, with job seekers increasingly prioritizing flexibility, shorter hours, and the option for remote work.

On the WMW website, WMW Weekly Hot Jobs! is a web page that provides quick links to relatively higher-paying job opportunities within in-demand industries.² As described in staff interviews on job posting policy, to be included on this list a job opportunity must pay at least \$13 per hour. It also must exist within an industry determined to be (1) in demand in West Michigan as a result of high projected growth or (2) in short-term demand generated by the COVID-19 pandemic. The Weekly Hot Jobs! job listings are presented as a set of industry-specific tables. For each job, the table shows the county, city, employer, job title, whether the employer is attending an upcoming hiring event, and a link to a more detailed description and application information. Exhibit E.1 shows a snapshot of how listings in the construction and energy industries are presented on the Weekly Hot Jobs! page.

¹ Statement based on interviews with WMW staff.

² The Weekly Hot Jobs! page is located at <https://jobs.westmiworks.org/weekly-hot-jobs/>.

Exhibit E.1. Snapshot of the Original WMW Weekly Hot Jobs! web page

Weekly Hot Jobs!

Browse hundreds full-time, part-time, permanent and temporary jobs in the tables below. You can view by industry and sort by location. Want the Weekly Hot Jobs! delivered to your inbox every week? [Sign up below.](#)

[Download a printable list.](#)

[CONSTRUCTION/ENERGY](#)
 [HEALTH SCIENCES](#)
 [INFORMATION TECHNOLOGY](#)
 [MANUFACTURING](#)
 [PROFESSIONAL/ ADMINISTRATIVE SERVICES](#)
 [RETAIL & RESTAURANT](#)

[STAFFING AGENCIES](#)
 [TEMPORARY/SEASONAL](#)
 [HIRING EVENTS](#)

COUNTY*	CITY	EMPLOYER	JOB TITLE	CLICK TO APPLY	UPCOMING HIRING EVENT?
Allegan	Allegan	Community Action of Allegan County	Housing Program Crew	Apply - 11336565	No
Allegan	Holland	Haworth, Inc.	Electrician 2nd Shift	Apply - 11718764	No
Allegan	Wayland	Holland	Fueler	Apply - 11661444	No
Allegan	Wayland	Holland	Local Driver (Class A)	Apply - 11657509	No
Allegan	Hamilton	Milling & Grading Services	Skid-Steer Operator	Apply - 9719926	No

Source: The Weekly Hot Jobs! page (<https://jobs.westmiworks.org/weekly-hot-jobs/>). Accessed 21 March 2021.

Intervention design

We designed an intervention to address the behavioral barriers identified as likely to impact users of the WMW Weekly Hot Jobs! site. The intervention included two key additions to the WMW Weekly Hot Jobs! page that were designed to provide simple, action-oriented information to lead job seekers to consider a larger range of job openings in occupations and industries for which they might be qualified:

1. We presented a simple set of information about relevant experience alongside existing, regularly updated job postings that WMW hosts on its Weekly Hot Jobs! page (<https://jobs.westmiworks.org/weekly-hot-jobs/>). This list of potentially relevant experience was developed using the O*NET career changers matrix.³ We included the top three most relevant job titles in a list that was visible in the main table and an additional three relevant job titles that users can see by hovering over a prompt to “show more.”
2. We also included a prompt to remind job seekers to review job listings in industries other than those in the first industry table displayed when the web page first loads.

In addition to speaking with WMW staff while designing the behavioral intervention, we conducted a series of user tests with nine WMW customers. The customers reviewed a prototype version of the enhanced Weekly Hot Jobs! web page and offered feedback on their experience, including the extent to which new and existing features of the page helped or hindered their job search. We incorporated updates to the final enhanced web page based on these interviews. Section A of the Appendix provides additional details on the process that we used to develop the intervention in response to the hypothesized behavioral bottlenecks.

³ The O*NET career changers matrix is a database that maps each O*NET occupation code to up to 10 related occupation codes. Related occupation codes are considered to be jobs that require similar skills and experience such that workers from one occupation may transfer to the other occupation without requiring substantial additional preparation. This data set is available on the O*NET webpage (https://www.onetcenter.org/dictionary/20.3/excel/career_changers_matrix.html).

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Exhibit E.2 presents a snapshot of the enhanced Weekly Hot Jobs web page, with labels highlighting the features that were manipulated for this experiment:

1. A new column with three examples of relevant experience listed under the heading, “This opportunity may be a good fit if you have ever held any one of these jobs”
2. A list with an additional three examples of relevant experience which can be accessed by hovering
3. A prompt to look across industries
4. Emphasized industry buttons

Exhibit E.2. Snapshot of WMW Weekly Hot Jobs! enhanced web page

Weekly Hot Jobs!

West Michigan Works has partnered with local employers to identify some of the highest-growing and most in-demand jobs in West Michigan. Browse hundreds full-time, part-time, permanent and temporary jobs in the tables below. You can view by industry and sort by location. Want the Weekly Hot Jobs! delivered to your inbox every week? [Sign up below.](#)

[Download a printable list.](#)

REMEMBER:
There may be jobs in other industries that fit your skills.

Click on the industry tabs below and view “examples of good fit prior jobs” to explore all your employment options.

Select an Industry

CONSTRUCTION/ENERGY
HEALTH SCIENCES
INFORMATION TECHNOLOGY
MANUFACTURING
PROFESSIONAL/
ADMINISTRATIVE SERVICES
RETAIL & RESTAURANT

STAFFING AGENCIES
TEMPORARY/SEASONAL
HIRING EVENTS

COUNTY	CITY	EMPLOYER	JOB TITLE	CLICK FOR MORE INFORMATION AND TO APPLY	THIS OPPORTUNITY MAY BE A GOOD FIT IF YOU HAVE EVER HELD ONE OF THESE JOBS
Barry	Hastings	D&S Machine Repair	Truck Driver	Click for more info	1. Light Truck or Delivery Services Drivers 2. Fence Erectors 3. Refuse and Recyclable Material Collectors Show More
Barry	Barry County	Roehl Transport	CDL Truck Driver	Click for more info	1. Heavy and Tractor-Trailer Truck Drivers 3. Excavating and Loading Machine and Dragline Operators Show More
Barry	Hastings	Roehl Transport	CDL - Dedicated Elwood Fleet	Click for more info	4. Industrial Truck and Tractor Operators 5. Paving, Surfacing and Tamping Equipment Operators 6. Locomotive Firers 3. Excavating and Loading Machine and Dragline Operators Show More

Source: Study team evaluation design documentation.

Study methodology and data collection period

To test this intervention, we used Google Optimize to randomly assign visitors to either see the treatment version of the site or the control (original) version of the site. Once visitors were assigned to a treatment arm, they continued to see the same version of the site for the duration of the experiment. We ran the experiment from August 7, 2021, to March 3, 2022, which resulted in a sample of 3,987 visitors who were randomly assigned to one of the two groups. To estimate the impact of the intervention, we use data from Google Analytics which showed visit-level data on website activity. We estimated impacts using regression analyses adjusting for observable characteristics of visitors including device type, time of day,

and month of visit. To evaluate the implementation of the intervention, we gathered qualitative data from website users and WMW staff during February and March 2022.

Research questions

To assess the impact of the intervention, the research team identified the following research questions.

Implementation of the intervention

1. What were the key features of the context in which this intervention was implemented?
2. How were the changes to the web page designed and implemented?
3. How did website visitors interact with the new web page, and what were their perceptions about benefits and drawbacks of the new design features? Were there additional features they believed would enhance the usefulness of the web page?

Impact of the intervention

To what extent might applying insights from behavioral science to job listings lead people to expand their job search? Specifically, does providing job seekers with salient information about job postings—in the form of examples of other occupations that require similar skills and tasks—and prompting them to search in multiple industries lead them to engage with a larger number of postings or a wider range of industries?

Summary of findings

Implementation. Results from our qualitative assessment of interview data show that, overall, WMW staff thought it was a useful study.

- WMW staff felt as though this partnership complemented and supported their organizational culture of continuous improvement.
- Job seekers reported that the information provided was helpful and used it to quickly focus their attention on what they believed to be the most promising openings. This suggests that job seekers used the new information to refine rather than expand their search.

Impact. Results from our quantitative analysis of data measuring users' interactions with the Weekly Hot Jobs! web page show that the intervention reduced users' likelihood of clicking on a job posting for more information but had no meaningful impact on other measures of engagement with the page. This ran counter to the original behavioral hypotheses developed by the study team that the intervention would broaden search.

- Adding examples of relevant previous experience to job listings led website visitors to be 4 percentage points less likely to click on a job listing and to click on an average of 0.1 fewer listings.
- Qualitative results suggest that customers found the new information helpful in searching efficiently and considering job descriptions they might have overlooked.
- The intervention showed no meaningful impact on the number of industries a user browsed in, nor did it affect their likelihood of making return visits to the site.

Considerations for future research

The results of this study suggest that providing a short list of relevant occupations to job seekers did not lead them to search more broadly across listings. In fact, this additional information decreased engagement with job listings and had no impact on the breadth of job search. This suggests that behavioral factors such as information avoidance and the use of filtering criteria may have dominated job seekers' reactions to the new information. These findings suggest that practitioners and researchers working to understand and improve job search for workers should pay close attention to what information is provided, how it is framed, and how it might interact with behavioral factors.

Further research can help build on the findings of the experiment. First, the results of this study are consistent with a narrowing of job search, which either increased efficiency or decreased job finding rates. If the smaller number of postings that treatment website users clicked on were better aligned with their skills and preferences, this would make their search more efficient. If the degree of alignment was the same but they viewed fewer postings we would expect them to have a lower rate of finding jobs, although we were not able to measure that outcome. Additional studies evaluating the impact of similar interventions on job finding rates and job satisfaction could help distinguish between these two impacts. This research could also be expanded to vary the information presented to see whether impacts varied, for example, including relevant skills, education or experience requirements, or other job attributes in place of examples of relevant experience.

This study demonstrates the potential for collaborating with local agency partners to estimate the ability of behavioral interventions to target job seekers' most common behavioral barriers. In this experiment, we demonstrated that it is feasible to develop simple interventions embedded in workforce agency websites and quickly learn about them. Results of interviews highlighted the benefits of the thought partnership between researchers and practitioners to develop a promising intervention. Other studies could continue to build on this model using other settings. Early and repeated engagement with prospective intervention users at the diagnosis and design stages may improve intervention design.

I. Introduction

A. Importance of improving job search

How workers search for and match to jobs is fundamental to the operation of labor markets, affecting outcomes for workers, employers, and the broader economy. When workers can efficiently find jobs that are a good fit for their skills, they can earn higher wages, firms can be more productive, and the overall labor market operates more efficiently (Mortensen and Pissarides 2011). Conversely, when job search and matching are not quick or smooth, this imposes costs on the job seeker and potential employers. When, for example, unemployed workers cannot quickly find and return to work, they may struggle to meet the basic needs of themselves and their families, with negative consequences for their household and their communities (Ganong and Noel 2019). Although some portion of unfilled job openings can be explained by a mismatch in the skills required for available jobs and those held by job seekers (Kahn 2015), some are driven by factors that can impede job seekers from quickly or easily finding opportunities for which they are qualified, such as the availability of information about job openings (Bartik and Stuart 2022). Therefore, because of both its importance and the presence of impeding factors, improving the matching of job seekers to job openings should be considered a first-order policy priority.

Today, most job search is conducted online (Faberman and Kudlyak 2016). Despite its potential to connect job seekers to substantially more opportunities, evidence is mixed on the degree to which internet search improves matching between job seekers and job openings (Kircher 2020). This suggests that despite improved access to job listings, job seekers are still missing promising openings when using internet search. One reason for this is that workers may be searching too narrowly. Although they may be open to diverse opportunities, workers focus their searches mostly on the sectors and occupations that they have worked in previously (Belot et al. 2019; Catalyst 2021). This suggests that strategies that encourage job seekers to consider new occupations that draw on their transferable skills could raise the number of job applications by prompting them to consider opportunities they weren't previously considering. If these applications turn into job offers, this may in turn may raise the job-finding rate or lead job seekers to find preferred opportunities. Therefore, if job seekers are looking at too narrow of a set of options due to cognitive biases⁴, they may be less likely to find a job. Behaviorally informed strategies⁵ that are designed to address systematic cognitive biases that narrow job search may be particularly well positioned for this.

Recent research suggests that providing additional or alternative information to job seekers may improve job finding rates and job quality (Kircher 2020). For example, Belot and colleagues (2019) found that redesigning job listings or search platforms might help job seekers identify a larger number of well-matched opportunities. Over the course of 12 weeks, they conducted a lab-based experiment where real job seekers were randomly assigned to receive a set of suggested job listings in addition to the default search results on an online platform. The suggested listings were tailored to a job seeker's previous occupation but included positions in new occupations for which the job seeker would likely have transferrable skills. They found that this did not lead to an increase in the number of applications submitted but did lead to a 44 percent increase in the total number of interviews.⁶ The findings suggest

⁴ Cognitive biases are systematic distortions in thought processes caused by the way that the human brain filters information. See, for example, Hilbert (2012).

⁵ Behaviorally informed strategies are strategies that are informed by insights from the behavioral sciences.

⁶ This result was statistically significant at the 0.1 level.

that the tailored listings may have helped job seekers direct their applications toward positions for which their skills were better matched.

The importance of improving job search, particularly online search, was heightened by the labor market conditions brought on by the COVID-19 pandemic. In spring 2020, unemployment skyrocketed with the onset of the pandemic (U.S. Bureau of Labor Statistics 2022a). This shock was felt disproportionately by workers in certain industries, such as service industries and hospitality (Lee et al. 2021). As job seekers were pushed to rely more on online search and to consider new industries due to COVID-19,⁷ the importance of being able to identify relevant opportunities through online listings increased. At the time of this study, which began in August 2021, the job market was recovering quickly with employers facing labor shortages, thereby amplifying the importance of matching job seekers to the growing number of job openings.⁸ Further, the COVID-19 pandemic precipitated the transition of many activities to online formats and limited the availability of in-person workforce services, increasing the importance of focusing on improving online job search (Feldmann et al 2020).

B. Overview of goals and design of behavioral intervention and evaluation

The Office of Workforce Investment (OWI) within the U.S. Department of Labor (DOL), Employment and Training Administration (ETA) supports state and local workforce agencies in providing information to help job seekers successfully search for work. As part of its support, OWI asked the Chief Evaluation Office (CEO) and the DOL Behavioral Interventions (DOL BI) team to explore whether applying behavioral science could improve the usefulness of the information that job seekers use when searching for positions, making decisions about training investments, and considering career paths. The DOL CEO has previously used behavioral interventions to improve program participants' outcomes by refining the information that they receive. Behavioral interventions are an approach to policy and program improvement that combines insights from cognitive science, psychology, and social science with empirical testing of results to support people in making choices and acting on their decisions.

The DOL BI team and CEO selected Michigan as a research partner because of the state's large size, state officials' interest in the area of applied behavioral insights, and the state's capacity to partner on an application of behavioral insights. Because of the central role that workforce agencies play in matching job seekers to open positions, CEO and the DOL BI team partnered with West Michigan Works! (WMW), a workforce agency serving seven contiguous counties in the Grand Rapids area, to explore whether behaviorally informed changes to job postings can improve job search success.⁹

Through interviews with WMW staff and customers in January 2020, the DOL BI team identified two key job seeker behaviors that might hamper workers' job search: (1) focusing the search in an overly narrow range of jobs and (2) not considering skill transferability across occupations. (Section II includes additional details of the study team's process to identify these behaviors.) Therefore, the DOL BI study team partnered with the WMW team to assess how using behavioral strategies can broaden job search

⁷ Based on interviews with West Michigan Works! staff.

⁸ Job openings at the beginning of the study, in August 2021, stood at 10.6 million, compared with 6.3 million a year earlier (U.S. DOL Bureau of Labor Statistics 2022b).

⁹ West Michigan Works! provides services to job seekers and employers, such as hosting job fairs and industry councils for employers, offering career coaching and employability services for job seekers, and identifying incumbent worker training and upskilling opportunities for those already employed. According to West Michigan Works web analytics, during the planning period for this experiment (March to August 2021), the agency's Hot Jobs webpage received over 12,000 unique visits, indicating that the page would be a reliable way to reach a relatively large group of job seekers.

among WMW customers. We identified the WMW Weekly Hot Jobs! web page as the site for this experiment. The WMW Weekly Hot Jobs! page is located on the WMW website and contains a list of job openings that offer a living wage and are in high-growth industries. This was identified by the study team as an effective channel for this intervention as a result of its large audience and its goal of quickly matching job seekers to job openings.

Users of the Weekly Hot Jobs! page encounter an initial list of multiple opportunities that displays the job title, employer, and location but no description of skills or training needed. Once a user clicks on a listing, they are taken to a more detailed job posting which describes the skills and experiences employers are looking for. As with other job posting sites, users of this page must decide which job titles to click for more detailed descriptions without any additional information about the potential match between their skills and the position requirements. This leads users to rely on cursory screening strategies that may be influenced by cognitive biases and can lead users to ignore some titles, particularly less familiar titles, even if they draw on skills a job seeker may have acquired in a previous job. The intervention tested in this study added a new column to the initial list of opportunities—a column that displays examples of other occupations that require similar skills and tasks and therefore may provide transferable skills relevant to the opening—and a prompt reminding the user to explore across industries. The goal of the intervention was to encourage job seekers to consider a broader range of job titles or industries that might be a good match. Section II.D describes how the study measured this outcome.

Exhibit I.1 summarizes the key features of the experiment, which was run on the WMW Weekly Hot Jobs! page from August 7, 2021, through March 3, 2022.

Exhibit I.1. Key features of intervention and evaluation

Behavioral intervention		Implementation timeline
Key features of the treatment web page	<ul style="list-style-type: none"> • A new column listing other occupations that require similar skills and tasks • Prompt to search other industries 	The intervention was designed between September 2020 and August 2021
Evaluation design		
Impact study	<ul style="list-style-type: none"> • Web page users randomly directed to see the treatment web page or the original (control) web page • Used Google Analytics application programming interface (API) to track user behavior on the treatment and control web pages • Measured effectiveness of the intervention by analyzing number of job listings clicked on, numbers of industries clicked on, and number of returns to the web page • Other measures of engagement with the WMW website 	The impact study ran from August 2021 through March 2022
Implementation study	<ul style="list-style-type: none"> • Focused on design and implementation of the intervention • Conducted phone interviews with WMW staff and virtual interviews and observations with web page users 	The implementation study ran from February through March 2022

Source: Study team evaluation design documentation.

The DOL BI team partnered with WMW to design an intervention and evaluation to answer the following research questions about how the intervention was implemented and its impacts:

Implementation of the intervention

1. What were the key features of the context in which this intervention was implemented as perceived by the WMW agency staff and the customers?
2. How were the changes to the web page designed and implemented?
3. How and why did the customers interact with the new and old versions of the web page? What were their perceptions about the changes to the web page and the benefits and drawbacks of the new design features? Were there additional features they believed would enhance the usefulness of the web page?

Impact of the intervention

To what extent might applying insights from behavioral science to job listings lead people to expand their job search? Specifically, does providing job seekers with salient information about job postings—in the form of examples of other occupations that require similar skills and tasks—and prompting them to search in multiple industries lead them to engage with a larger number of postings or a wider range of industries?

C. Organization of the report

Section II discusses the setting, theoretical foundation for the study based on behavioral science, and evaluation design. Section III summarizes and interprets the evaluation results. Section IV discusses key takeaways and next steps in continued learning. The Appendix provides supplemental findings and additional detail on the study development and evaluation design, including technical details on our quantitative methods and a description of analysis methods.

II. Evaluation Design

To build evidence on whether applying insights from behavioral science could improve job search, our team partnered with WMW to develop and test a behavioral intervention tailored to the unique conditions in the region. This section summarizes the design of the evaluation.

A. Evaluation context

Setting

WMW is the workforce agency covering seven counties in West Michigan: Allegan, Barry, Ionia, Kent, Montcalm, Muskegon, and Ottawa. WMW runs American Jobs Centers called Michigan Works! offices in each of the seven counties. It is one of the 16 Michigan Works! agencies in the state. Except for the Detroit metropolitan area, the WMW area is the most densely populated region in Michigan (State of Michigan 2020). The largest industries in the region are manufacturing, health care and social assistance, and retail trade (State of Michigan 2021).

WMW aims to promote economic growth in West Michigan by connecting job seekers with employers and developing the local workforce to meet employer needs. It does this by providing a range of services and supports to employers, employees, and job seekers. These include services such as hosting job fairs and industry councils for employers, offering career coaching and employability services for job seekers, and identifying incumbent worker training and upskilling opportunities for those already employed. In addition, WMW hosts a website that serves as a resource for all its customer types.¹⁰

West Michigan's labor market and the pandemic context during the experiment

When the experiment began in August 2021, the unemployment rate across the country had fallen from its peak of 21.4 in April 2020, and over the course of the experiment the unemployment rate in West Michigan was approximately 3.9 percent, on average (U.S. DOL Bureau of Labor Statistics 2022a, 2022c).

The pandemic context continued to affect West Michigan's labor market throughout the experiment. Policy and labor market changes occurred during the course of the evaluation. Specifically, requirements for UI beneficiaries to register with WMW were waived before the experiment and then reinstated in November 2021, and enhanced UI benefits continued through early September 2021. These contextual changes coincided with a reduced flow of customers to WMW, and they may have influenced those customers' orientation toward job search and career exploration.

WMW Weekly Hot Jobs! Web page

On the WMW website, WMW Weekly Hot Jobs! is a web page that provides quick links to relatively higher-paying job opportunities within in-demand industries.¹¹ As described in phone conversations with WMW staff on job posting policy, to be included on this list a job opportunity must pay at least \$13 per hour. It also must exist within an industry determined to be (1) in demand in West Michigan as a result of high projected growth or (2) in short-term demand generated by the COVID-19 pandemic. The Weekly Hot Jobs! list is updated every Friday to ensure that it includes the most current information on opportunities. Each week the page lists approximately 500 open positions.

¹⁰ This website is located at the following url: <https://www.westmiworks.org/>.

¹¹ The Weekly Hot Jobs! page is located at the following url: <https://jobs.westmiworks.org/weekly-hot-jobs/>.

The Weekly Hot Jobs! job listings are presented as a set of industry-specific tables. For each job, the table shows the county, city, employer, job title, whether the employer is attending an upcoming hiring event, and a link to a more detailed description and application information. Exhibit II.1 shows a snapshot of how listings in the construction and energy industries are presented on the Weekly Hot Jobs! page.

Exhibit II.1. Snapshot of the original WMW Weekly Hot Jobs! web page

The screenshot shows the 'Weekly Hot Jobs!' web page. At the top, there is a navigation menu with categories: CONSTRUCTION/ENERGY, HEALTH SCIENCES, INFORMATION TECHNOLOGY, MANUFACTURING, PROFESSIONAL/ADMINISTRATIVE SERVICES, and RETAIL & RESTAURANT. Below this, there are sub-categories: STAFFING AGENCIES, TEMPORARY/SEASONAL, and HIRING EVENTS. The main content area features a table with the following columns: COUNTY, CITY, EMPLOYER, JOB TITLE, CLICK TO APPLY, and UPCOMING HIRING EVENT?. The table lists several job openings, including positions like 'Housing Program Crew', 'Electrician 2nd Shift', 'Fueler', 'Local Driver (Class A)', and 'Skid-Steer Operator'.

COUNTY	CITY	EMPLOYER	JOB TITLE	CLICK TO APPLY	UPCOMING HIRING EVENT?
Allegan	Allegan	Community Action of Allegan County	Housing Program Crew	Apply - 11336565	No
Allegan	Holland	Haworth, Inc.	Electrician 2nd Shift	Apply - 11718764	No
Allegan	Wayland	Holland	Fueler	Apply - 11661444	No
Allegan	Wayland	Holland	Local Driver (Class A)	Apply - 11657509	No
Allegan	Hamilton	Milling & Grading Services	Skid-Steer Operator	Apply - 9719926	No

Source: The Weekly Hot Jobs! page (<https://jobs.westmiworks.org/weekly-hot-jobs/>). Accessed 21 March 2021.

B. Literature on the behavioral barriers used to inform the intervention design

This section describes the research that helped to inform the intervention design tested in this study. Specifically, we considered a range of cognitive biases, which we refer to as behavioral barriers in the remainder of the report and identified those which we believed to be most relevant to the WMW Weekly Hot Jobs! context. This section describes what we identified to be the most relevant behavioral barriers and why they might lead job seekers to search in an overly narrow manner.

The motivating hypothesis for this experiment was that job seekers were searching too narrowly on the WMW Weekly Hot Jobs! page, and therefore missing promising opportunities. This hypothesis was developed based off both the perceptions of WMW staff and the accompanying research suggesting that unemployment is at least partially driven by job seekers and employers not recognizing the transferability of skills across occupations. For example, research on unemployment in the 2009 recession indicates that an important factor prolonging unemployment was the mismatch between the sectors in which employers post vacancies and those in which unemployed workers search for new positions (Sahin et al 2014). One way to address this mismatch is by encouraging workers to search in a broader set of occupations and industries, a strategy that is particularly important for less skilled workers (Moscarini 2001). The behavioral science literature indicates that one reason that job seekers search a narrower set of jobs than they would be interested in or qualified for is that they face behavioral barriers, many of which arise from the complicated nature of job search itself (Babcock et al. 2012). Finding a job often requires an individual to gather and assess a large amount of information about job characteristics, their own skills, and how competitive and time-consuming each application process might be (Grubb 2002).

Facing more information than they can feasibly digest can lead job seekers to feel overwhelmed—a condition described in behavioral science as *information overload*. Information overload comes into play in situations where there is so much relevant information available to a decision maker that it exceeds their capacity to process it, leading to reduced quality of decisions (Hanka and Fuka 2000, Eppler and Mengis 2004). In the context of online job search, job seekers have access to more job listings than they can reasonably review.

When individuals face information overload in the process of informing a decision, they must choose between different available strategies, known as *heuristics*. (See, for example, reviews by Bettman et al. 1991 and Payne et al. 1992.) These heuristics may involve detailed consideration of the characteristics of each option (“elimination by aspects,” Tversky 1972) or they might avoid assessing characteristics of options altogether, by simply recalling how one felt about each option last time they were evaluated (“affect referral,” Wright 1975, Lynch et al. 1988). Bettman and colleagues (1991) observe that different heuristics require varying levels of effort to implement, and the heuristic used can affect the accuracy of the decision—how much the option chosen aligns with the chooser’s preferences. When deciding between many job options, individuals may adopt one heuristic, or use a multi-stage strategy to filter these options by first removing some as quickly as possible before focusing on those that remain (Payne 1976). They may also respond to the overwhelming amount of information with *information avoidance*, which is when one simply stops considering any new information at all (Bawden and Robinson 2020, Hiltz and Turoff 1985).

While some heuristics may be rational, for example first screening out job opportunities in areas that an individual is not willing to work, others are impacted by behavioral barriers. We describe three common behavioral barriers that we perceived most likely to be relevant in the WMW Weekly Hot Jobs! context. We also discuss what happens when individuals, in the face of information overload, employ these common strategies in decision-making.

Status quo bias. Status quo bias describes the tendency of individuals to rely on prior experience and stay in their comfort zone of familiar opportunities, rather than exploring new ones (Samuelson and Zeckhauser 1988). In a study that builds on the discussion of heuristics above, Geng (2016) found that one factor contributing to status quo bias is that people spend more time considering a default option than the alternatives. Among job seekers, this could help explain people’s tendency to search for positions in the same industries or occupations in which they have previously worked (Samuelson and Zeckhauser 1988). Although this may be rational at times—for example, there may be lower risk in the known occupation—we hypothesize that this can also lead individuals to miss more promising opportunities in different occupations or industries. The research team hypothesized that disadvantages from status quo bias may be more pronounced in a context like the COVID-19 pandemic, which increased job openings in some industries, such as information technology, while reducing openings in industries such as hospitality and tourism.

Identity mismatch. Identity mismatch occurs when someone perceives that their identity is not consistent with the social perceptions of a group (Rodríguez-García et al. 2021). Bettman et al. (1991) link the evaluation of social categories (Fiske and Pavelchak 1986) to decision making heuristics. Specifically, they hypothesize that decisionmakers draw on recognizable social categories as part of a heuristic that allows them to evaluate each option based on the category it belongs to, rather than assessing the characteristics of each option. For this study, we consider identity mismatch to be at play when an individual perceives their identity not to align with a specific social category they assign to the job listing, such as the industry culture or qualities needed to succeed in an occupation. One common example of this

is with gender. For example, research has attributed the disproportionate share of women in nursing to the perception that nursing is a job for women or that it requires feminine characteristics (O'Connor 2015). In job search, the research team hypothesized that identity mismatch can lead job seekers to focus only on positions in the industries and occupations that most closely align with their perceived identity. This may cause job seekers to overlook job opportunities that could be a good fit for their skills and interests.

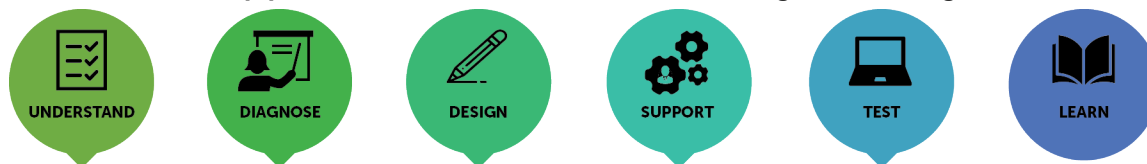
Hassle factors. Hassle factors are aspects of a process that seem like minor inconveniences to those who designed it, but which nonetheless dissuade users from engaging the way designers intend (Bertrand et al. 2004). For example, in the context of applying for a government program, even when the time and mental effort required by an application process are easily outweighed by subsequent benefits in a rational cost-benefit analysis, these hassles (time spent and cognitive burden) can deter individuals from applying (Babcock et al. 2012). In the job search context, the study team hypothesized that small steps—such as having to click to view a new website to see information about a job opening—may prevent job seekers from taking the next step and, ultimately, pursuing an opportunity. Providing information in a format that is easy to access and use can help address this potential barrier (Simpson and Prusak 1995).

In the context of job search, we hypothesized that these behavioral barriers in response to information overload could lead job seekers to search more narrowly than would be ideal, thereby missing out on promising options. To address this, we designed an intervention to prompt individuals to reassess the heuristics they have created in response to these barriers. Recent empirical research has found that job seekers who start with a narrow search will search more broadly after receiving recommendations of occupations related to their initial search (Belot et al. 2019). Similarly, another important finding from the information overload literature is that in some cases information overload can actually be addressed by providing additional information designed to help the decision-maker distinguish between more and less attractive options (Malhotra 1984). If this information is presented at the point in time when needed and with guidance on how to use it, it can be particularly helpful (Simpson and Prusak 1995). The intervention designed by the research team, which is described in the next section, includes components designed to address each of the behavioral barriers described above and ultimately improve job seekers' ability to make well-informed decisions about which job opportunities to pursue.

C. Behavioral diagnosis and study development

When assessing how we could use the insights from the behavioral science literature described above to improve the WMW Weekly Hot Jobs! website, we used a six-step process, shown in Exhibit II.2 and developed for the DOL BI project (Darling et al. 2017), to design and implement BIs:

Exhibit II.2. Six-step process for behavioral intervention design and testing



Source: Darling et al. (2017).

As detailed below, we worked closely and collaboratively with WMW, CEO, and OWI to execute each step:

- **Understand** areas in which program performance could be improved
- **Diagnose** potential behavioral barriers
- **Design** an intervention that addresses those barriers and an evaluation to determine whether the intervention worked
- **Support** implementation of the behavioral intervention
- **Test** the intervention's effectiveness
- **Learn** from and share the results

Understand

We began by holding fact-finding conversations with WMW staff and customers to identify potential behavioral bottlenecks that might prevent job seekers from making full use of labor market information, specifically wage and labor demand projections for certain occupations in West Michigan. This included two meetings with WMW leadership and managers as well as conversations with nine job seekers in both rural and urban areas in January 2020. Drawing on information gathered during these and follow-up meetings, the DOL BI team developed an initial intervention email in spring 2020 and designed an evaluation to measure its effects on job search and training services.¹²

The onset of the COVID-19 pandemic and resulting waiver of UI work search requirements, however, had the unexpected consequence of disrupting WMW access to the email addresses for new customers. This made an email-based intervention infeasible. In the face of these circumstances, we held another round of meetings with WMW during summer and fall 2020 to inform new behavioral diagnoses and an intervention design.

After the onset of the COVID-19 pandemic, leaders of WMW identified the Weekly Hot Jobs! web page as a promising setting for an intervention that would engage customers seeking jobs and could be operated in the context of the pandemic. They decided to focus on enhancing WMW job listings, rather than basing an intervention on existing aggregate-level labor market information such as average wages and projected growth for selected occupations. This decision was also informed by qualitative data from the initial customer interviews, in which several customers expressed more interest in viewing actual job listings. These customers felt they would use aggregate-level labor market information to make career planning decisions about areas for skill development and were more interested in finding jobs using existing skills.

We therefore conducted additional conversations with WMW staff focused on the potential barriers to successful job search using the Weekly Hot Jobs! web page. WMW indicated that a primary concern was that users were too restricted in their job search and did not consider the transferability of their skills to other occupations and industries. Based on this description and additional conversations, we identified the following areas in which search could be improved:

¹² As described in this section, the study team redesigned the intervention and study in response to the COVID-19 pandemic and the final study design did not measure use of training services because the intervention did not focus on encouraging use of those services.

1. People may browse fewer than the ideal number of industry-specific tables: agency staff shared their impression that many job seekers do not review job listings in industries other than those in which they have held jobs.¹³
2. Within each industry-specific table, job seekers might not browse the full set of listings, might click through fewer than the optimal number of job listings, might apply to fewer than the optimal number of job listings, or might not view jobs which could be a good fit.

Diagnose

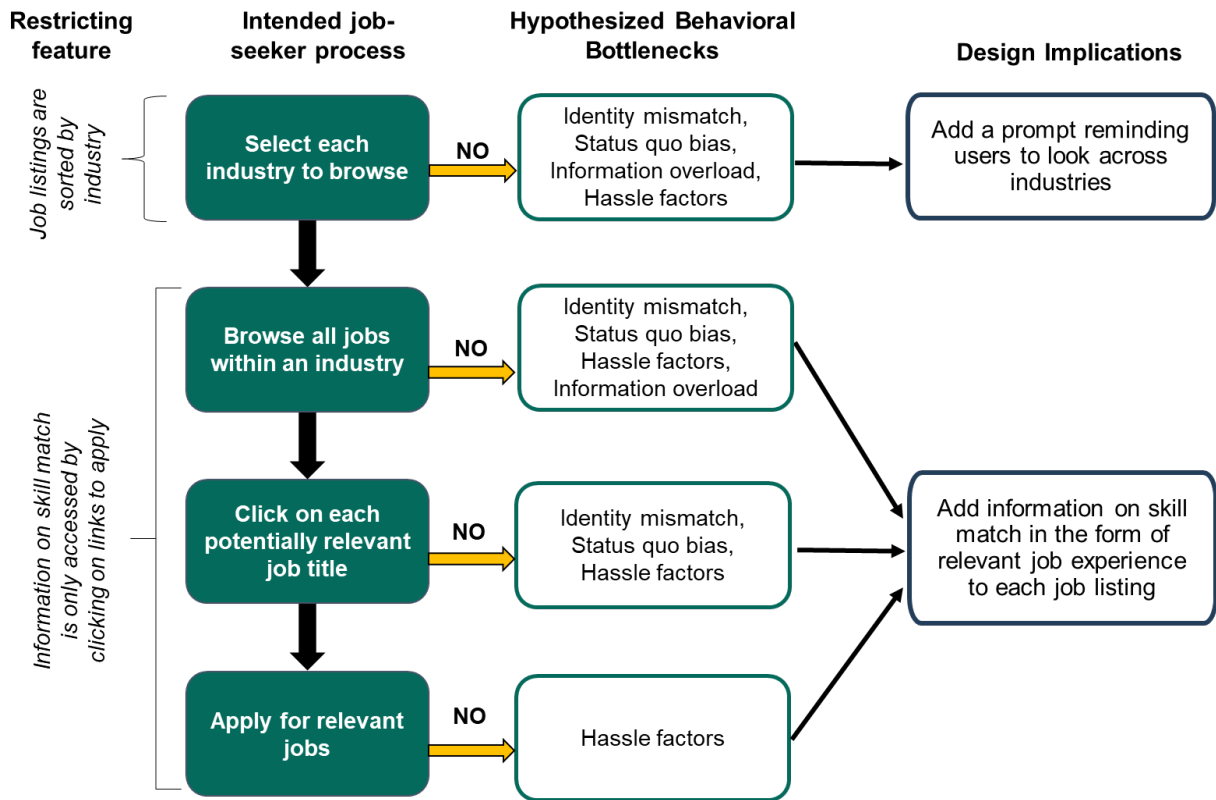
The conversations with WMW staff highlighted the potential role of behavioral factors in preventing job seekers from reviewing listings in multiple industries and clicking to view position descriptions that offer more information about qualifications for each listing. With these overarching barriers in focus, the DOL BI team reviewed the existing Weekly Hot Jobs! web page using a behavioral lens to hypothesize what behavioral bottlenecks might affect customers' use of the page.

In this review, first we created a “journey map” documenting the steps that a user would need to complete to use the site as intended. Then, we identified factors that might cause users not to complete those steps. When identifying hypothesized behavioral bottlenecks, we drew on the interviews with WMW customers and staff described above.¹⁴ Qualitative data from these interviews validated hypotheses that multiple behavioral barriers documented in the job search literature might be at play. Exhibit II.3 provides an overview of the hypothesized behavioral bottlenecks.

¹³ We note that the ideal number of tables to browse is not a knowable quantity, but instead defines the number of tables that optimizes the chance of the user finding the best position, after accounting for search costs. This hypothesis is based on interviews with WMW staff who believe based on their work providing job assistance that some customers do not search a broad enough range of occupations and industries, given their skills and job search goals.

¹⁴ We did not use analytics data extensively in our diagnosis because before the evaluation WMW did not collect detailed records of visitor activity on the web page.

Exhibit II.3. Behavioral bottlenecks that might affect use of the Weekly Hot Jobs! web page



Source: Synthesis by authors based on behavioral diagnosis.

When a user reaches the site, they see the list of industries with job opportunities and choose which industries to browse. Users may browse fewer than the optimal number of industry-specific tables due to hypothesized behavioral bottlenecks. First, they may underestimate the number of jobs they qualify for in industries in which they have not previously worked or do not feel like the right fit—a manifestation of **identity mismatch** and **status quo bias** (Rodríguez-García et al. 2021, Samuelson and Zeckhauser 1988). Second, in a quick scan of the web page, they might also not realize there are additional listings to access by clicking the industry headers, an issue of inattention potentially caused by **information overload** (Bawden and Robinson 2020). Finally, they may realize that there is additional information in industry-specific tables but be discouraged from browsing by **hassle factors**, or the inclination to overestimate the burden from seemingly minor inconveniences (Briscese 2017).

After reaching a list of job opportunities within an industry, the user decides how many job listings to look through and whether to click through to the job postings. Within each industry-specific table, job seekers might not browse the full set of listings or might click through to fewer detailed job descriptions than would be ideal. **Identity mismatch** and **status quo bias** were hypothesized to be factors, for example, if people refrain from browsing jobs for which they might be qualified because they think a job title is not consistent with their self-perception or work experience. In such cases, making information about the relevant experience for each job more salient—and easier to access—by presenting it alongside the job title could address these bottlenecks and encourage users to click through to a larger number of job descriptions. Even if they click through to some detailed descriptions, they might not view the descriptions that are best matched with their skills and experience. As a result, they might choose to apply

to fewer openings than would be ideal. Each of these aspects of suboptimal engagement with the job listings could be driven by **hassle factors**. Specifically, because the initial listing provides no information on the skills or experience required (see exhibit II.1 above) job seekers may feel that they cannot efficiently home in on opportunities that are worth considering more closely, in this case the cost of reviewing additional job listings.

Design

We designed an intervention to address the behavioral barriers identified in the previous step. The Appendix describes the process that we used to develop the intervention in response to the hypothesized behavioral bottlenecks. Exhibit II.3 summarizes how the behavioral bottlenecks might affect customers' use of the page. The intervention included two key additions to the WMW Weekly Hot Jobs! page that were designed to provide simple, action-oriented information to lead job seekers to consider a larger range of job openings in occupations and industries for which they might be qualified:

1. We presented a simple set of information about relevant experience alongside existing, regularly updated job postings that WMW hosts on its Weekly Hot Jobs! page (<https://jobs.westmiworks.org/weekly-hot-jobs/>). This list of potentially relevant experience was developed using the O*NET career changers matrix.¹⁵ We included the top three most relevant job titles in a list that was visible in the main table and an additional three relevant job titles that users can see by hovering over a prompt to “show more.” This information was intended to address identity mismatch and status quo bias by prompting users to consider that their experience may be more transferable or relevant than they had originally considered. It was also intended to address hassle factors by highlighting relevant experience so that users did not have to click to see whether their experience was relevant.
2. We also included a prompt to remind job seekers to review job listings in industries other than those in the first industry table displayed when the web page first loads. This prompt was designed to address potential status quo bias and identity mismatch. It also was designed to help users overcome information overload, as prior research has suggested that even small nudges may affect behavior in the face of information overload (Nagtegaal et al. 2019).

In addition to speaking with WMW staff while designing the behavioral intervention, we conducted a series of user tests with nine WMW customers. The customers reviewed a prototype version of the enhanced Weekly Hot Jobs! web page and offered feedback on their experience, including the extent to which new and existing features of the page helped or hindered their job search. We incorporated updates to the final enhanced web page based on these interviews. Section A of the Appendix provides additional details on the process that we used to develop the intervention in response to the hypothesized behavioral bottlenecks.

Our final treatment site incorporated four changes to the Weekly Hot Jobs! page which were designed to address the behavioral bottlenecks identified. Exhibit II.4 presents a snapshot of the enhanced Weekly Hot Jobs web page, with labels highlighting the features which were manipulated for this experiment.

¹⁵ The O*NET career changers matrix is a database that maps each O*NET occupation code to up to 10 related occupation codes. Related occupation codes are considered to be jobs that require similar skills and experience such that workers from one occupation may transfer to the other occupation without requiring substantial additional preparation. This data set is available on the O*NET webpage (https://www.onetcenter.org/dictionary/20.3/excel/career_changers_matrix.html).

Applying Behavioral Insights to Inform Online Job Search in West Michigan

1. A new column with three examples of relevant experience listed under the heading, “This opportunity may be a good fit if you have ever held any one of these jobs”
2. A list with an additional three examples of relevant experience which can be accessed by hovering
3. A prompt to look across industries
4. Emphasized industry buttons

Exhibit II.4. Snapshot of WMW Weekly Hot Jobs! enhanced web page

Weekly Hot Jobs!

West Michigan Works has partnered with local employers to identify some of the highest-growing and most in-demand jobs in West Michigan. Browse hundreds full-time, part-time, permanent and temporary jobs in the tables below. You can view by industry and sort by location. Want the Weekly Hot Jobs! delivered to your inbox every week? [Sign up below.](#)

[Download a printable list.](#)

REMEMBER:
There may be jobs in other industries that fit your skills.

Click on the industry tabs below and view “examples of good fit prior jobs” to explore all your employment options.

Select an Industry

4
1

COUNTY	CITY	EMPLOYER	JOB TITLE	CLICK FOR MORE INFORMATION AND TO APPLY	THIS OPPORTUNITY MAY BE A GOOD FIT IF YOU HAVE EVER HELD ONE OF THESE JOBS
Barry	Hastings	D&S Machine Repair	Truck Driver	Click for more info	<ol style="list-style-type: none"> 1. Light Truck or Delivery Services Drivers 2. Fence Erectors 3. Refuse and Recyclable Material Collectors Show More
Barry	Barry County	Roehl Transport	CDL Truck Driver	Click for more info	<ol style="list-style-type: none"> 1. Heavy and Tractor-Trailer Truck Drivers 3. Excavating and Loading Machine and Dragline Operators
Barry	Hastings	Roehl Transport	CDL - Dedicated Elwood Fleet	Click for more info	<ol style="list-style-type: none"> 4. Industrial Truck and Tractor Operators 5. Paving, Surfacing and Tamping Equipment Operators 6. Locomotive Firers

2

Source: Study team evaluation design documentation.

Support, test, and learn

Once we designed the intervention, we worked with WMW to **support** its implementation. We then **tested** the intervention’s effectiveness using the design described next in Section III.D. We interpreted these results **to learn** from and share the findings discussed in Section IV.

D. Experiment design

The purpose of this evaluation was to learn how changing the information presented to job seekers on job listings would affect their job search behavior and to learn about the implementation of the intervention.

The evaluation (a randomized controlled trial) was designed to measure the impact of the intervention on job seeker behavior by creating equivalent groups, one of which received the intervention and other of which did not. The first time a user visited the Weekly Hot Jobs! web page after the start of the

experiment, they were automatically assigned either to see the enhanced web page (the treatment group) or to see the original Weekly Hot Jobs! page (the control group). The experiment ran from August 7, 2021, through March 3, 2022. We used Google Optimize, a standard platform for testing two or more variants of an experiment (also called an “A/B testing platform”), to randomly assign users (Optimize Resource Hub 2023). Once assigned, web page users continued to see the same version of the page for return visits from the same browser.¹⁶

We used data on user behavior on the site from the Google Analytics application programming interface (API) to track outcomes. The outcomes we assessed are listed in Exhibit II.5. Further details of the evaluation design and construction of outcomes are available in Section B of the Appendix.

Exhibit II.5. Quantitative outcomes assessed as part of the impact evaluation

Outcomes	Description
Primary outcomes	
1. Number of job descriptions clicked on at first visit	Number of unique job listings the user clicked on during their first visit
2. At least one job description clicked on at first visit	Whether the user clicked on at least one job listing during their first visit
Secondary outcomes	
Measures of engagement with job listings across all visits	
1. Number of job descriptions clicked on across all visits	Number of unique industries the user clicked to view the associated job postings across all visits
2. At least one job description clicked on across all visits	Whether the user clicked on at least one job listing across all visits
Measures of job opportunity exploration	
3. Number of industry buttons clicked at first visit	Number of unique industries the user clicked to view the associated job postings during their first visit
4. Accessed website more than once	Whether the user visited the website on at least two distinct dates
Measures of engagement with other aspects of the WMW website	
5. Contacting a WMW talent development specialist at first visit	Whether the user clicked to contact a WMW talent development specialist during their first visit
6. Scheduling a mock interview at first visit	Whether the user clicked to schedule a mock interview during their first visit

Source: Study team evaluation design documentation.

Note: All quantitative outcomes were collected from WMW Google Analytics data between August 7, 2021, and March 4, 2022. A user is defined using a unique client ID that identifies a unique browser and IP address combination. Because it is not possible to differentiate between sessions, we defined a visit as a unique date on which the individuals visited the site.

WMW = West Michigan Works!

¹⁶ This ensures that outcomes estimated over the course of the experiment consistently represent exposure to either the treatment page or the control page, but not both. If a user accesses the website from multiple devices or from multiple browsers on the same device, it is possible that the user will be exposed to both the treatment and control sites.

To assess the implementation of the study, we gathered implementation data through interviews with four key WMW staff who led design and implementation, as well as through interviews and observations with five customers who had previously used the Weekly Hot Jobs! web page. We then analyzed data to identify themes across respondents. Because we were able to interview all staff who were substantially involved in the design and implementation of the experiment, we got a comprehensive understanding of what it took to implement the intervention. While customer interviews offer suggestive evidence about their experience engaging with the website, the small number of respondents (five) does not represent the full range of users who interacted with the intervention website and so has limitations. The sample for customer interviews was small due to the COVID-19 pandemic and other logistical constraints.

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III. Results

The study produced a number of important results that represent the first step of a longer-term learning agenda about using behavioral science to improve job search. We have organized our findings into two groups: those from the implementation analysis and those from the impact analysis. In Section IV, we discuss the broader implications of our evidence for future work in developing behavioral intervention studies to improve job search.

A. Implementation analysis

Perspectives of WMW agency staff

The study team conducted semi-structured discussions with four key WMW staff to learn about their experiences participating in the design and implementation of the web page intervention. These findings may help state and local workforce agencies that may be interested in pursuing behavioral experiments to understand aspects of what the design and implementation of the intervention entailed.

The staff we interviewed were those most heavily involved in the design and implementation of the intervention, so the findings can provide a complete overview of their experiences with the experiment. They included staff with key leadership positions within the agency. Their roles allowed them to occasionally interact with customers, but they primarily had roles that were not customer facing. The discussions gathered information on four primary topics: (1) the level of effort and resources involved in designing and implementing the intervention, (2) the degree to which WMW was able to implement the intervention as intended, (3) key features of the context in which WMW implemented it, and (4) lessons learned through the design and implementation processes. The study team transcribed and coded discussion data to identify themes and areas of variation. From our conversations with state staff, we identified four primary insights.

This study allowed WMW to obtain additional value from its existing systems and initiatives.

- Staff felt that they had a robust foundation for the design and implementation of the treatment web page which contributed to its success (four respondents). The WMW team already published the Weekly Hot Jobs! list, collected website analytics, and endeavored to share data on labor market information with customers through an email blast. Moreover, one staff member expressed that building the treatment web page and examining its impact on key outcomes of interest was an opportunity to expand the way they used the WMW Weekly Hot Jobs! web page, an existing resource.

The intervention design required coordination across multiple functional roles within the WMW team.

- Staff from across the agency provided input on the design of the intervention. This suggests the design benefitted from staff members' varying experiences and areas of expertise to best meet perceived job seekers' needs.
- The treatment web page was time-consuming to design, as it required multiple meetings between WMW staff and the study team, and the process was paused and then restarted during the pandemic. Most respondents felt that the development of the treatment web page and preparations for the evaluation required a moderate- to high-level of effort (three respondents). However, the staff member who led implementation of the intervention reported that implementing the intervention,

including making weekly updates to match new job postings with information on related occupations, was less time-consuming than they had expected at the outset.

The ongoing economic impacts of the COVID-19 pandemic affected the context of the experiment implementation.

- Although three staff respondents described a strong local job market as expected given the low local unemployment rate, the factors influencing labor force participation and job preferences were reported to have been in flux during the pandemic. Two staff respondents reported that large numbers of people, especially women, left the labor market. They reported that securing child care was one substantial challenge that workers faced.

The evaluation took place during a period when customers were observed to change how they conducted their job search and what they looked for in a job.

- All staff respondents reported that customers were no longer satisfied with the types of jobs they held in the past. They began re-evaluating their wages and other features of their jobs, such as ability to work remotely and have a flexible schedule. According to staff, these changes occurred across customers of varied backgrounds. Additionally, two staff reported that WMW customers expressed interest in changing industries and looking for new types of jobs in existing fields. For example, one staff member reported that customers seemed to become interested in moving away from work in the health care and service industries and moving toward work in the information technology sector.

Perspectives of customers

The study team conducted interviews and observations with five WMW customers to understand how they interacted with and perceived the treatment and control versions of the web page. During the interviews, the customers interacted with both the new and old versions of the web page, and interviewers observed their interactions and asked about their impressions. Interviewers asked customers to imagine they were exploring the web page to find a job that might be a good fit for them. The discussions gathered information on four primary topics: (1) the customers' work search goals, (2) the customers' goals for using the treatment page and the extent to which it met their expectations as they explored it during the conversation, (3) the differences they noticed between the treatment and control pages, and (4) the extent to which the intervention produced changes to the web page that were useful and encouraged the customer to search more broadly.

From our conversations with the customers about their experiences with the web page, we learned the following:

The new "Relevant Experience" column on the far right of the job listings (feature number 2 in Exhibit II.4) was reported to help the customers find listings with an unexpected skill match (four respondents).

- One customer mentioned they saw a job they had previously held listed in the "Relevant Experience" column, and the job listing then caught their attention. Another customer felt the column helped them think more expansively and understand how their skills might help them secure a position.
- The customers described the experience of using the "Relevant Experience" column positively (five respondents). One customer mentioned wanting to be confident they would have a chance to secure a job if they applied for it. Another mentioned it helped them understand if they were interested in a job

or not before having to click for more information. These observations support our initial hypothesis that the “Relevant Experience” column would help broaden job seekers’ search.

However, customers reported that the “Relevant Experience” column helped them filter out job listings before clicking on the full description (four respondents).

- The customers felt the ability to filter out job listings before clicking on the full description made their search more efficient (three respondents) and appreciated this efficiency. They described how the control web page required them to click further for more information to be able to learn anything about the job beyond its location, the name of the employer, and the job title. On the other hand, they believed the “Relevant Experience” column helped them understand the experiences they might have needed to qualify for a position. Though the customers did not describe the new relevant experience information as *required experience* for the job listings, the study team acknowledges it is possible the customers perceived it as such. If they did, they may have misunderstood the meaning of the column because the related occupations listed on the right did not come from employers’ description of required experience.
- These observations are consistent with the findings of our impact analysis that the intervention led web page users to click on fewer job postings.

The customers did not report that the additional information was overwhelming or undesirable.

- No customer shared they were overwhelmed by the additional information included on the treatment web page.
- The prompt to search multiple industries (feature number 3 in Exhibit II.4) was not noticeable or was mistaken for an advertisement or error box (four respondents). Only one customer mentioned the feature when exploring the web page independently, and no customers mentioned it when asked about differences between the treatment and control web pages. When asked about it directly, most reported it did not stand out to them or they mistook it for an ad or error box (four respondents). The red font of the text may have contributed to the latter confusion. During user testing, this prompt was in a gray font (consistent with font used elsewhere on the web page). The customers felt the teal did not stand out, which prompted the change to red.

Geographic location was a primary search criterion (three respondents).

- Although the customers could sort by county on both the treatment and control web pages, they asked for ability to filter by county or other location information to restrict the information available for viewing to their location of interest.
- The “Relevant Experience” column may have been less effective for the customers looking for work in counties that had few listings available. Some counties in WMW’s seven-county service area had very few listings. Two customers remarked on the limited options in their counties of interest.

Customers valued efficiency in their job search (four respondents).

- They suggested adding filters or a search function to improve efficiency (three respondents). For example, the customers recommended a filter for education requirements or a way to search within relevant experience for prior jobs they had held.

Although these discussions provided useful insights, the evidence should be considered as suggestive due to the small number of participants. Nonetheless, these customer impressions illustrate potential explanations for the pattern of impacts presented in the next section.

B. Impact analysis

To assess the impact of the intervention on job seeker behavior, we relied on data on user behavior on the WMW site collected through Google Analytics. We used this information to assess the impact of the intervention on the outcomes listed in Exhibit II.5. Our sample included 3,987 users of the Weekly Hot Jobs! page from August 7, 2021, to March 3, 2022. Exhibit III.1 presents descriptive statistics on this sample. The sample includes 1,975 users who were randomly assigned to see the treatment page and 2,012 who were randomly assigned to see the control page. Fifty percent of the sample accessed the website using a desktop computer, and 47 percent used a mobile device. There were no meaningful or statistically significant differences between the treatment and control groups by device type, time of first visit, or the month of their first visit. Despite this, we adjusted all analyses to control for observable characteristics (device type, time of day, and month) using regression analysis. See Section B of the Appendix for a detailed description of the data and Section C of the Appendix for detailed analysis methods.

Exhibit III.1. Descriptive statistics on the analytic sample

Characteristic	All	Treatment	Control
Total sample	3,987	1,975	2,012
Device type			
Desktop	50%	50%	51%
Mobile	47%	47%	47%
Tablet	3%	3%	3%
Hour of first visit			
10 p.m. – 4 a.m.	10%	10%	10%
5 a.m. – 11 a.m.	48%	48%	49%
12 p.m. – 5 p.m.	33%	34%	32%
6 p.m. – 9 p.m.	9%	9%	9%
Month of first visit			
August 2021	14%	14%	13%
September 2021	14%	14%	13%
October 2021	15%	15%	15%
November 2021	17%	16%	17%
December 2021	13%	14%	13%
January 2022	13%	13%	14%
February/March 2022	13%	13%	14%

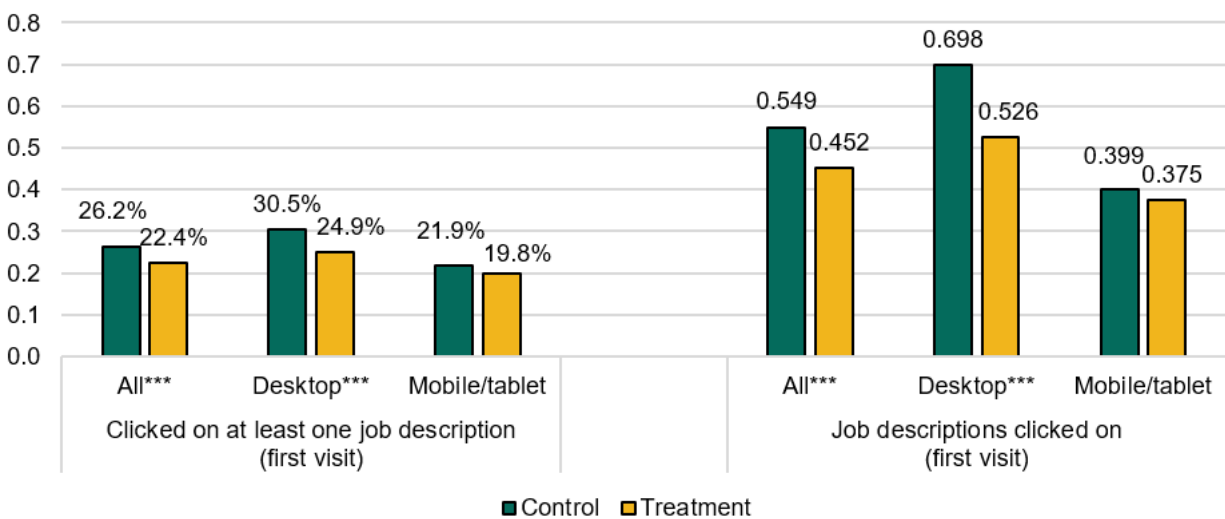
Source: Google Analytics data for the Weekly Hot Jobs! page (<https://www.westmiworks.org/>).

Note: The sample excludes 88 users who were determined to be outliers based on their interaction with the Weekly Hot Jobs! page. See Appendix Section C for a description of how outliers were determined. None of the differences between the treatment and control groups in this table is statistically significant. Percentages within a characteristic, such as device type, may not sum to 100 due to rounding.

Primary outcomes

We found that users who were directed to the treatment web page decreased their engagement with job opportunities relative to users directed to the control web page. After adjusting for observable characteristics (device type, time of visit, and month of visit), among users of the control page, 26 percent clicked on at least one job description in their first visit, compared to only 22 percent in the treatment group (Exhibit III.2). Similarly, after adjusting for observable characteristics, the users of the control page clicked on 0.55 job descriptions in their first visit, on average, compared to only 0.45 in the treatment group. These results were both statistically significant at the 0.01 level. We then looked at how these impacts vary by the type of device used to access the page and found that differences are substantially larger for desktop users. Among desktop users, those directed to the treatment page clicked on an average of 0.17 fewer job postings than users directed to the control page, after adjusting for observable characteristics. In contrast, among mobile users, the difference was only 0.02 fewer job postings, and the difference was not statistically significant. This may be related to the way that the web page displays differently on a desktop versus mobile device. Although desktop users will see the “This opportunity may be a good fit if you have ever held any one of these jobs” column on their initial screen, mobile users must scroll to the right to see additional columns.

Exhibit III.2. Engagement with job listings in the treatment and control groups



Source: Google Analytics data for the Weekly Hot Jobs! page (<https://www.westmiworks.org/>), N= 1,975 (treatment), 2,012 (control).

Note: Results show the regression-adjusted averages after controlling for observable characteristics including device type, month, and time of day. Statistical differences between the treatment and control groups are denoted as * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Secondary outcomes

We found no evidence that the intervention changed the extent of search on the web page. After arriving at the initial table of job listings in the construction and energy industries (the default table for treatment and control users), users in the treatment and control groups were equally likely to click on another tab to view listings in a different industry. Specifically, after adjusting for observable characteristics, users of the treatment page clicked on 0.04 fewer industry tabs than users of the control page, but this difference

was not statistically significant (Exhibit III.3). Similarly, the likelihood of returning to the Weekly Hot Jobs! page on a later date differed by less than 1 percentage point between groups and the difference was not statistically significant.

We also measured other engagement with the site, including contacting a talent development specialist or scheduling a mock interview. We found no meaningful difference in measures of other engagement with the site between the treatment and control groups, but less than 10 percent of users engaged in these behaviors in either group.¹⁷

Exhibit III.3. Engagement with job search in the treatment and control groups

Variable description	Control	Treatment	Difference
Job search			
Number of industry buttons clicked at first visit	0.538	0.501	-0.037
Accessed website more than once (percentage)	0.145	0.151	0.006
Other engagement			
Contacted a WMW talent development specialist at first visit (percentage)	0.005	0.001	-0.004**
Scheduled a mock interview at first visit (percentage)	0.097	0.085	-0.011
Total observations	2,012	1,975	

Source: Google Analytics data for the Weekly Hot Jobs! page (<https://www.westmiworks.org/>), N= 1,975 (treatment), 2,012 (control).

Note: Results show the regression-adjusted averages after controlling for observable characteristics including device type, month, and time of day. Differences between the treatment and control group averages may not match the value in the Difference column due to rounding. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Finally, our results on engagement with job listings were consistent when measuring engagement in only the first visit or across all visits. Users who saw the treatment site clicked on an average of 0.15 fewer job descriptions across all visits and were four percentage points less likely to click on at least one job description. When measuring across all visits, differences also account for any change in job search activity. For example, lower levels of job exploration may be caused by increased job finding rates from the first visit. Therefore, these differences are less straightforward to interpret.

Exhibit III.4. Engagement with job listings in the treatment and control groups across all visits

Variable description	Control	Treatment	Difference
Engagement with job listings across all visits			
Total job descriptions clicked on	.773	.621	-.152***
Clicked on at least one job (percentage)	.289	.254	-.036**
Total observations	1,972	1,922	

Source: Google Analytics data for the Weekly Hot Jobs page (<https://www.westmiworks.org/>), N= 1,975 (treatment), 2,012 (control).

Note: Results show the regression-adjusted averages after controlling for observable characteristics including device type, month, and time of day. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

¹⁷ The difference between the treatment and control groups in contacting a talent development specialist was statistically significant at the .05 level. However, this only represents a difference of .4 percent of users, which we do not consider to be a substantively meaningful change in this context.

We describe the methods used in our impact analyses in Section C of the Appendix. In Section D of the Appendix, we demonstrate that these results are consistent when including outliers and we present additional subgroup analyses by device type.

C. Interpretation

The results from this experiment suggest that the new information added to job listings had the opposite effect from what we had hypothesized, leading job seekers to click on fewer job titles rather than a greater number. The impact findings also suggest that the prompt to search across multiple industries did not affect job seekers' behavior, though user interviews indicate this may have been because the prompt's bold color unexpectedly caused users to perceive it as an advertisement or other irrelevant information. Our results contradict the behavioral hypothesis that prompting users to think more broadly about how their experience may be relevant to other positions will encourage them to explore additional job openings by clicking to view detailed position descriptions. Instead, it points to alternative behavioral interpretations. Two of these potential interpretations are information avoidance and filtering information in stages, which we describe in detail here.

Increased information overload. The treatment web page was designed to help users overcome a specific hassle factor—the fact that the initial job listing did not inform them about skills the position might require, so users had to click on each listing to gather that information. To address that potential hassle factor, the treatment page added more information to the initial listing. However, that might have contributed to additional information overload, in either of two ways. Bawden and Robinson (2020) note that information overload can be caused by the sheer volume of information encountered or by information that contradicts existing perceptions and beliefs. In the case of this experiment, both of these factors could have been at play. First, when confronted with additional information, users may have become more overwhelmed at the amount of information available to evaluate an opportunity, which caused them to avoid the new information. Second, due to other behavioral barriers such as status quo bias and identity mismatch, users may have found the new information provided to be inconsistent with their own view of which positions were relevant to them, and therefore ignored it. However, quantitative results did not indicate that users of the treatment web page were less likely to return to the web page, as might be expected if information overload were at play. Interviews with users did not indicate that those users found the new information on relevant experience overwhelming; the small number of users we spoke with reported finding the new information useful.

Filtering information in stages. Job seekers may also respond to information overload by developing criteria that they can use to quickly scan jobs and reduce the cognitive difficulty of the search (Payne 1976). When faced with a large set of options, individuals often simplify the task by using these criteria to mentally filter options in stages, first eliminating all but a few options before selecting an even smaller set to explore further. Examples of filtering criteria may include specific job titles, industries, or counties. Filtering out most of the job listings with one or two simple criteria allows them to carefully compare the remaining listings they have prioritized for review (Roberts and Lattin 1991; Manduca 2019). For example, in the case of our experiment, users may have already eliminated listings by job title and county before reviewing the examples of relevant experience. In this case, users would not have been exposed to the information that may have broadened their search. Even if users only filtered by county, when there were only a few listings within a customer's county, this would mean that there was limited room to encourage customers to expand search into. Users may also have responded to the relevant experience information by incorporating it into their first stage of filtering, for example, excluding all options that did

not list a specific job they previously held in the “This opportunity may be a good fit if you have ever held any one of these jobs” column. Feedback from user testing aligns with both interpretations. Some users noted that they only considered opportunities in one or two counties, and several users reported that they found the new information helpful for quickly focusing on the most promising opportunities. The labor market context may have also influenced how job seekers used filtering criteria. For example, users in this experiment may have felt more comfortable eliminating more listings in their initial filtering because the job market was strong.

Implications for job search outcomes. The different possible responses to new information described above have distinct implications for job search outcomes such as job finding rates, which this study was not able to measure. The study team hypothesized that if job seekers used the new information when filtering listings into a priority set for review, then it may have improved their outcomes if it allowed them to more quickly filter out poorly matched opportunities. In contrast, if the main response to new information was avoidance, that would primarily prevent users from viewing potentially well-suited opportunities. Therefore, the results of the experiment provide insights on two different explanations for users’ online job search behaviors online. Specifically, the study’s results are consistent with two different ways the intervention might have altered job seekers’ search process:

1. **More efficient job search.** If job seekers focus only on positions that would be of interest to them and that they are likely to get, this would lead to similar job finding rates with lower search time and potential improvements in match quality.
2. **Overly narrow job search.** If job seekers miss positions that may be well suited to them, this would lead to lower job finding rate.

In supplemental, exploratory analyses using data on job application clicks, we found some limited evidence suggesting that the intervention is leading to more efficient job search.¹⁸ Among individuals who clicked on initial listings to view a detailed description, we examined the share who then clicked to view the job application. We found that only 4 percent of Weekly Hot Jobs! users who clicked to view a job description then clicked on the “Click to Apply” button to view the job application. This indicates that the overwhelming majority of job descriptions clicked on were not pursued through the step of submitting an application. In other words, there is a lot of room for website users to filter the initial listings more thoroughly and spend less time reviewing job descriptions that turn out to be a poor match. Based on this, additional information that could help users quickly evaluate whether a job is likely to be a good fit has the potential to substantially increase the efficiency of job search. However, additional research is needed to determine more conclusively whether this intervention or other similar adjustments to job listings would lead to more efficient job search or an overly narrow job search.

D. Study limitations

Although findings from this study help to further illuminate barriers that might reduce job seekers’ success, as well as areas for further learning, it is important that these results be interpreted in the context in which the intervention was implemented. This intervention was limited to the WMW Weekly Hot Jobs! site, and therefore the findings may not be applicable to other settings. First, the tight labor market

¹⁸ Google Analytics data were provided by Pure Michigan Talent Connect, which hosts the website that contains the full job descriptions and application links for all jobs listed on the WMW Weekly Hot Jobs! page. These data show the number of visitors to the Pure Michigan Talent Connect website coming from the WMW site and the number of application clicks from this set of visitors. The data do not allow us to distinguish between visitors from the treatment group and the control group.

during the study period may have impacted job seekers' behavior. Second, visitors to the site are likely not representative of the average job seeker. These job seekers are limited to individuals in West Michigan who were aware of the WMW site and opted to use it for job search.

Another limitation of this study is that we are unable to estimate the impact of our intervention on job applications and job finding rates due to lack of data. We would also likely lack sufficient power to observe an impact if data were available. As noted earlier, of WMW website users who visited job descriptions, only 4 percent clicked through to applications. As a result, even a large percentage impact would not be detectable with our sample. This low rate also limits our ability to consider the impacts of the intervention on job-finding rates if the job seekers were not well matched with this set of opportunities. It is also unknown whether the results would be similar in a setting where job seekers pursued a larger share of the opportunities that they initially clicked on.

Finally, this experiment was limited by the technology used to implement it. Google Optimize randomizes individuals into the treatment and control groups based on the device and browser that they use. If a user visited the site on more than one device or browser, there is a possibility that they were randomized to view both the treatment site and the control site. In this case, the user may have opted to use the version of the site that they preferred or have been otherwise impacted by seeing two versions of the site.

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IV. Takeaways and Directions for Future Learning

A. Lessons learned about behavioral impacts

Even as advances in information technology, such as artificial intelligence, make it easier to match job opportunities to job seekers' skills (Montuschi et al. 2013), behavioral insights on how to present information to job seekers will remain critical in matching job seekers to employment opportunities, accounting for their employment preferences and constraints. This study provides new evidence that can inform future studies on addressing behavioral barriers in job search.

The results of this study suggest that providing a short list of relevant occupations to job seekers did not lead them to search more broadly across listings. In fact, this additional information decreased engagement with job listings and had no impact on the breadth of job search. We provide two hypotheses to explain results using behavioral factors—information avoidance and the use of filtering criteria may have dominated job seekers' reactions to the new information. These findings suggest that practitioners and researchers working to understand and improve job search for workers should pay close attention to what information is provided, how it is framed, and how it might interact with behavioral factors.

Further research can help distinguish between interventions that promote efficient search and those that narrow search without improving efficiency. The results from this experiment raise questions about the limited information on a job listing may be used to quickly screen jobs for fit. Whether this screening behavior would improve the efficiency of search or deter job seekers from considering potentially well-suited jobs may depend on how users interact with the information. In this context, additional interviews with Weekly Hot Jobs! users would help distinguish between responses that promote efficiency and those that lead to overlooking promising opportunities by yielding nuanced data on how website users engage with the new information. To quantitatively measure the impact on job applications, we would need to apply the same intervention to a setting with more users or over a longer time period. In other settings, researchers can expand on this work by assessing the impact of new information on job applications, job finding rates, job quality, and the quality of the employee–job match. Measuring impacts on these outcomes would help distinguish between scenarios in which job seekers are refining their search to improve efficiency based on new information versus those in which they are filtering out promising positions using the new information. Although this experiment focused on examples of relevant experience, other information could include relevant skills, education or experience requirements, or other job attributes.

This study demonstrates the potential for web-based experiments to estimate the ability of behavioral interventions to target job seekers' most common behavioral barriers. Particularly, interventions that directly attempt to reduce information overload may lead users to consider more options or engage with more job descriptions. Future interventions may consider ways to provide a small, targeted set of promising options that a job seeker may have missed due to behavioral barriers such as status quo bias and identity mismatch.

B. Lessons learned on developing behavioral interventions

This exploration of applying behavioral insights to expand job search has generated some valuable lessons.

- **It is feasible to develop simple interventions embedded in workforce agency websites and quickly learn about them.** The WMW Hot Jobs! web page allowed for customization based on the intervention design, and platforms such as Google Optimize make A/B testing relatively simple. The reflections of WMW staff further demonstrate the feasibility of studies like this one. The staff member who led implementation reported that implementation was less time-consuming than they anticipated at the outset. Although designing the intervention required a moderate- to high-level of effort (three respondents), this could have been due in part to the COVID-19 pandemic, which caused challenges in the design process that extended the design period.
- **Designing a web-based behavioral intervention requires additional consideration of how users interact with the web.** The average user likely interacts with day-to-day, web-based tools differently from how they might interact with something on paper.¹⁹ Customer interviews suggested that some web page users may not have noticed the prompt to search multiple industries. They felt they were primed to quickly skim over the content because it was bright red. This issue may have been less prominent in a printed letter.
- **Thought partnership with workforce agencies can target opportunities for behavioral interventions.** Our partners at WMW were well informed about the interests and needs of their customers. Our goal in designing the intervention was that it would both meet the needs of the WMW customer base and support learning among other state and local workforce agencies. The early site visit, phone calls, and email conversations with WMW allowed us to gain insight and feedback from WMW to design a better intervention. This partnership also complemented WMW's existing culture of continuous improvement. The WMW staff involved are now more familiar with A/B testing as a learning approach and can use the findings from this evaluation to inform future website development. Future partnerships between researchers and workforce agencies can help align intervention designs to the needs of job seekers and strengthen the capacity of local workforce agencies to build and use evidence to improve their services.
- **Early and repeated engagement with prospective intervention users at the diagnosis and design stages may improve intervention design.** We spoke with WMW customers during an early site visit and through user testing as we designed the intervention. These activities happened at the understand and design stages of the six-step process for designing and implementing behavioral interventions (Exhibit II.2). We learned insights from customers that we had not learned elsewhere, including in our discussions with WMW staff. Future researchers may consider engaging with prospective intervention users at multiple steps in the design process. In this case, a follow-up meeting with users who engaged in user testing to confirm and review the changes made to the intervention might have led to a better design. Conversations with users at the diagnose stage to validate initial behavioral diagnoses might also help future researchers confirm hypotheses.

¹⁹ See, for example, Fink 2019, Epstein et al 2001, Hollandare et al. 2010.

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Appendix

This Appendix provides additional details on the study to supplement the information provided in Sections II and III of the main report.

A. Study development and intervention design

We drew on the behavioral diagnosis described in Section II.C of the main report to design the study and intervention. Exhibit II.3 shows the hypotheses identified through that process about how behavioral bottlenecks might affect customers' use of the web page.

When considering the channels available to field an intervention based on the behavioral diagnosis above, we sought to balance the rigor of the design with the operational considerations of West Michigan Works! (WMW). One key consideration was that, because of the COVID-19 pandemic, WMW no longer had access to a large database of job seeker emails. However, the WMW website was experiencing a dramatic increase in traffic, which likely reflected high unemployment rates and either the unavailability of, or a reluctance to seek, in-person services.²⁰ We identified the Weekly Hot Jobs! web page as a promising setting for an experiment because of its high traffic volume and its direct goal of matching job seekers to immediate job opportunities.

We drew on the behavioral diagnoses and expertise of the WMW agency when determining which type of information to add to the Weekly Hot Jobs! web page. Although the U.S. Department of Labor Behavioral Interventions (DOL BI) team and WMW initially considered providing job seekers with information about skills associated with each job posting, WMW staff indicated that, based on their experience with customers, many would find the skill terminology too vague and difficult to understand. To avoid inadvertently adding complexity to the web page, we decided to present information related to skill match through the "Relevant Experience" column, listing occupations that have skill requirements similar to those of the job posting of interest. This form of information on required skills is indirect, but WMW staff with extensive experience felt it would be easier for job seekers to compare with their own experience.

To refine the intervention, we conducted a series of user tests from March 15–19, 2021, with nine WMW customers who were current job seekers. In the sessions, we observed users as they navigated to the treatment web page. We then asked a series of questions about their experience and perceptions to better understand how users interact with the treatment web page. The purpose of the user testing was to identify any improvements that could advance our goal of broadening job search and increasing successful job search.

Through user testing, we identified two categories of changes to the intervention design. The first were technical or clarification changes that were applied to both the treatment and control versions of the web page. The second set of changes were design-based changes that were intended to advance our goal of broadening job search and increasing successful job search. These included the following:

- 1. Change the heading of the "Relevant Experience" column to "This opportunity may be a good fit if you have ever held any one of these jobs."** The users expressed some confusion over the information the examples of relevant experience were intended to convey. This appeared to be related

²⁰ Based on Google Analytics data shared by WMW, from January 2020 to May 2020, unique monthly visitors to the WMW Weekly Hot Jobs! site increased from 854 to 2,803, representing a 228 percent increase.

to the interpretation of the meaning of “*relevant experience*.” For example, one user expressed concern that the employer only wanted an applicant who had experience in all of the listed jobs. We therefore adjusted the heading to be more direct and use simpler language.

- 2. Drop from 10 to six examples of relevant experience.** The users expressed that reviewing all 10 examples of relevant experience was time consuming. Further, some examples lower on the list were perceived to be less relevant to the associated opportunity. Dropping from 10 to 6 examples was intended to be more digestible for users and limit the inclusion of only tangentially relevant experience.
- 3. Emphasize the prompt to look across industries.** Eight of the nine users mentioned that they did not notice the prompt reminding job seekers to look across industries. To address this, we changed the prompt to be larger and in a more eye-catching color. We also duplicated this prompt at the bottom of each table.
- 4. Emphasize industry buttons.** Two users mentioned that they did not think it was clear that they could click on multiple industries. We therefore adjusted the design of the industry links to make it clearer that they were buttons.

Exhibit II.4 in section II of the main report presents a snapshot of the treatment web page with these design changes incorporated.

B. Evaluation design and data sources

This section describes the design of the behaviorally informed job search experiment on the WMW Weekly Hot Jobs! web page.

To randomly assign users to the treatment or control site, we used the A/B testing feature of Google Optimize. This randomly assigned each visiting IP address and browser combination to either the treatment or control group. A returning user saw the same page each time they visited the site as long as they used the same device and browser. Because we used the free version of Google Optimize, each individual experiment was only allowed to run for three months. We therefore had to restart the experiment twice during the course of the study, on November 4, 2021, and February 2, 2022. Practically, this meant that all users were randomly assigned again at this time. Therefore, when they returned to the Weekly Hot Jobs! site, there was a 50 percent chance they would see a different version. But because our primary outcomes are focused on the first site visit, this did not impact our primary outcomes. For outcomes that are estimated over all visits, we removed users whose treatment status changed over the experiment and use weighting to adjust for this. We describe the method for generating weights in Section C of this Appendix. To determine the length of the study, we completed power calculations to estimate the minimum detectable effects based on predicted users and baseline outcome rates.

Data

To measure how users engaged with the website content, we drew on data from Google Analytics. The data were obtained using the Google Analytics Reporting application programming interface (API). These data include information on visit date and time, links clicked, device type, and whether the user saw the treatment or control site. A user is defined using a unique client ID that identifies a unique browser and IP address combination. Because it is not possible to differentiate between session, we defined a visit as a unique date on which the individuals visited the site.

C. Analysis methods

In this section we describe the methods used to analyze both the implementation and impact of the evaluation.

Implementation data collection and analysis methods

To answer the implementation research questions, the study team conducted semi-structured discussions with four WMW staff who led the design and implementation of the web page in collaboration with the study team. The study team also conducted interviews and observations with five WMW customers who had previously used the Weekly Hot Jobs web page.

Staff interviews

We conducted discussions with WMW staff in February and March 2022. Each discussion lasted approximately one hour. The discussions gathered information on four primary topics aligned to the implementation research questions:

- 1. The level of effort and resources involved in designing and implementing the intervention.** We first asked staff to describe who was involved in designing and implementing the intervention, as well as the level of effort associated with designing the intervention.
- 2. The degree to which WMW was able to implement the intervention as intended.** We next asked staff to share their perspectives on implementation and data collection. Staff shared their recollections of whether any changes were made to the treatment or control web pages after the treatment web page was launched, their perspectives on the level of effort involved in implementation and data collection, and perceived factors that facilitated or impeded it.
- 3. Key features of the context in which they implemented it.** The third topic of focus involved contextual factors that may have affected the evaluation, particularly the treatment web page's effectiveness. This section of the conversation explored staff perspectives of the demographic features of likely users of the web page, the labor market in West Michigan, and the effects of the COVID-19 pandemic on West Michigan and how customers may have conducted work search.
- 4. Lessons learned through the design and implementation processes.** Finally, we asked staff to share lessons they had learned or best practices they had identified through the intervention design and implementation processes.

Customer interviews

We conducted interviews and observations with five WMW customers in March 2022. We initially aimed to recruit nine customers to participate in interviews and observations; however, recruitment was challenging. For example, some customers who were identified to participate never selected a time. Additionally, we asked WMW to restrict their selection of customers to those who previously used the Weekly Hot Jobs! web page. Though we later opened up this restriction, WMW staff were not optimistic they would find additional participants.

We recruited participants who were diverse in terms of age, occupation, and industry. Each discussion lasted approximately 45 minutes, and customers received a \$50 electronic gift card for their participation. The discussions gathered information on three primary topics: (1) the customers' work search goals, (2)

the differences they noticed between the treatment and control web pages, and (3) the extent to which the changes to the web page were useful and encouraged the customer to search more broadly.

We first asked customers to describe whether they were searching for work and, if applicable, their work search goals. Each customer then explored either the treatment or control web page. Three customers began with the treatment web page and two began with the control web page. We asked them to imagine that they were visiting the web page to search for a job and to narrate what they were doing as we observed via screen-share. After they explored the treatment web page, we asked an initial set of questions focused on the customers' goals for using the treatment page and the extent to which it met their expectations. After customers had explored both web pages, we asked customers to describe the differences they noticed between the two pages and their reactions to those differences. For any differences they did not mention, we then pointed them out and asked for their reflections on the salience and usefulness of those differences. Finally, we asked customers to reflect on the extent to which the changes to the web page were useful and encouraged the customer to search more broadly. We probed to understand whether they would recommend other changes, whether the column listing relevant experience felt applicable to their level of experience, and whether they were open to searching for work in multiple industries.

Analysis methods

In the analysis, we transcribed data from the discussions and observations and coded them to identify themes and areas of variation. After transcribing the data, we used Excel to code those themes present in the interviews. To identify themes, we first pulled relevant data for each topic; we then looked across respondents and coded themes for each topic. We also identified notable areas of variation. For the staff interviews, we noted singular responses that appeared important to the context or may have reflected the unique responsibilities of the staff member.

After coding themes by discussion question, we identified overarching themes and insights. We elevated themes that did one or more of the following: (1) provided context helpful to understanding the quantitative findings, particularly the pattern of impacts on quantitative outcome measures; (2) shared WMW staff recommendations that would be critical for other state agencies considering similar interventions; and (3) illustrated WMW staff reflections on the ongoing impact that participating in the intervention was having on the agency. We used these themes to generate potential insights for supplementing and informing the interpretation of the quantitative results.

Impact analysis

The impact analysis relied on the random assignment of users to the Weekly Hot Jobs! website to see either the treatment or the control version of the site. We used Google Optimize to conduct random assignment, which appears to have been successful. The website had 4,150 users during our study period, of which 2,060 were randomly assigned to the treatment group and 2,090 were randomly assigned to the control group. Before analyzing the sample, we removed users from the data whom we believed could bias the results. First, we removed all observations with client identifiers that were associated with a member of the study team. We further removed the 72 individuals who clicked on both the treatment and control websites during a single experiment, that is, not related to the required restart of the experiment. The final two groups—1,975 treatment observations and 2,012 control observations—were similar on observable characteristics including device type, visit time, and visit month (see Exhibit III.1 in the main report).

Our primary analyses excluded 88 individuals who were determined to be outliers, in that they exhibited unusual patterns in the data (Barnett and Lewis 1994). Outliers can introduce bias in our analysis in two ways. First, the unusual patterns in the data may suggest data quality issues or that users were not using the website in the same way as traditional users. For this reason, we removed individuals with atypical site visit patterns because these individuals are unlikely to be job seekers and more likely to be professionals assisting others with job search. Second, outliers may introduce extreme values of an outcome, which can have a disproportionate impact on the analysis. For this reason, we removed individuals who clicked on an atypical number of job descriptions on their first visit. Identifying outliers in this context is challenging given that outcomes are skewed right, making the presence of extreme values consistent with the distribution of the data (National Institute of Standards and Technology 2012). We therefore considered values to be outliers if they were in the top 1.22 percent of values. This represents the percentile threshold associated with a z-score of 2.24, which is a standard cutoff used in the literature (Aguinis et al. 2013). Based on this rule, we removed individuals who visited the site on more than 19 unique dates or clicked on more than eight job descriptions on their first visit. In Section D of this Appendix, we present results inclusive of outliers and show that their inclusion does not meaningfully impact results.

As described in Section B of this Appendix, the terms of our Google Optimize use required that we restart the experiment twice during the course of the study. Therefore, individuals who visited the study in multiple periods could see both the treatment and control version of the website. For all outcomes that were measured at the first visit, including the primary outcomes, this restart did not impact analysis. Similarly, a reassignment would not affect whether an individual returned to the site. However, for outcomes measured across all visits, seeing both the treatment and control sites could introduce bias. In calculating outcomes measured across all visits, we therefore removed data for individuals assigned to both the treatment and control groups and adjusted for sample composition using weights. Exhibit A.1 shows the sample weights used to adjust for experiment restarts.

Appendix Exhibit 1. Sample weights for outcomes measured across all visits, adjusting for experiment restarts

Experiment Period			Weight
Experiment 1 (Aug 7, 2021 – Nov 4, 2021)	Experiment 2 (Nov 4, 2021 – Feb 2, 2022)	Experiment 3 (Feb 3, 2022 – Mar 3, 2022)	
T or C			1
	T or C		1
		T or C	1
T	T		2
C	C		2
T	C		0
C	T		0
T		T	2
C		C	2
T		C	0
C		T	0
	T	T	2

Experiment Period			Weight
Experiment 1 (Aug 7, 2021 – Nov 4, 2021)	Experiment 2 (Nov 4, 2021 – Feb 2, 2022)	Experiment 3 (Feb 3, 2022 – Mar 3, 2022)	
	C	C	2
	T	C	0
	C	T	0
T	T	T	4
C	C	C	4
T	T	C	0
T	C	T	0
T	C	C	0
C	T	T	0
C	T	C	0
C	C	T	0

Source: Study team calculations and evaluation design documentation.

Note: Blank cells indicate that an individual did not visit the website in that experiment period. A weight of zero will cause an individual to be dropped from the sample for weighted analyses.

C = control group; T = treatment group.

To estimate the impacts of the experiment on site users, we measured the outcomes listed in Exhibit II.5. We analyzed data using the following linear regression adjustment to control for observable characteristics associated with each user:

$$y_i = \beta_0 + \beta_1 T_i + \alpha D_i + \gamma J_i + \delta M_i + \varepsilon_i$$

Here, y_i represents the outcome variable for individual i , for example, job listing clicks. T_i is an indicator equal to one if the individual was assigned to the treatment group. D_i , J_i , and M_i are a series of indicators for the observable covariates including for device type, time of day, and month of year, respectively. Although randomization leads these characteristics to be balanced across groups, if they help explain systematic variation in outcomes, then accounting for them can increase the precision of our treatment effect estimates (Lin 2013). ε_i is a user-specific error term.

D. Supplemental findings

1. Implementation analysis

We held semi-structured discussions with key WMW staff to learn about their experiences participating in designing and implementing the treatment web page. In addition to the key findings described in Section III of the main report, we obtained the following supplemental findings:

WMW serves a diverse population with diverse needs.

- The region includes seven counties, ranging from urban to rural. Staff reported that customers’ demographic characteristics vary (four respondents), and customers face challenges such as securing transportation (two respondents) and reliable internet access (one respondent).

- Customers follow a range of paths to arrive at the Weekly Hot Jobs! page (three respondents). For example, some customers are directed by WMW staff to the web page, while others might learn about the web page through their school or community college or a simple web search. Two respondents shared that the web page is often used by customers seeking a career change that may require obtaining a degree or credential.

Designing the treatment web page required collaboration across the organization and with the study team.

- Staff involved in designing the treatment web page represented multiple WMW teams. Respondents agreed that staff involved were the chief executive officer, chief operating officer, director of marketing, director of talent solutions, members of the marketing team, and a policy manager who led direct work with job seekers.
- The study team contributed to the design of the intervention and the evaluation, including helping WMW consider how to use Google analytics for the evaluation.

The implementation of the intervention occurred as intended, requiring less effort than staff expected at the outset.

- Members of the marketing team were most heavily involved in preparing for the web page to launch once the design was finalized and in implementing the treatment web page (four respondents). To do so, the director of marketing maintained the web page and kept it updated. She was assisted by another staff member who uploaded a spreadsheet containing needed data.
- WMW staff reported that they were not aware of any changes to the treatment or control web pages after the evaluation began (four respondents).

Policy changes and other impacts of the COVID-19 pandemic were reported to affect how, when, and why job seekers interacted with WMW and the web page.

- WMW lost some of its access to customers during the pandemic (three respondents). Many WMW services shifted from in-person to online. As demand increased for remote services, WMW felt they had less direct interaction with customers relative to when most services were in-person. Additionally, applicants for unemployment insurance in the region are required to register with WMW. This requirement was waived and later reinstated during the evaluation.

WMW staff gained valuable experience participating in the evaluation.

- Staff reported that they gained insights from the experience of designing and implementing the intervention and supporting the evaluation. They mentioned that how they think about using data has changed (three respondents).
- They recommended that other workforce agencies should understand the needs of and gather input from potential users when making behaviorally informed changes (two respondents).

We conducted interviews and observations with five WMW customers to learn about their experiences interacting with the web page. In addition to the key findings described in Section III of the main report, we obtained the following supplemental findings:

All customers reported that they had visited the Weekly Hot Jobs web page in the past.

- They reported first visiting the web page for a range of reasons. Two customers visited the web page because of an unemployment insurance requirement or direction from WMW staff, two customers visited the site to look for available jobs for themselves or a loved one, and one did not share why they previously used the web page.

The treatment page provided what customers were looking for.

- After exploring the treatment page, most customers (three) reported that it provided what they were looking for. For example, the treatment page helped meet their needs by sharing more information about job listings and by helping them to save time in their job search.

The changes to the web page helped customers expand their job search.

- Four customers stated that the changes to the treatment page either would help them to search more broadly or that the changes might help someone else to do so.
- One customer shared that job seekers may not realize they have the sought-after qualifications. The “relevant experience” column might help them realize alignment between their qualifications and a job listing.

Most customers were already looking beyond one industry.

- As mentioned above, we varied the web page that customers were first introduced to. Two of the five customers first explored the control web page, and the other three customers first explored the treatment web page. The two customers who explored the control web page both clicked on jobs in more than one industry. One customer who explored the treatment web page first shared that they were searching for work in multiple industries.
- These observations are consistent with WMW staff observations that job seekers might be looking for new types of jobs or for work in new industries.

Staff interviews can provide a complete overview of experiences implementing the intervention. Our conversations with customers gave us good insights into their perspectives on the changes to the web page and thoughts on its contrast with the existing web page. However, because we spoke only with five customers, what we heard may not represent sentiment among customers more broadly.

2. Impact analysis

To understand how users experienced the treatment differently across device type, we included a subgroup analysis with results separated into two categories: desktop and mobile device or tablet. We found that the impact of treatment was substantially larger for desktop users than for mobile device or tablet users (Appendix Exhibit 2). This suggests that most of the impact was among desktop users who could view the additional information without scrolling.

Appendix Exhibit 2. Job description clicks in the treatment and control groups by device type

Variable description	Control	Treatment	Difference
Desktop			
Job listings			
Total job descriptions clicked on (first visit)	0.698	0.526	-0.172***
Clicked on at least one job (first visit), %	30.5	24.9	-5.58***
Job exploration			
Total industry tab clicks	1.028	0.928	-0.100***
Accessed website more than once, %	12.0	14.4	2.48*
Other engagement			
Contacted a talent development specialist, %	0.298	0.199	-0.099
Scheduled a mock interview, %	8.60	8.36	-0.244
Mobile/tablet			
Job listings			
Total job descriptions clicked on (first visit)	0.399	0.375	-0.024
Clicked on at least one job (first visit), %	21.9	19.8	-2.14
Job exploration			
Total industry tab clicks	0.045	0.067	0.021
Accessed website more than once, %	17.0	15.8	-1.25
Other engagement			
Contacted a talent development specialist, %	0.813	0.093	-0.720**
Scheduled a mock interview, %	10.8	8.72	-2.12
All users			
Job listings			
Total job descriptions clicked on (first visit)	0.549	0.452	-0.098***
Clicked on at least one job (first visit), %	26.2	22.4	-3.82***
Job exploration			
Total industry tab clicks	0.538	0.501	-0.037
Accessed website more than once, %	14.5	15.1	0.627
Other engagement			
Contacted a talent development specialist, %	0.550	0.149	-0.401**
Scheduled a mock interview, %	9.70	8.55	-1.16

Source: Google Analytics data for the Weekly Hot Jobs! page (<https://www.westmiworks.org/>), N= 2,004 (desktop), 1,983 (mobile/tablet).

Note: Results show the regression-adjusted averages after controlling for observable characteristics including month and time of day. Statistical differences between the treatment and control groups are denoted as * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The sample includes 2,004 desktop users and 1,983 mobile device or tablet users. Differences between the treatment and control group averages may not match the value in the Difference column due to rounding.

Finally, we assessed the sensitivity of our results to the exclusion of outliers (Appendix Exhibit.3). We found that including outliers in the analysis does not meaningfully change our results.

Appendix Exhibit 3. Results with no outlier exclusion

Variable description	Control	Treatment	Difference
Job listings			
Total job descriptions clicked on (first visit)	.668	.597	-.071
Clicked on at least one job (first visit), %	.272	.232	-.040***
Job exploration			
Total industry tab clicks	.581	.537	-.054
Accessed website more than once	.157	.158	.001
Other engagement			
Contacted a talent development specialist	.005	.001	-.004**
Scheduled a mock interview	.098	.086	-.012

Source: Google Analytics data for the Weekly Hot Jobs! page (<https://www.westmiworks.org/>), N= 2,012 (treatment), 2,063 (control).

Note: Results show the regression-adjusted averages after controlling for observable characteristics including device type, month, and time of day. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

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