

# Using Recruitment Source Timing and Diagnosticity to Enhance Applicants' Occupation-Specific Human Capital

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This study proposes that reaching applicants through more diagnostic recruitment sources earlier in their educational development (e.g., in high school) can lead them to invest more in their occupation-specific human capital (OSHC), thereby making them higher quality candidates. Using a sample of 78,157 applicants applying for jobs within a desirable professional occupation in the public sector, results indicate that applicants who report hearing about the occupation earlier, and applicants who report hearing about the occupation through more diagnostic sources, have higher levels of OSHC upon application. Additionally, source timing and diagnosticity affect the likelihood of candidates applying for jobs symbolic of the occupation, selecting relevant majors, and attending educational institutions with top programs related to the occupation. These findings suggest a firm's recruiting efforts may influence applicants' OSHC investment strategies.

*Keywords:* recruitment, job search, staffing, occupational choice, human capital

Many firms struggle to attract high-quality talent, and these struggles are most salient for occupations that require high levels of knowledge and expertise that are acquired over long periods of time (Dahl, 2012; SHRM, 2013). Recruitment into science, technology, engineering, and math (STEM) occupations provides a popular example, but these problems are (to varying degrees) experienced within many industries and occupations (Lennon, 2014; Peralta, 2014; Wright, 2013). Competitive pressures for high-quality applicants have led firms to begin to recruit farther upstream of the application process. For example, some firms have begun promoting their jobs to students in college and even high school (e.g., Feintzeig, 2014). At the same time, competition among applicants for prestigious jobs has also led many people to begin planning their careers far in advance of when they may actually be viable candidates for a job (Brown & Hesketh, 2004; Tomlinson, 2007, 2008).

The problem for both employers and candidates is the simple fact that many jobs, even those at the entry level, require high degrees of *occupation-specific human capital* (OSHC). OSHC is defined as the knowledge, skills, abilities and other characteristics (KSAOs) individuals acquire through investments made in education and work experience that are relevant for achieving economic

outcomes within a specific occupation but are largely nontransferable to other occupations (cf. Becker, 1964; Ployhart, Nyberg, Reilly, & Maltarich, 2014). One seemingly obvious solution is for firms to seek out ways to enable individuals to enhance their levels of OSHC prior to application. Enticing potential applicants to develop their OSHC over long periods of time before applying may help the candidates enhance their employability and desirability as a candidate.

The purpose of this article is to advance recruitment scholarship by integrating concepts from a variety of research perspectives to begin to understand how firms can use recruitment to enhance applicants' levels of OSHC. First, we examine if individuals who hear about an occupation through recruitment sources that differ in their timing (including as far back as high school) and diagnosticity accumulate more OSHC by the time they apply. *Recruitment sources* refer to the modes by which organizations communicate job, occupational, or organizational information to applicants. *Diagnosticity* refers to the degree to which information is helpful for making judgments and choices (e.g., Einhorn & Hogarth, 1986; Skowronski & Carlston, 1987; Tversky, 1977). Second, we extend and reinforce our findings by examining how source timing and diagnosticity relate to individuals' OSHC investment strategies. It is not obvious, either theoretically or empirically, that recruitment sources can induce individuals to willingly invest in their own long-term OSHC development. Yet, clearly firms do invest in recruitment before potential applicants are even eligible for employment (e.g., high school awareness and early outreach programs). This study provides initial theory and data to explain why such early recruitment programs may be valuable. Thus, this study potentially offers both theoretical and practical contributions.

This article contributes to the literatures on recruitment and job search in three ways. First, we introduce the concept of source timing to literatures that have thus far operated under the assumptions that (a) the objectives of the first stage of recruitment (i.e.,

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applicant generation) are to identify and attract individuals who already meet the organization's needs (Barber, 1998), and (b) individuals are already as qualified as they will be for the job. In so doing, we embrace rather than ignore the possibilities that recruitment sources often do reach individuals early in their educational development and that such exposure may afford certain advantages such as greater opportunities to develop their OSHC prior to application. Thus, early exposure to recruitment sources might be an effective way to stimulate individuals' investments in their OSHC.

Second, we extend prior work on source diagnosticity by explaining how recruiting sources contribute to individuals accumulating more OSHC by the time they apply. Source diagnosticity is relevant to understanding the behaviors of applicants who are currently on the job market (Van Hoye & Lievens, 2009). However, it may also be relevant to understanding applicant behavior long before they reach the job market because early exposure to sources that are more diagnostic about the characteristics of an occupation may lead individuals to better understand which educational choices will enable them to develop more OSHC.

Finally, we examine applicants' OSHC investment strategies, thus enabling us to understand how recruitment source timing and diagnosticity relate to the intermediate steps involved in becoming more prepared for an occupation. It seems reasonable that individuals who hear about a particular occupation earlier and/or through a more diagnostic source will also be more likely to (a) establish employment goals, (b) select majors that are related to the occupation, and (c) attend schools known for producing candidates capable of obtaining jobs within the occupation. However, there is little research that speaks to this issue, and from a recruitment perspective it is not obvious whether sources—even those of high diagnosticity—are strong enough interventions to trigger such actions. It is also unclear whether such actions improve applicants' OSHC to a meaningful degree as prior research generally focuses on earnings (James, Alsalam, Conaty, & To, 1989; Robst, 2007). Therefore, we examine the investment decisions that applicants make as well as how they relate to their subsequent levels of OSHC. This study also provides an important practical implication by showing how a firm can shift some of the costs (financial or otherwise) associated with generating the human capital it needs to individuals prior to their entering the firm.

We test the hypotheses on a sample of 78,157 applicants applying for five jobs within a highly desirable professional occupation at a public organization over the course of 6 years. Importantly, the primary outcome examined in this study is OSHC, which has previously been measured using variables such as major (Berger, 1988; Christiansen, Joensen, & Nielsen, 2007) and quality of educational institution (Datta & Iskandar-Datta, 2014; Miller, Xu, & Mehrotra, 2015). Yet, these operationalizations contain at least two important deficiencies. First, they are indirect measures and only serve as proxies of OSHC. Second, they do not account for whether individuals retain what they learned in school. For these reasons, we adopt Ployhart et al.'s (2014) definition of human capital, which is those KSAOs most critical (or relevant) to achieving economic outcomes (such as attaining a job) within a particular occupation, and operationalize OSHC as applicants' scores on an occupation-specific knowledge test taken at the time of application. Although this knowledge test may be deficient in that it does not measure skills, abilities, or other characteristics, it reflects the

knowledge requirements that are common across jobs within the occupation, and thus represents occupational knowledge rather than just job knowledge. It further represents an objective assessment of the OSHC held by individuals at the time of application, and is directly tied to their ability to obtain a job in the occupation.

## Theoretical Background and Hypotheses

Prior to developing the hypotheses, it is important to recognize that this study is primarily concerned with occupations. An *occupation* is defined as a "group of jobs, found at more than one establishment, in which a common set of tasks are performed or are related in terms of similar objectives, methodologies, materials, products, worker actions, or worker characteristics" (U.S. Department of Labor, 1991, p. 2–1). This study examines occupations for two reasons. First, individuals at early educational phases (e.g., high school) focus more on occupations (e.g., doctor, lawyer) than individual jobs (e.g., pediatrician, patent attorney; Rohlfing, Nota, Ferrari, Soresi, & Tracey, 2012). Second, the occupational choice literature suggests that people rely on their occupational interests and aspirations to guide their educational decisions (Brown, Ortiz-Nunez, & Taylor, 2011).

### Human Capital Theory and Occupational Choice: Acquiring OSHC

Human capital theory is a theory meant to identify and explain the mechanisms that link inputs such as individual educational investment choices to outcomes such as wages and occupational attainment (Becker, 1964; Strober, 1990). This theory proposes that individuals invest in themselves through the decisions they make concerning their education and on-the-job training (Becker, 1962, 1964). Investments with high rates of return (e.g., advanced education or specialized training) enhance individuals' human capital, which can lead to greater productivity and earnings (Becker, 1964).

Return on investment and the time required to realize a return are essential components of this theory. First, one can only model investment decisions by studying the process over reasonably long periods of time (e.g., long enough to make choices about, and investments in, education). It also takes time for investments to produce returns. This means the processes and consequences of investment decisions must adopt a "long-term view," one that is much longer than most recruitment and job search research. Second, timing matters, such that when recruitment messages are delivered, and when potential applicant choices are made, affect subsequent choices. Thus, time and timing are both critical for understanding what outcomes are probable or even possible, even though timing is scarcely considered in the organizational sciences (Ployhart & Hale, 2014; Roe, 2008). By incorporating the role of timing, human capital theory predicts that the earlier individuals hear about a particular occupation they find attractive, the greater the opportunity they have to formulate investment strategies that will enhance their OSHC by the time they apply (Becker, 1962, 1964).

Research on occupational choice similarly stresses the importance of time and timing. For example, it underscores the importance of early exposure to work-related information for individuals in terms of their eventual career success (Fouad, 2007). However,

it provides further nuance to the concept of timing by suggesting that early exposure to information regarding work and occupations affects (and potentially expands) individuals' *opportunity structures*, or their perceptions regarding future possibilities and outcomes given situational constraints that do not reflect pure motivation (Briscoe, Hall, & DeMuth, 2006; Howell, Frese, & Sollie, 1984; Krieshok, Black, & McKay, 2009; Wolff & Moser, 2010).

Figure 1 offers a conceptual example depicting how this occurs. In this figure, individuals' initial placements on the opportunity structure are determined by (a) the educational phase in which they hear about the occupation, and (b) the nature (i.e., occupation-relatedness) of the previous investments in education and work experience they have made. Following this, they make a number of investment decisions moving them from one level of OSHC to another prior to applying to an organization. For example, these investments may take the form of decisions to select an undergraduate major for study relevant to the occupation, followed by selecting a graduate major that is relevant, and finally followed by relevant posteducation work experience. As suggested by human capital theory, OSHC requires time to build and cannot be instantaneously created. In this way, each investment decision results in an incremental change in OSHC. Thus, the particular type, timing, and duration of investments individuals select over time have direct implications for their OSHC.

Hearing about the occupation through a recruitment source at an earlier educational phase (e.g., while in high school vs. during

college) grants individuals the ability to develop an advantage over other applicants. First, it affords them the opportunity to select the most optimal investments (i.e., the solid lines leading to the highest level of OSHC at application in Figure 1). That is, early investment decisions will enhance OSHC because there is more opportunity to acquire it (Becker, 1964). Second, hearing of the occupation at a time closer to application also limits the sheer quantity of investment options individuals have left. As such, even if individuals are capable of maximizing every subsequent investment they make relative to their initial amounts of OSHC (solid lines from point to point in Figure 1), they will be unable to fully make up for the disadvantage associated with hearing of the occupation later than their competition. In other words, a "time-compression diseconomy" exists (Dierickx & Cool, 1989), wherein the timeframe for making investments cannot be compressed or shrunk to produce the same amount of OSHC. For example, if an individual who hears of the occupation while obtaining an undergraduate degree previously selected an undergraduate major that is unrelated to the occupation of interest, then he or she is likely less competitive compared to others who heard of the occupation in high school that did select a related undergraduate major. This is true even if everyone selects a graduate major related to the occupation because the returns to investments in majors (as well as the educational institutions from which majors are obtained) are path dependent. The absolute amount of OSHC an individual has at any

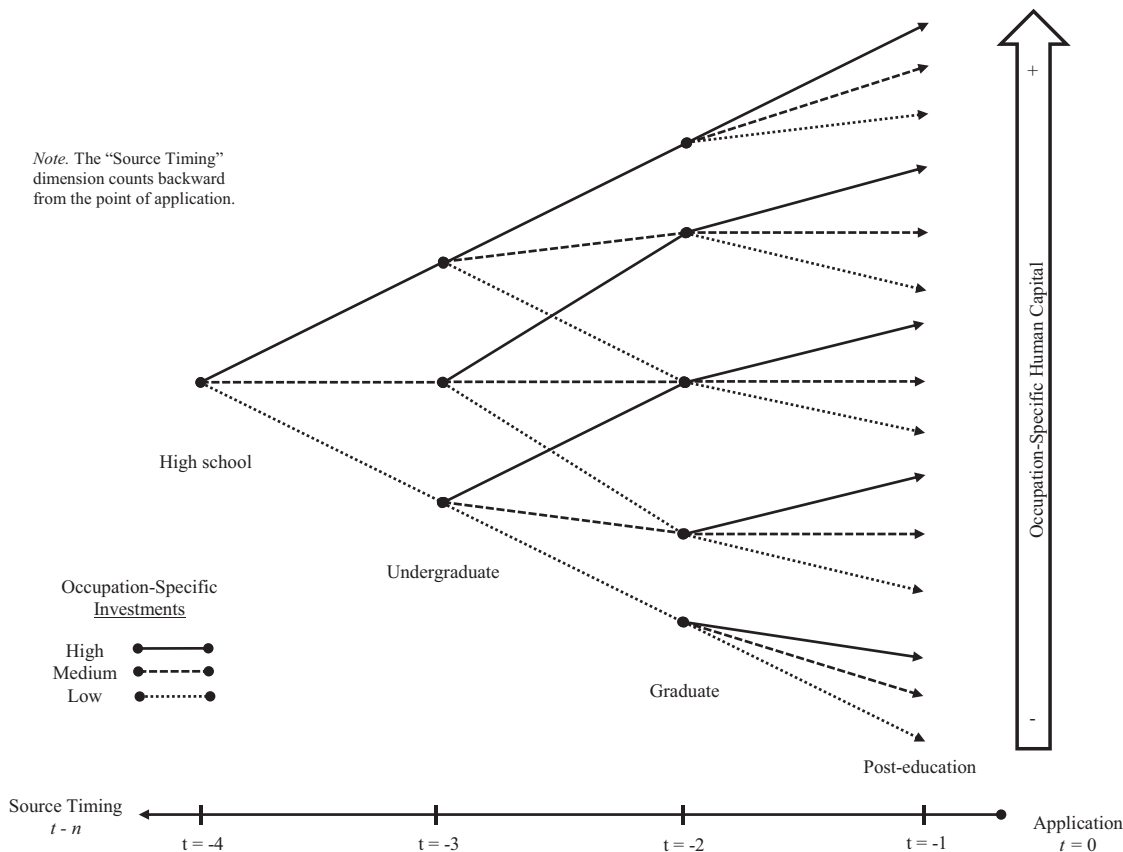


Figure 1. Conceptual depiction of opportunity structure created through exposure to recruitment sources and affected by occupation-specific human capital investments over time.

given point in time depends on the nature of his or her entire set of prior investments.

*Hypothesis 1:* Applicants who heard about the occupation during an earlier educational phase will have higher levels of occupation-specific human capital.

### The Impact of Recruitment Source Diagnosticity on OSHC

The information a recruitment source conveys can exert a substantial amount of influence over an applicant's beliefs, attitudes, and decisions (Breugh, 2013). Although informational characteristics of recruitment sources can be classified in a number of ways, an emerging stream of research focuses on diagnosticity (Van Hoyer & Lievens, 2005, 2007, 2009; also see Slaughter, Cable, & Turban, 2014). Diagnostic information relates to judgments in that information regarding characteristics of options is used to determine their categorization. Categories are developed to minimize within-category differences and maximize between-category differences among options (Tversky, 1977). Choices or decisions among options are then determined by the salience of their differences created by judgments of their categorization and the prototypicality of options within categories (Tversky, 1977). Thus, a diagnostic recruitment source is one that offers information that improves applicants' abilities to "discriminate between alternative hypotheses, interpretations, or categorizations" (Van Hoyer & Lievens, 2009, p. 343) when considering options among potential employers, occupations, jobs, educational institutions, and majors. For example, recruiters or employees would generally be considered more diagnostic recruitment sources than general (print) advertising because they can identify more fine-grained distinctions.

When viewed through the lens of human capital theory, recruitment source diagnosticity can thus be conceptualized as the degree to which information acquired through a recruitment source (and later, through investment decisions) informs an individual's ability to discriminate among alternative human capital investment options (e.g., different majors and educational institutions) in terms of their value for acquiring greater amounts of OSHC. Using Figure 1 to illustrate, the greater the diagnosticity associated with the recruitment source to which an individual is initially exposed, the clearer the distinctions among different OSHC investment alternatives (depicted by solid, dashed, and dotted lines) comprising the individual's opportunity structure. This results in a greater likelihood of selecting an investment path that leads to a higher level of OSHC, as shown by the solid lines running from point to point.

*Hypothesis 2:* Applicants who heard about the occupation through a source offering more diagnostic information will have higher levels of occupation-specific human capital.

Further, individuals hearing about an occupation earlier and through a source offering more diagnostic information will be most likely to exhibit the highest levels of OSHC upon application. Research on occupational choice suggests that one's initial exposure to a recruitment source creates an opportunity structure for them. This, in turn, places constraints, both perceived and actual, on the choices they are capable of making (Briscoe et al., 2006). For example, hearing about the occupation during high school provides a set of possibilities far greater in size when compared to those hearing about the occu-

pation later. However, the likelihood of acquiring OSHC is also shaped by the diagnosticity of the recruitment source at that point in time, such that more diagnostic information leads to choices to acquire more OSHC (i.e., solid lines in Figure 1). If an individual has been exposed to a more diagnostic recruitment source, one would expect the path to be positive and gravitate toward the top part of the figure—that is, they seek to acquire more OSHC. The reason for this continual development of OSHC lies in the fact that, in the context of sequential decision making, individuals become capable of better categorizing alternatives over time when sequential decisions all relate to the overarching goal of accumulating OSHC (see Weber & Johnson, 2009). Prior research suggests that, when making high involvement decisions such as these, motivation is high to retrieve as much diagnostic information from memory as possible when making each decision (Feldman & Lynch, 1988; Lynch, Marmorstein, & Weigold, 1988). This should result in an accumulation of diagnostic information over time rather than a continuously updating process where less diagnostic information is forgotten or ignored. Prior research on learning and expertise development supports this argument by suggesting that this "deliberate practice" of making OSHC-relevant decisions over time should enable more efficient and effective acquisition and use of information relevant to making decisions (e.g., Ericsson & Lehmann, 1996; Gagne, 1984; Glaser, 1990).

*Hypothesis 3:* Source timing will interact with source diagnosticity, such that applicants who heard about the occupation during an earlier educational phase and through a more diagnostic source will have higher levels of occupation-specific human capital.

### Individual OSHC Investment Strategies

**Employment goals.** Prior research on job search and occupational choice suggest that human capital investment strategies begin with the selection and establishment of an employment goal. This goal, in turn, governs search and decision-making behavior thereafter, which is intended to enable the individual to realize this goal (e.g., Kanfer, Wanberg, & Kantrowitz, 2001). When individuals learn of occupations early in their educational careers, they likely associate them with the most salient jobs they contain. For example, when individuals consider becoming a lawyer, they are most likely thinking about a job as a litigator rather than a job as a legal researcher. This may be especially true the earlier a recruitment source reaches a potential applicant in his or her educational development because very early in the recruitment process individuals often have only a rudimentary understanding of organizations, occupations, and jobs (Barber, 1998; Turban, 2001). Furthermore, resources in high school (e.g., guidance counselors) tend to supply only general information regarding the world of work (Lynch, 2000). Research on diagnosticity (e.g., Tversky, 1977) suggests that the most salient job, due to its prototypicality of the occupation, will serve as a focal referent for judgments and decisions, therefore being seen as a "symbol" of the occupation that guides how individuals subsequently invest in acquiring OSHC.

The result of this may be that the most symbolic job within the occupation becomes a part of individuals' self-concepts and social identities as they make choices concerning the educational institutions they attend, the majors they select, and any other investment decisions (Berger & Luckmann, 1966; Phillips, Lawrence, &

Hardy, 2004). Research on OSHC and information diagnosticity suggest that these processes, and the path-dependent nature of investment strategies over time, create a lock-in-effect. This reinforces individuals' initial job and educational choices, resulting in subsequent incremental increases in their commitment to applying for those jobs, and thus a reduced likelihood of switching as they are exposed to new information (Feldman & Lynch, 1988; Kambourov & Manovskii, 2009; Lynch et al., 1988; Simmons, Bickart, & Lynch, 1993). This is because information and human capital acquisition are costly, and early information plays a critical role in shaping how future information is interpreted (i.e., by constraining how it affects beliefs and attitudes) as well as whether this information is encoded and stored.

In contrast, hearing about the occupation in a later educational phase (e.g., graduate school, posteducation) is less likely to result in applying for jobs that are symbolic of the occupation. Because individuals who hear about the occupation at a later educational phase have already made a number of investment decisions, their initial OSHC is less likely to be tailored to the most symbolic job within the occupation. For example, an individual who has been studying to become an academic researcher is more likely to have developed OSHC relevant for a job as a legal researcher rather than as a litigator. Further, individuals who hear about the occupation at a later educational phase are less likely to have been exposed to the same opportunities and information as those who heard about the occupation earlier. Thus, their beliefs and attitudes regarding which job is more attractive are less strongly held, and they are less committed to applying for jobs for which they are less qualified. As these individuals make decisions regarding jobs to apply for within a given occupation, they are likely to select those that are most consistent with their abilities and perceived strengths, which are less likely to be the jobs most symbolic of the occupation.

*Hypothesis 4a:* Applicants who heard about the occupation during an earlier educational phase will be more likely to apply for jobs that are symbolic of work in the occupation.

*Hypothesis 4b:* Applicants who heard about the occupation through a more diagnostic source will be more likely to apply for jobs that are symbolic of work in the occupation.

*Hypothesis 4c:* Applicants who applied for jobs more symbolic of work in the occupation will have higher levels of occupation-specific human capital.

**Choosing college majors.** Choosing a college major represents a critical educational investment decision that individuals must make as part of their human capital investment strategies. Prior human capital theory and occupational choice research on this topic offers two fairly straightforward, but key, findings. First, research has shown that individuals' decisions to invest in majors are based largely on their occupational expectations for the future (Arcidiacono, 2004; Berger, 1988). For example, if one aspires to be an engineer, he or she is more likely to select engineering as a major in college. This is obvious, but important to recognize because choice of major enhances some opportunities and constrains others. Second, research has shown that the amount of return associated with this decision tends to rely on the resulting degree of alignment between major and subsequent occupation (James et al., 1989; Robst, 2007). Earnings are significantly

greater for individuals working in an occupation that is related to their previous major area of study in college (James et al., 1989). This is important because it suggests that majors result in greater returns to those who are matched to a related occupation, due to higher levels of OSHC (Betts, 1996).

Importantly, human capital theory suggests that individuals' abilities to select majors most relevant to occupations are constrained by the time at which they first are reached by recruitment sources (Becker, 1964). This is because it is largely after individuals become aware of an occupation and select it as an employment goal that they become capable of selecting majors that will enhance their OSHC. In other words, the onset of behaviors associated with OSHC strategy development and implementation generally follows the event of hearing about it through a recruitment source. Thus, the timing of when a person hears of the occupation enables him or her to make better educational investments. Prior research on recruitment also adds insight when used to examine college major selection (Slaughter et al., 2014). Specifically, it suggests that individuals who already have an occupational goal in mind and also heard about the occupation through more diagnostic sources will be more capable of categorizing majors based on their similarity to the occupation, which should result in the selecting majors that are valuable toward obtaining employment within that occupation.

*Hypothesis 5a:* Applicants who heard about the occupation during an earlier educational phase will be more likely to have selected undergraduate and graduate majors that are related to the occupation.

*Hypothesis 5b:* Applicants who heard about the occupation through a more diagnostic source will be more likely to have subsequently selected majors that are related to the occupation.

*Hypothesis 5c:* Applicants who selected majors more relevant to the occupation will have higher levels of occupation-specific human capital.

**Selecting educational institutions.** Human capital theory suggests that individuals will differentiate and evaluate educational institutions based on how likely they are to enhance their OSHC. Consistent with prior research (Avey et al., 2012), we propose that a number of educational institutions exist that can be conceptualized as *OSHC hotspots*. Hotspots are theorized to contain three features: greater resource munificence, high levels of legitimacy, and a high flow of knowledge and information within them (Pouder & St. John, 1996). These three characteristics are likely to afford individuals a greater return on their educational institution investment decisions. First, with greater knowledge resource munificence, OSHC hotspots should be capable of, on average, producing graduates with higher levels of OSHC. Higher OSHC at the time of graduation, by definition, leads to higher wages upon entering the labor market (Becker, 1964; Mincer, 1958). Second, they are likely perceived as capable of providing greater access to outside opportunities (e.g., internships, partnered study abroad institutions), which also aids individuals in acquiring OSHC and developing network connections that facilitate the acquisition of jobs upon graduation (Taylor, 1988; Zhao & Liden, 2011). Finally, a greater flow of knowledge and information

among faculty and students should enable individuals to develop broader, higher quality OSHC that is relevant to the institution's specialization. For example, research shows that human capital pipelines often exist between firms hiring for professional occupations and top educational institutions in particular scholarly areas (e.g., engineering), where such institutions produce graduates who are hired by the firm at disproportionately greater rates (Brymer, Molloy, & Gilbert, 2014).

Similar to decisions regarding majors, human capital theory and research on occupational choice and recruitment suggests that individuals' decisions to attend OSHC hotspots will be affected by recruitment source timing. As with college majors, individuals largely must have first learned about the occupation and what it entails, and then selected it as an employment goal, prior to making the decision to invest in attending an OSHC hotspot. Note also that whereas many majors are offered across a wide variety of educational institutions and are relatively low-cost to change (especially early on when classes can be more easily transferred), OSHC hotspots entail their own selection systems and transfers among (and into) them are likely more costly. In this way, the onset of individuals' decisions to attend OSHC hotspots for their degrees are perhaps even more likely to require that the occupation be heard of well in advance. Moreover, recruitment sources that are more diagnostic should enable individuals to (a) identify these characteristics of OSHC hotspots that render them valuable toward obtaining employment within the occupation, and (b) distinguish hotspots from other schools, which would increase their likelihoods of attending them.

*Hypothesis 6a:* Applicants who heard about the occupation during an earlier educational phase will be more likely to have obtained degrees from occupation-specific human capital hotspots.

*Hypothesis 6b:* Applicants who heard about the occupation through a more diagnostic source will be more likely to have subsequently obtained degrees from occupation-specific human capital hotspots.

*Hypothesis 6c:* Applicants who attended occupation-specific human capital hotspots will have higher levels of occupation-specific human capital.

## Method

### Participants and Procedure

This study included 78,157 participants applying for an occupation consisting of five rotational jobs in an agency of the U.S. Government between 2007 and 2012. Like many other professional occupations (e.g., scientists, engineers, doctors, lawyers), this occupation is one where individuals can become aware of its existence at relatively early educational phases (e.g., high school). The nature of this occupation requires a large amount of OSHC in terms of knowledge and skill; thus, it offers a context where preparation in the form of long-term human capital investment strategies is important.<sup>1</sup> All individuals who apply for jobs within this occupation at this organization take the same battery of employment tests as part of the entrance exam. The time of application at this organization is defined as the time at which individuals register to take the initial battery of assessments, which occurs only a

few weeks prior to assessment. Average age at the time of application was 30.96 ( $SD = 8.75$ ). Approximately 62% of participants had a bachelor's degree and 38% had a graduate degree upon application. Note that the data reported in this study were part of a larger data collection effort that has been ongoing since the year 2000. As a result, there have been several articles published using this organization (see the Appendix). However, the sample and data in this study only overlap with Campion, Campion, Campion, and Reider (2016). For a discussion of the differences among these studies, see Table A1 in the Appendix. We do not have future intentions to publish this sample, although we will continue conducting research with this organization. This study was submitted to the University of South Carolina Institutional Review Board and judged to be exempt (Pro00036748). Sample sizes for measures described below vary downward due to changes over time in the types of information the organization requested from applicants, applicant discretion in responding to items within the survey (e.g., type of recruitment source), and applicant characteristics (e.g., whether a graduate degree was obtained). We therefore report sample sizes in all tables because we try to use the largest sample size possible for each analysis.

### Measures

**Occupation-specific human capital.** We operationalize occupation-specific human capital as applicants' scores on an occupation-specific knowledge test taken during the first hurdle of the hiring process in this organization. This test was developed by the organization with the aid of outside consultants, takes approximately one hour to complete, and directly influences applicants' ability to move to the next hurdle of the hiring process. In this way, our operationalization is a convenient, although perhaps arbitrary, endpoint for when to measure the comparative amount of accumulated OSHC. In constructing this test, a comprehensive job analysis of each of five jobs comprising this occupation at this organization was performed. Data from these analyses was converted into a test blueprint to ensure content validity. The blueprint specifies an explicit number of test items for each of over 20 knowledge areas that were found to be common to all jobs comprising this occupation at this organization. The test contained approximately 70 multiple choice items, which were scored as "incorrect" or "correct." The internal consistency reliability of

<sup>1</sup> The organization precluded us from revealing the occupation or jobs as a condition of publication as this is an ongoing hiring program and the organization does not want to reveal information that may compromise the integrity of the staffing process. The occupation for which individuals are applying includes five jobs that entail (to greater or lesser degrees) working in various professional areas such as management, economics, and public relations. The incumbents are generalists, meaning they are transferred regularly and are expected to be able to work in many of these five jobs depending on the needs of the organization. Applicants pick a specialty at time of application, but all recruiting is for the set of jobs combined and the hiring procedures are identical, with approximately equal numbers hired in each job. This organization is not the only, but is the major employer of this occupation, and these jobs cover the range of those that exist within this occupation. For these reasons, our measure of OSHC described subsequently samples much of the knowledge that is required to obtain a job within this particular occupation at any organization. Similarly, recruitment sources for this organization generally entail information regarding all jobs. Thus, our measure of source diagnosticity described below speaks primarily to the value of the occupation-specific information.

scores on the OSHC test was  $\alpha = .92$ . Scoring converts the number of correct answers to *T*-scores.

**Symbolic jobs.** Although the hiring process is the same for all jobs, applicants must choose among the five different jobs comprising this occupation within the organization at the time of application. Two of the five jobs were identified by the organization's management as being more symbolic (or representative) of the core mission of the occupation within this organization (as opposed to less symbolic and support jobs). Jobs were binarily coded, with the two symbolic jobs coded as 1 and the remaining three as 0.

**Relevant majors.** As part of the assessment process, applicants were required to report what major they received their degree in at both the undergraduate and graduate level (if applicable). One hundred twenty-six unique majors were reported. All majors were coded according to how related they were to the occupation for which applicants were applying by job. Coding was performed by two of the coauthors who are familiar with the organization on a three-point scale ranging from 1 (*low relatedness*) to 3 (*high relatedness*). Initial interrater agreement was 69.05%. Lack of agreement was due primarily to the vast number of unique majors and their subtle differences. Coding differences were resolved to achieve 100% agreement through discussion.

**Occupation-specific human capital hotspots.** As part of the assessment process, applicants reported the colleges or universities they attended when obtaining their undergraduate and graduate degrees. They reported 1,291 unique colleges or universities. A recent study that surveyed 1,582 faculty members representing more than 40% of scholars in the primary scholarly areas related to this occupation asked participants to identify the top five institutions they felt had the knowledge resources to best prepare individuals for work in this occupation based on the core members of the faculty (research output and influence over the scholarly area) and the quality of training students receive. Of the top 20 institutions Avey et al. (2012) identified and listed in their study, we designated the top 10 as the occupation-specific human capital hotspots for several reasons. First, this set of 10 captured schools for which there was substantially more agreement on average (e.g., 38.9% for the top 10 vs. 4.3% for 11 through 20). Thus, there was an observable pattern of diminishing agreement after the top 10 schools identified by Avey et al. (2012), and including schools after the top 10 with such low levels of agreement would only serve to add error to our measure. Second, those institutions in the top 10 generally had 10% or more scholars identifying them as belonging in the top 5, whereas those not in the top 10 generally had less than 10%. Finally, using this smaller set of schools allowed us to empirically sharpen the definition of institutions that have an abundance of knowledge resources and those that also have correspondingly high levels of legitimacy. Such legitimacy likely improves the overall levels of attractiveness applicants feel toward these schools and hiring officials feel toward applicants from these schools, both of which are important in the context of recruitment and aligned with theory on hotspots (Pouder & St. John, 1996). These 10 institutions were coded as 1; all others were coded as 0. Note that the organization does not designate or officially recognize any school as being a hotspot, but instead explicitly encourages applicants from all schools and backgrounds.

**Source timing.** During application, individuals are required to respond to a question concerning when they first heard about the occupation for which they are applying. Possible responses were

high school, undergraduate school, graduate school, and posteducation. These responses were then coded continuously with 4 representing high school, 3 representing undergraduate degree, 2 representing graduate degree, and 1 representing posteducation.

**Source diagnosticity.** When applying, applicants responded to a question that asked, "How did you first hear about this occupation?" This question required applicants to identify one of 27 different sources possible including, for example, "teacher, professor, or other faculty member," "internship," "organization website," and "LinkedIn" (see Table 3 for a complete listing). The process of coding sources according to their levels of diagnosticity involved several steps. First, the definitions of diagnosticity and recruitment source diagnosticity from research on judgment and decision making (Tversky, 1977) and recruitment (Van Hoye & Lievens, 2005, 2009), respectively, were reviewed. Second, two coauthors independently coded each source using a three-point scale ranging from 1 (low diagnosticity) to 3 (high diagnosticity) based on the perceived likelihood that each source would, in general, meet the criteria set by these definitions. That is, the likelihood that each source would communicate information that, on average, would enable categorization of alternative OSHC investment decisions. Third, interrater agreement was calculated (90.74%). Finally, the differences in opinion were resolved through discussion among the authors. For example, sources such as articles and advertisements received 1 (low diagnosticity), sources such as the organization's website and career fairs received 2 (medium diagnosticity), and sources such as recruiters and employee referrals received 3 (high diagnosticity).

**Control variables.** Two controls are used for models predicting OSHC. First, *total times applied* represents the total number of times each applicant applied to and took the entrance exam. This variable is used as a control variable in our analyses in order to factor out any change in scores on the exam that may have occurred due to repeated test-taking. Second, we controlled for individual differences that may be related to occupational choices (e.g., planfulness, initiative) using *biodata* scores. Applicants take a biodata test as part of the first hurdle of assessments. It contains 56 items that measured conflict resolution, adaptability, information processing, initiative/persistence, interaction with external customers and internal customers, leadership, oral communication, planning/prioritizing, and stress tolerance, based on the job analysis. It was rationally scored on a 5-point scale ( $\alpha = .95$ ), with summed totals converted to *T*-scores.<sup>2</sup>

## Results

Table 1 presents the means, standard deviations, and intercorrelations among the study variables. Hypothesis 1 predicted that

<sup>2</sup> As suggested during the review process, we also tried to control for grade point average (GPA). Unfortunately, GPA is only available for approximately 10% of the sample due to the organization not requesting this information after the first year of data collection. Thus, the sample size drastically drops in the regression models from 78,157 for source timing and 64,608 for source diagnosticity to 7,938 and 6,768, respectively, when GPA is included. Nevertheless, if one controls for GPA in the regression models (see Table 2), the substantive differences are trivial, as the effect sizes are: Model 2 source timing = 1.72, Model 3 source diagnosticity = 2.35, Model 4 timing = 1.63 and diagnosticity = 1.78, Model 5 interaction = .01. The interaction term is not statistically significant ( $p < .05$ ) when controlling for GPA. These analyses are available on request.

Table 1  
Means, Standard Deviations, and Correlations

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Total times applied	78,157	1.40	.90											
2. Biodata	78,157	50.03	10.10	.19**										
3. Source timing <sup>a</sup>	78,157	2.56	1.07	.08**	.06**									
4. Source diagnosticity	64,608	2.46	.64	.04**	.06**	.20**								
5. Source diagnosticity in high school <sup>b</sup>	11,776	2.61	.65	.03**	.03**		1.00**							
6. Source diagnosticity as undergraduate <sup>b</sup>	30,724	2.52	.60	.02**	.05**		1.00**							
7. Symbolic job <sup>c</sup>	78,157	.42	.49	-.03**	.02**	.17**	.09**	.03**	.07					
8. Undergraduate degree major	67,872	2.35	.69	.06**	.02**	.29**	.13**	.05**	.11**	.21**				
9. Graduate degree major	26,189	2.22	.65	.11**	.04**	.24**	.12**	.06**	.09**	.18**	.33**			
10. Undergraduate degree OSHC hotspot <sup>d</sup>	76,632	.11	.31	.04**	.05**	.14**	.07**	.06**	.03**	.08**	.11**	.05**		
11. Graduate degree OSHC hotspot <sup>d</sup>	28,816	.16	.37	.05**	.03**	.15**	.08**	.04**	.05**	.10**	.10**	.15**	.22**	
12. OSHC	78,157	49.24	10.35	.16**	.09**	.20**	.14**	.06**	.12**	.15**	.18**	.12**	.15**	.16**

Note. OSHC = occupation-specific human capital.

<sup>a</sup> 4 = high school, 3 = undergraduate, 2 = graduate, 1 = post-education. <sup>b</sup> Reductions in sample size are due to focus on one particular educational stage, correlations with source timing could not be calculated because source timing does not vary because of pair-wise deletion, and the correlations between source diagnosticity in high school and as undergraduates could not be calculated because variables include no overlapping applicants. <sup>c</sup> 0 = not symbolic of work in occupation, 1 = symbolic. <sup>d</sup> 0 = not hotspot, 1 = hotspot.

\*\*  $p < .01$ .

those who heard about the occupation during an earlier educational phase would have higher levels of OSHC. Using ordinary least squares (OLS) regression, Model 2 in Table 2 demonstrates that this hypothesis was supported. When controlling for total times applied and biodata, hearing about the occupation earlier predicted the level of OSHC acquired ( $\beta = 1.81, p < .01$ ). In practical terms, this means that a one unit change in source timing (high school vs. undergraduate vs. graduate vs. posteducation) corresponds to a 1.81 point increase in OSHC. Put differently, this is equivalent to an increase in passing rates of approximately 7.10% for every instance of learning about the occupation earlier, which translates into roughly 462 more applicants being capable of passing this assessment per year.

Hypothesis 2 predicted that applicants who heard about the occupation from a more diagnostic source will have higher levels of OSHC. Using OLS regression, Model 3 in Table 2 shows that, when controlling for total times applied and biodata, this hypothesis was supported ( $\beta = 2.17, p < .01$ ). In practical terms, this means that, for every one unit increase in source diagnosticity, applicants score 2.17 points higher on OSHC. Put differently, this is equivalent to an increase in passing rates of approximately 8.70% for every one unit change in source diagnosticity, which translates into roughly 566 more applicants being capable of passing this assessment per year. Also, note that both Hypothesis 1 and Hypothesis 2 are still supported even when both effects are included at the same time (Model 4, Table 2).

Hypothesis 3 predicted that source timing and source diagnosticity would interact, such that applicants who heard about the occupation during an earlier educational phase and through a more diagnostic source would have higher levels of OSHC. Using OLS regression, Model 5 in Table 2 demonstrates that this hypothesis was supported ( $\beta = -.12, p < .05$ ). However, although this interaction was statistically significant, it was too small to be practically significant. To illustrate, Figure 2 shows a plot of this interaction. This figure suggests that source timing and source diagnosticity are generally additive in how they relate to OSHC.<sup>3</sup>

Hypothesis 4a predicted that those who heard about the occupation during an earlier educational phase would be more likely to

apply to a job symbolic of this occupation. In support of this hypothesis, Table 1 indicates that source timing and symbolic job selection are positively correlated ( $r_{pb} = .17, p < .01$ ). Using logistic regression, in practical terms, this means that hearing about the occupation one educational phase earlier (a one unit increase in educational phase) was associated with a 40.49% ( $p < .01$ ) increase in likelihood of applying for a symbolic job.

Hypothesis 4b predicted that applicants who heard about the occupation through a more diagnostic source will be more likely to apply for jobs that are symbolic of work in the occupation. This hypothesis was supported ( $r_{pb} = .09, p < .01$ ). Using logistic regression, in practical terms, this means that a one unit increase in source diagnosticity for applicants is associated with a 35.28% ( $p < .01$ ) increase in their likelihood of applying for a symbolic job.

Hypothesis 4c predicted that applicants who applied for jobs more symbolic of work in the occupation will have higher levels of occupation-specific human capital. When controlling for total times applied and biodata, this hypothesis was supported (partial  $r_{pb} = .15, p < .01$ ). In practical terms, those applying for symbolic jobs score 3.18 points higher than those not applying for symbolic jobs on our measure of OSHC. Put differently, this is equivalent to an increase in passing rates of approximately 12.60% for those applying for symbolic jobs, which translates into roughly 819 more applicants being capable of passing this assessment per year.

<sup>3</sup> An interesting practical question is whether source timing and source diagnosticity are substitutable. *Substitutability* relates to whether one predictor has an effect similar in magnitude to another predictor on an outcome of interest. In other words, could an organization help applicants make up for hearing about the occupation later by reaching them through more diagnostic sources and vice versa? Figure 2 indicates that that these two source characteristics are only substitutable when applicants who were exposed to a source of high diagnosticity during a given educational phase (e.g., as an undergraduate) are compared to those who were exposed to a source of low diagnosticity in the educational phase directly prior (e.g., in high school). Aside from this, hearing about the occupation later generally cannot be compensated for through exposure to more diagnostic sources in terms of applicants' eventual levels of OSHC.



Table 2

Results of Ordinary Least Squares Regression Analysis of Source Timing and Diagnosticity Predicting Occupation-Specific Human Capital

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE
Total times applied	1.70**	.04	1.55**	.04	1.65**	.05	1.53**	.04	1.53**	.04
Biodata	.07**	.00	.06**	.00	.06**	.00	.06**	.00	.06**	.00
Source timing			1.81**	.03			1.75**	.04	2.05**	.14
Source diagnosticity					2.17**	.06	1.60**	.06	1.91**	.16
Source timing $\times$ Source diagnosticity									-.12*	.06
N	78,157		78,157		64,608		64,608		64,608	
Adj. $R^2$		.03**		.06**		.05**		.08**		.08**
$R^2$		.03**		.06**		.05**		.08**		.08**
$\Delta R^2$				.04**		.02**		.05**		.00*

Note. Source timing is reverse coded, such that higher numbers represent earlier educational phases. Coefficients are unstandardized. Change in  $R^2$  for Model 5 is between Models 4 and 5; all others are based on change from Model 1. OSHC = occupation-specific human capital.

\*  $p < .05$ . \*\*  $p < .01$ .

Hypothesis 5a predicted that applicants who heard about the occupation during an earlier educational phase would select undergraduate and graduate majors that are related to the occupation. In support of this hypothesis, source timing was positively associated with the selection of relevant undergraduate,  $r = .29, p < .01$  and graduate majors,  $r = .24, p < .01$ . In terms of practical significance, the effect of hearing about the occupation in high school as opposed to later on major selection for undergraduate and graduate degrees was  $d = .34$  and  $d = .24$ , respectively. Similarly, the effect hearing about the occupation while obtaining undergraduate degrees as opposed to later on graduate major selection was  $d = .44$ .

Hypothesis 5b predicted that applicants who heard about the occupation through a more diagnostic source will be more likely to have subsequently selected majors that are related to the occupation. As Table 1 indicates, this hypothesis was supported. Source diagnosticity for those who heard about the occupation in high school was correlated with selection of relevant undergraduate,  $r = .05, p < .01$  and graduate,  $r = .06, p < .01$  majors. Similarly, source diagnosticity for those who heard about the occupation while obtaining their undergraduate degrees was correlated with relevance of graduate school majors selected,  $r = .09, p < .01$ . To gain a practical interpretation of these effects we computed

$d$ -scores to enable comparisons among the three levels of source diagnosticity. For those hearing about the occupation in high school, we found that the effects of highly diagnostic sources as compared to sources of medium and low diagnosticity on relevance of undergraduate major were  $d = .03$  and  $d = .22$ , respectively. For these same individuals, the effects of highly diagnostic sources as compared to sources of medium and low diagnosticity on relevance of graduate major were  $d = .02$  and  $d = .24$ , respectively. For those hearing about the occupation while obtaining their undergraduate degrees, the effects of highly diagnostic sources as compared to sources of medium and low diagnosticity on relevance of graduate major were  $d = .14$  and  $d = .27$ , respectively.

Hypothesis 5c predicted that applicants who selected majors more relevant to the occupation will have higher levels of OSHC. When controlling for total times applied and biodata, this hypothesis was supported for undergraduate majors (partial  $r = .17, p < .01$ ) and graduate majors (partial  $r = .11, p < .01$ ). In practical terms, this means that a one unit increase in relevance of undergraduate major selected is associated with an increase in passing rates of approximately 9.90%, which translates into roughly 644 more applicants being capable of passing this assessment per year. Moreover, a one unit increase in relevance of graduate major selected is associated with an increase in passing rates of approximately 6.00%, which translates into roughly 390 more applicants being capable of passing this assessment per year.

Hypothesis 6a predicted that applicants who heard about the occupation during an earlier educational phase would be more likely to obtain undergraduate and graduate degrees from OSHC hotspots. Supporting this hypothesis, Table 1 indicates that source timing was positively associated with obtaining undergraduate ( $r_{pb} = .14, p < .01$ ) and graduate degrees ( $r_{pb} = .15, p < .01$ ) from OSHC hotspots. Using logistic regression, in practical terms, this means that hearing about the occupation one educational phase earlier (a one unit increase in educational phase) was associated with a 63.84% ( $p < .01$ ) and 49.39% ( $p < .01$ ) increase in likelihood of attending an OSHC hotspot for undergraduate and graduate degrees, respectively.

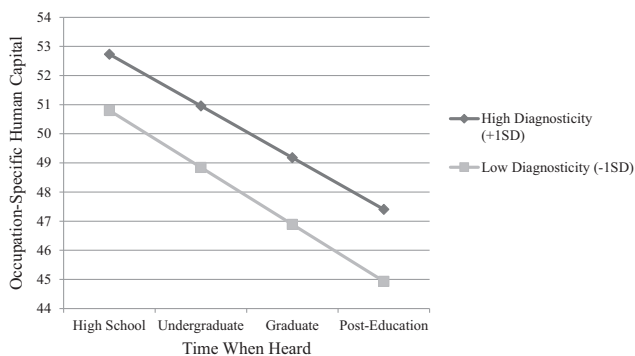


Figure 2. Source timing and source diagnosticity predicting occupation-specific human capital.

Hypothesis 6b predicted that applicants who heard about the occupation through a more diagnostic source will be more likely to have subsequently obtained degrees from occupation-specific human capital hotspots. As Table 1 indicates, this hypothesis was supported. Source diagnosticity for those who heard about the occupation in high school was correlated with attending an OSHC hotspot for undergraduate ( $r_{pb} = .06, p < .01$ ) and graduate ( $r_{pb} = .04, p < .01$ ) degrees. Using logistic regression, in terms of practical significance, a one unit increase in source diagnosticity during high school results in a 26.88% ( $p < .01$ ) increase in their likelihood of attending an OSHC hotspot for their undergraduate degree, and a 15.31% ( $p < .01$ ) increase in their likelihood of attending an OSHC hotspot for their graduate degree. Similarly, source diagnosticity for those who heard about the occupation while obtaining their undergraduate degrees was correlated with attending OSHC hotspots for graduate degrees ( $r_{pb} = .05, p < .01$ ). In practical terms, this means a one unit increase in source diagnosticity for those who heard about the occupation as undergraduates results in a 23.56% ( $p < .01$ ) increase in their likelihood of attending an OSHC hotspot for their graduate degree.

Hypothesis 6c predicted that applicants who attended occupation-specific human capital hotspots will have higher levels of occupation-specific human capital. When controlling for total times applied and biodata, this hypothesis was supported for both undergraduate (partial  $r_{pb} = .15, p < .01$ ) and graduate degrees (partial  $r_{pb} = .15, p < .01$ ). In practical terms, those attending

OSHC hotspots for their undergraduate and graduate degrees score 4.83 and 3.73 points higher, respectively, on the measure of OSHC than do those not attending OSHC hotspots. Put differently, this is equivalent to an increase in passing rates of approximately 18.40% and 14.40% for those attending OSHC hotspots for their undergraduate and graduate degrees, respectively, which translates into roughly 1,196 and 936 more applicants being capable of passing this assessment per year.

Although no hypotheses were developed regarding specific recruitment sources, it is instructive from a practical perspective to outline which sources were used in this study and the average levels of OSHC accumulated by source. Briefly, there are at least two noteworthy findings (see Table 3). First, with the exception of the organization's website, a greater proportion of individuals report having heard about the occupation through more diagnostic sources. Excluding candidates who heard about the occupation through the organization's website, approximately 34,920 candidates reported hearing about the occupation through a source with high diagnosticity, while only 3,962 and 5,081 candidates reported having heard about the occupation through sources with medium and low levels of diagnosticity, respectively. Second, the number of candidates who heard about the occupation through each source suggests that current research focusing on sources such as Websites, media and advertisements, word-of-mouth, and referrals may be capturing the majority of sources that applicants utilize today.

Table 3  
Mean Levels of Occupation-Specific Human Capital (OSHC), Standard Deviations, and Number of Applicants by Recruiting Source Diagnosticity Level

Source ranked by source diagnosticity	M	SD	High School	Undergrad	Graduate (n)	Postgraduate (n)	Total (N)
<b>High</b>							
Teacher, professor, or other faculty	52.33	8.45	3,268	6,595	909	362	11,134
Friend or relative working for the organization	50.55	9.35	3,728	4,292	1,216	3,984	13,220
School or college counselor or other official	50.51	9.67	729	2,589	408	160	3,886
Current or former intern	49.62	9.55	75	433	92	75	675
On-site recruiter	49.55	10.22	203	1,553	330	290	2,376
Remote recruiter	49.21	9.75	311	2,120	509	689	3,629
<b>Medium</b>							
Student organization	49.31	9.45	536	0	0	0	536
College career fair	48.62	10.20	76	1,711	229	190	2,206
Professional organization	46.13	10.50	36	150	66	215	467
Commercial career fair	45.38	11.40	11	44	27	117	199
Organization's website	46.45	11.50	2,024	8,989	2,337	7,295	20,645
Listserv message from organization	42.86	15.16	5	17	6	14	42
Keep in touch message from organization's website	42.58	12.51	48	169	44	151	412
Military transition assistance program or military career fair	41.69	12.58	10	44	12	34	100
<b>Low</b>							
Newspaper	54.82	9.55	82	44	13	27	166
Poster	52.61	9.10	5	26	6	3	40
Articles or other media/press	52.29	8.85	547	466	112	464	1,589
Radio/TV interview	51.11	9.79	26	17	2	22	67
General advertising	50.40	9.34	316	692	113	402	1,523
E-mail marketing	45.43	10.56	24	111	49	216	400
Radio advertisement	45.15	15.06	1	2	0	5	8
Other career-related website	44.27	10.57	47	180	64	424	715
Other website	44.21	11.43	11	42	19	120	192
Facebook	44.13	10.65	16	96	25	126	263
Jobster	40.55	9.16	0	8	4	21	33
Direct mail	37.54	12.79	4	4	1	12	21
Magazine	52.38	11.01	17	22	11	14	64

## Discussion

The attraction of qualified individuals to firms is one of the primary outcomes of interest in recruitment scholarship (Barber, 1998; Breaugh, 2013; Chapman et al., 2005; Uggerslev, Fassina, & Kraichy, 2012). Insofar as research has focused on identifying factors that enable firms to attract high-quality applicants, however, theoretical approaches have remained fairly “timeless” in their orientations (Ployhart & Hale, 2014), and ignored how information communicated through recruitment sources enables applicants to enhance their employability. That is, they have largely neglected that applicants require time to develop their talent prior to application, and that the timing and diagnosticity of recruitment sources to which individuals are initially exposed may have important implications for a given firm’s ability to enable such development. Therefore, the purpose of this study was to present a conceptual approach that considers how various research perspectives might help to explain how source timing and diagnosticity influence the development of applicant OSHC.

## Theoretical Implications

Emphasizing that individuals are often exposed to recruitment sources long in advance of coming on the job market has broad theoretical implications. First, the present study extends current theory by highlighting that, in addition to attracting applicants to organizations, recruitment sources that reach applicants earlier in their educational careers can also play a role in influencing their eventual levels of OSHC. While this finding may seem readily apparent, its significance lies in its implications for directing future research. Specifically, it suggests that the effects of source characteristics may be much more influential than previously recognized. For example, for individuals on the job market, source diagnosticity influences attitudes toward the organization and decisions to apply (Van Hoye & Lievens, 2009). On the other hand, for individuals not yet close to the job market, source diagnosticity also influences OSHC investment decisions. This means that firms may be able to gain an advantage by tactically using recruiting sources to reach individuals before they are actually on the job market, and thus before competitors are trying to recruit them. Future research needs to more explicitly consider the roles of time and timing in recruitment. For example, prior research confounds source characteristics with source timing. By not modeling when the source reaches the applicant, the different effects of recruitment sources may in part be due to differences in when the sources are administered. This type of temporally focused research opens new avenues for recruitment research and stimulates many new types of research questions (e.g., Are some sources more effective at different recruitment stages?; How early is too early for recruitment to be effective?).

Second, our study extends prior research on recruitment sources by examining the effect recruitment source diagnosticity has in influencing applicant OSHC. While prior research has shown that source diagnosticity plays an important role in recruitment (e.g., Van Hoye & Lievens, 2009), this research investigated a small number of sources in the context of applicant attraction. Results from our examination of 27 sources indicate that highly diagnostic sources benefit individuals by enabling them to better prepare themselves for the job market through influencing their investments in OSHC. Of course, many of the sources examined in this

study were infrequently used. Further, it is unclear why, within each level of diagnosticity (i.e., low, medium, and high), a large amount of variability was observed among applicant’s mean levels of OSHC. Nevertheless, by showing that source diagnosticity was associated with higher levels of OSHC and related to OSHC investment decisions, our study highlights an opportunity for future research to examine diagnosticity as a means to influence the behaviors of individuals before they apply.

Third, we extend prior research on recruitment and job search by tracing the relationships between source timing and diagnosticity, applicants’ OSHC investment strategies, and applicants’ eventual levels of OSHC. We show that earlier source timing and higher levels of source diagnosticity are associated with decisions to apply for symbolic jobs within an occupation, selection of relevant majors, and decisions to attend OSHC hotspots. These decisions, in turn, were associated with higher levels of OSHC. Prior research on recruitment and job search offers little insight regarding whether or why source timing and diagnosticity should relate to applicants’ levels of OSHC. This is primarily because these literatures thus far have ignored individual preparation behavior long in advance of application. Yet, clearly firms do invest in recruitment before potential applicants are even eligible for employment (e.g., high school awareness and early outreach programs). Further, scholarly research and the popular press routinely note concerns that relate to these investment decisions. For example, are premier schools worth the huge tuitions associated with attending them (Smith, 2014)? Do business degrees actually impart management-relevant KSAOs to students (Bennis & O’Toole, 2005)? Thus, our findings are noteworthy because they provide initial evidence that recruitment sources are capable of prompting individuals to willingly make long-term investments in their OSHC and that these investments do pay off in terms of improving applicants’ employability. Future research should extend these findings by examining how source timing and diagnosticity relate to OSHC investments in work experience and how different forms of work experience relate to applicants’ employability.

Finally, our study provides a platform for future research to begin developing a more holistic theory of applicant attraction. Such a theory would view attraction not only as a multidimensional phenomenon in terms of how source characteristics (e.g., information, aesthetics) influence attraction outcomes, but also as an evolving process in which source timing determines the relative importance of different types of source characteristics and their effects on attraction and/or investment outcomes. In so doing, the theory would create clearer linkages among findings from disparate literatures and yet contribute to each literature. As an example, prior research on occupational choice suggests that career interventions must be “hands-on” to effectively prepare individuals for work (Whiston, Sexton, & Lasoff, 1998). In contrast, our theorizing and empirical findings suggest that recruitment sources can be effective ways to communicate perceivable opportunities and induce preparatory behavior on the part of individuals, thus increasing their likelihood of obtaining jobs within their desired occupation. This is particularly important as enrollment in higher education is continuing to increase (National Center for Education Statistics, 2015). As individuals remain in school longer, the likelihood of recruitment sources reaching them at a time when they still have additional OSHC investment options available continues to increase.

## Practical Implications

Firms face challenges when recruiting for professional occupations; there are often shortages of qualified applicants and those applicants who are qualified are frequently difficult to identify or highly sought after (Dahl, 2012; SHRM, 2013). This is usually taken to imply that firms must become more competitive with their peers through expending more resources when it comes to their recruitment activities (e.g., spending more money, offering greater compensation). This study offers an alternative response with at least two key implications for managers. First, we suggest that it could be more efficient and effective to begin to explicitly consider the long-term interests of potential applicants and search for ways to align their interests with those of the firm (particularly when the organization is the primary employer of the occupation, the occupation is highly visible and appealing, and requires high levels of OSHC). Applicants are interested in becoming more qualified and distinguishing themselves from their competition; yet, they need time to acquire OSHC prior to application, so getting to them early and providing more diagnostic information can aid them in this effort. Second, provided an organization is the primary employer of a particular professional occupation, recruitment may offer an alternative way to reduce organizational costs associated with motivating individuals to accumulate human capital that is specific to the organization's needs. Our study suggests that some organizations might be capable of using more diagnostic recruitment sources that target individuals at early educational phases to induce them to absorb some of the costs associated with accumulating human capital the organization needs.

## Limitations and Future Directions

The present study had a number of strengths, but is not without limitations. First, the conceptual approach developed in this study may be dependent on the type of occupation and organization examined. The setting studied here is somewhat unique in that the organization is governmental, is the primary employer of the occupation examined, recruitment is for professional occupations where high levels of OSHC is required, applicants must begin preparing for jobs long before they are on the job market, and occupations are generally well-known and publically appealing.<sup>4</sup> Thus, the direct implications of the study may be mostly for organizations and occupations with these characteristics. Future research would benefit from examining this study's generalizability with respect to other occupations and firms.

Second, our study is limited in that the research design was cross-sectional and does not allow for a strong causal link between the focal firm's recruitment tactics and changes to its applicant pool. For example, we did not show that the quality of the applicant pool improved over time following the onset of the practice of targeting individuals earlier in their educational careers and providing them more diagnostic information. We only showed that individuals applying for jobs within the organization examined in this study who were exposed to more diagnostic sources earlier in their educational careers had higher levels of OSHC. Our inference is that, had these individuals not been included in the sample, the mean level of OSHC within this organization's applicant pool would have been lower. Future research should use research designs that can make stronger causal inferences.

Third, we also did not examine whether using more diagnostic sources to reach individuals at early educational phases contributes to competitive advantage for the focal firm. It was not possible to examine these effects across multiple firms, and so we do not know whether qualified applicants went to competitors. However, there are several possible conditions under which a firm adopting this practice would likely realize a greater payoff in terms of its applicant pool quality: (a) when the firm is the major employer of the occupation, (b) when there are geographic (and other) barriers that isolate the firm from others hiring for the occupation, and (c) when the firm has a more attractive or salient brand than others hiring for the occupation (e.g., Microsoft, Apple, Google when hiring computer programmers). Thus, an important question for future research is the degree to which the theory and findings from the present article apply to the quality of the applicant pools for specific firms versus the general labor market.

Fourth, the retrospective nature of our study provides a potential limitation. Research on autobiographical memory and survey design have noted a number of issues associated with the use of retrospective items (Bradburn, Rips, & Shevell, 1987; Thompson, Skowronski, Larsen, & Betz, 1996; Tourangeau, Rips, & Rasinski, 2000). Here, we attempted to prompt applicants to invoke a more controlled "search" of their memories by not only asking them to identify when but also how they first heard about the occupation. In addition, examination of the number of respondents hearing about the occupation within each educational phase was not suggestive of response bias because many candidates heard at each stage (14,416 in high school, 35,267 in undergraduate, 7,896 in graduate school, 20,578 posteducation). Finally, and perhaps, most importantly, this does not present an alternative explanation for our findings.

Finally, we were not able to obtain information regarding the quantity and types of information candidates obtained through exposure to each type of source. Although this is somewhat common in prior recruitment research, it is nonetheless important for future research to begin to investigate such additional differences in information characteristics (beyond diagnosticity) across sources as well as potential differences between information conveyed and information perceived and interpreted by candidates. Such examinations may begin to shed light on boundary conditions to the value of different recruitment sources for individuals. Also, we used a single measure of source diagnosticity based on the initial source from which a candidate learned of the profession. In all likelihood, individuals continue to accumulate information on an occupation over time. Future research should model the influence of the accumulation of diagnostic information over time on OSHC investment decisions as well as OSHC accumulation.

In conclusion, we proposed that reaching applicants early in their educational development can influence their subsequent investment decisions, enabling them to accumulate more OSHC by the time they apply. We further argued that recruitment sources

<sup>4</sup> There are many other governmental examples where the agency is the primary employer of a particular occupation (e.g., Federal Bureau of Investigation, NASA, U.S. Patent Office, National Weather Service, and CIA). Note that, although the firm examined in the present study is the major employer of the occupation examined, this occupation also exists in other agencies in the United States and in the governments in almost every other developed country.

conveying information of more diagnostic value when it comes to the development of OSHC investment strategies would serve as valuable resources to individuals. We hope future research will advance these initial findings by refining the theoretical arguments and measures.

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(Appendix follows)

## Appendix

### Summary of Data/Sample Overlap

The following table presents the dataset variables, and identifies the variables used by each of the manuscripts that have published from this data collection effort over the years. There are a few key points that should be noted regarding the sample and variables included in the dataset. First, the current study and [Campion et al. \(2016\)](#) are the only studies with any sample overlap. Sample overlap between that of the current article and of [Campion et al. \(2016\)](#) is 22.67% ( $n = 28,127$ ). All other studies use samples that predate those included in these studies.

Second, the occupation-specific knowledge test (in the current study) is referred to as a “professional knowledge test” in [Campion et al. \(2016\)](#). The reason for this is that [Campion et al. \(2016\)](#) was not focusing on applicants’ occupation-specific human capital—that is, there was no interest in the connection between applicants’ KSAOs and how they relate to achieving economic outcomes. Thus, the term “professional knowledge test” was sufficient to explain its contents. Further, in [Campion et al. \(2016\)](#) the assessments in Hurdle 1 were only used to the extent that correlations were computed with computer-scored accomplishment records and human rater scored accomplishment records as one of several ways to examine the construct validity of computer scores. This variable along with the others from Hurdle 1 were presented as a range of correlations in [Campion et al. \(2016\)](#), and did not play a critical role in the article.

Third, as noted at the end of the table, the complete dataset was constructed by including all variables given to us from the organization for both studies (current study and [Campion et al. \[2016\]](#)). Variables are defined according to whether they have their own column of data in any of the data sets. Categories (8,554 variables, [Campion et al. \[2016\]](#)) are created by text-mining text-based data, but are included as separate variables with their own columns in the complete dataset used. We present data overlap percentages between the current study and [Campion et al. \(2016\)](#) both ways in

the table—including them as separate variables and not. That is, the variable overlap between these two studies ranges between .09% and 5.67% depending on whether the categories are considered separate variables.

Fourth, as noted in the current article, the organization prefers that data regarding relationships with demographic variables not be published. In [Campion et al. \(2016\)](#), we only report ranges for  $d$ -scores, and only because it was an important component of [Campion et al.’s \(2016\)](#) contribution. For the current study, these variables did not alter the results or any of the effect sizes to a meaningful degree. Therefore, we cannot include them.

Fifth, accomplishment records occur in Hurdle 2 of this organization’s hiring process. Therefore, scores on this assessment were not included as a control in the current study.

Finally, variables that include asterisks were included among the text-mined categories as a single category and thus were not analyzed separately in [Campion et al. \(2016\)](#).

### Summary of Studies

Campion, M. C., Ployhart, R. E., & Campion, M. A. (in press).

Using recruitment source timing and diagnosticity to enhance applicants’ occupation-specific human capital. *Journal of Applied Psychology*.

This article investigates how recruitment source characteristics (timing and diagnosticity) relate to scores on assessments in Hurdle 1 as well as educational decisions such as undergraduate school and major. Thus, it focuses on source timing, source diagnosticity, undergraduate school and major, graduate school and major, occupation-specific knowledge test scores, English writing knowledge test scores, biodata scores, total times applied, and symbolic job selection.

(Appendix continues)

Campion, M. C., Campion, M. A., Campion, E. D., & Reider, M. H. (2016). Initial investigation into computer scoring of candidate essays for personnel selection. *Journal of Applied Psychology, 101*, 958–975.

This article investigates the use of text mining and predictive modeling computer software programs as a surrogate for human raters in selection and assessment. Because this study uses a computer to model all information available to human raters during Hurdle 2 of the hiring process, most demographic variables (e.g., race, sex, job titles, special skills, work duties, employers, other experiences, number of jobs, overseas experience, years work experience, education variables), scores on assessments in Hurdle 1, and a host of computer generated variables are included.

Levashina, J., Morgeson, F. P., & Campion, M. A. (2012). Tell me some more: Exploring how verbal ability and item verifiability influence responses to biodata questions in a high-stakes selection context. *Personnel Psychology, 65*, 359–383.

This article examines whether requiring elaboration in biodata responses affects applicant faking. It focuses on item-level biodata and English writing knowledge test scores.

McCarthy, J. M., Van Iddekinge, C. H., & Campion, M. A. (2010). Are highly structured job interviews resistant to demographic similarity effects? *Personnel Psychology, 63*, 325–359.

This article examines the extent to which highly structured job interviews are resistant to demographic similarity effects. Thus, it focuses on interview scores and interviewer and interviewee sex and race.

Schleicher, D. J., Van Iddekinge, C. H., Morgeson, F. P., & Campion, M. A. (2010). If at first you do not succeed, try, try

again: Understanding race, age, and gender differences in retesting score improvement. *Journal of Applied Psychology, 95*, 603–617.

This article examines subgroup differences in retesting for different types of selection procedures. Thus, it focuses on biodata scores, English writing knowledge test scores, and occupation-specific knowledge test scores, the leaderless group discussion scores, case exercise scores, and interview scores—in addition to sex, race, and age.

Levashina, J., Morgeson, F. P., & Campion, M. A. (2009). They do not do it often, but they do it well: Exploring the relationship between applicant mental abilities and faking. *International Journal of Selection and Assessment, 17*, 271–281.

This article examines the relationship between mental ability and faking on biodata. Thus, it focuses on biodata, the English writing knowledge test, and the occupation-specific knowledge test.

Schleicher, D. J., Venkataramani, V., Morgeson, F. P., & Campion, M. A. (2006). So you didn't get the job . . . now what do you think? Examining opportunity-to-perform fairness perceptions. *Personnel Psychology, 59*, 559–590.

This article examines (a) how opportunity-to-perform (OTP) relates to fairness judgments, (b) how receiving negative feedback affects this relationship, (c) differences in OTP across a variety of different selection methods, and (d) determinants of OTP perceptions. Thus, it focuses on perceptions regarding opportunity to perform, job relevance, communication, interpersonal treatment, procedural fairness, and selection outcomes.

(Appendix continues)



Table A1  
Data Transparency

Variables	Campion, Ployhart, and Campion (in press)	Campion et al. (2016)	Levashina et al. (2012)	McCarthy, Van Iddekinge, and Campion (2010)	Schleicher, Van Iddekinge, Morgeson, and Campion (2010)	Levashina et al. (2009)	Schleicher et al. (2006)
Total variables used	46	8,64	2	11	15	3	6
Total variables used in current study and Campion et al. (2016) and percentage of overlap	8 (.09%)						
Total variables used excluding categories created by text mining in Campion et al. (2016)	46	95					
Total variables used in current study and Campion et al. (2016) and percentage of overlap (without categories)	8 (5.67%)						
Total number of participants included in both studies and percentage of overlap	28,127 (22.67%)						
Variables in the complete dataset	These studies used samples that do not overlap with those in the current study						
ID							
Total times applied (Hurdle 1)	X						
Date of most recent application							
Date of birth							
Age					X		
Job applied for	X						
Asian		X		X	X		
Black		X		X	X		
Hispanic		X		X	X		
Pacific Islander		X			X		
Indian		X			X		
White		X		X	X		
Women		X		X	X		
Men		X		X	X		
Job titles (text-based)		X					
Special skills (text-based)		X					
Work duties (text-based)		X					
Employers (text-based)		X					
Other experiences (text-based)		X					
Number of jobs		X*					
Overseas experience (text-based)		X*					
Years of work experience		X*					
Accomplishment record scores by competency and human rater (18 variables)		X					
Leaderless group discussion					X		
Case exercise					X		
Interview				X	X		
Interviewer race (White)				X			
Interviewer race (Black)				X			
Interviewer race (Asian)				X			
Interviewer race (Hispanic)				X			
Interviewer sex (Female)				X			
Interviewer sex (Male)				X			
Text-mined categories for accomplishment records, job titles, special skills, work duties, employers, other experiences, and quantitative variables (8,554 variables across all 6 competencies)		X					
Computer scores for quantitative variables (six variables for six competencies)		X					

(Appendix continues)

Table A1 (continued)

Variables	Campion, Ployhart, and Campion (in press)	Campion et al. (2016)	Levashina et al. (2012)	McCarthy, Van Iddekinge, and Campion (2010)	Schleicher, Van Iddekinge, Morgeson, and Campion (2010)	Levashina et al. (2009)	Schleicher et al. (2006)
Computer scores for accomplishment record (six variables for six competencies)		X					
Computer scores for employers (six variables for six competencies)		X					
Computer scores for tasks (six variables for six competencies)		X					
Computer scores for jobs (six variables for six competencies)		X					
Computer scores for skills (six variables for six competencies)		X					
Computer scores for experience (six variables for six competencies)		X					
Computer scores overall (six for six competencies)		X					
Flesch Reading Ease score for accomplishment record		X					
Essay score		X					
Occupation-specific/professional knowledge test	X	X			X	X	
English writing knowledge/English test	X	X	X		X	X	
Biodata scores	X	X			X	X	
Item-level biodata Scores			X				
Level of education	X	X*					
Undergraduate school (text-based)	X	X*					
Undergraduate major	X	X*					
Undergraduate grade point average (GPA)	X						
Graduate school	X	X*					
Graduate major	X	X*					
Graduate GPA							
Recruitment source type (27 variables)	X						
Recruitment source diagnosticity	X						
Recruitment source diagnosticity (high school)	X						
Recruitment source diagnosticity (undergraduate)	X						
Source timing through recruitment source (four variables)	X						
Source Diagnosticity × Source Timing	X						
Opportunity to perform perceptions							X
Job relevance perceptions							X
Communication perceptions							X
Interpersonal treatment perceptions							X
Overall procedural fairness							X
Selection outcome							X

*Note.* Complete dataset was constructed by including all variables given to us from the organization for both studies. Variables are defined according to whether they have their own column of data in any of the datasets. Categories (8,554 variables, Campion et al. [2016]) are created by text mining, but are included as separate variables with their own columns in the complete dataset used. However, we present overlap percentages between those in the current manuscript and those in Campion et al. (2016), including them as separate variables and not.

\* These variables were included among the text-mined categories as a single category and thus were not analyzed separately.

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### **Correction to Campion, Ployhart, and Campion (2017)**

In the article “Using Recruitment Source Timing and Diagnosticity to Enhance Applicants’ Occupation-Specific Human Capital,” by Michael C. Campion, Robert E. Ployhart, and Michael A. Campion (*Journal of Applied Psychology*, Advance online publication. February 2, 2017. <http://dx.doi.org/10.1037/apl0000190>), the following headings were inadvertently set at the wrong level: Method, Participants and Procedure, Measures, Occupation specific human capital, Symbolic jobs, Relevant majors, Occupation-specific capital hotspots, Source timing, Source diagnosticity, Results, and Discussion. All versions of this article have been corrected.

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