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Research paper

# Impact of research collaboration cosmopolitanism on job satisfaction

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## ABSTRACT

The concept of collaboration cosmopolitanism has referred to the institutional and geographic distance characteristics of academic researchers' collaboration patterns. We study the effect of collaboration cosmopolitanism on doctoral level research personnel working in different sectors—government, industry, and academia. The study examines the impact of collaboration cosmopolitanism on an important aspect of career success: job satisfaction. We employ the 2006 and 2010 Survey of Doctorate Recipients (SDR) collected by the US National Science Foundation to evaluate the cross-sectional and longitudinal effect of collaboration cosmopolitanism on job satisfaction. We are particularly interested in doctoral level researchers' job satisfaction related to sector of employment while controlling for demographic and work characteristics such as gender, minority status, salary, and work hours. Findings suggest that scientists working at a higher level of collaboration cosmopolitanism tend to report a higher level of job satisfaction. Furthermore, we find that academic scientists are more satisfied than those working in industry. This finding holds in the longitudinal model—industry scientists are less satisfied—but we find that over time, government scientists are more satisfied than academic scientists, and much more satisfied than industry scientists.

## 1. Introduction

We know that collaborative research is productive, both by perception and by measured gain (Abramo et al., 2009; Andrade et al., 2009; Bruneel et al., 2010; Hamann et al., 2011; Lee and Bozeman, 2005). Our interest is in the impacts of research collaboration, not only on science writ large but, especially, on the careers of STEM researchers. That is, our concern is much more personalistic than previous studies of collaboration's effects on productivity: what is the relationship of collaboration to job satisfaction? Our research focuses not on research collaboration experiences of all types but rather one specific aspect of collaboration, one we refer to as “collaboration cosmopolitanism” (Bozeman and Corley, 2004; Lee and Bozeman, 2005). The basic idea of collaboration cosmopolitanism is the extent to which researchers work with persons who are distant from them either institutionally or geographically. We shall later provide specific measurement details but for the present let us say that a very low degree of collaboration cosmopolitanism would be signified if all of one's collaborations are with people in the same laboratory. By contrast, the most cosmopolitan collaborators would be those who work with people in

different laboratories, organizations, or nations than their own.

The central research question then is this: *To what extent, if any, do more cosmopolitan collaborators differ from less cosmopolitan collaborators with respect to job satisfaction?* We look at different nuances and variations of this question, focusing especially on differences according to sector of employment – academic, government and industry. Today, research is a generative process as collaborative teams attract more collaborators, thus accelerating the growth of research teams (Parker and Hackett, 2012). Furthermore, research takes place in a variety of settings not exclusive to universities (Roach and Sauermann, 2010), and scientists exhibit different preferences for the sector in which they wish to be employed (Agarwal and Ohyama, 2012; Fox and Stephan, 2001; Janger and Nowotny, 2016).

Collaboration across sector, disciplines, organizations, or countries becomes more prevalent in individuals' daily work life with the flow of globalization as well as the emphasis on interdisciplinary efforts seeking innovative solutions to the complex social problems such as health care or environmental issues (Van Rijnsoever and Hessels, 2011).

Research shows that those having higher degrees of job satisfaction have, among other positive benefits such as better productivity, better

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health outcomes, lower absenteeism, greater likelihood of remaining in the field of work (Spector, 1997; Cowin, 2002; Porter and Steers, 1973; Faragher et al., 2005). The more we learn about relationships between researchers' career attributes and their job satisfaction, the better our ability to identify incentives, policies and procedures with potential to enhance research careers and, ultimately, the capacity to produce research.

We examine the relationship between collaboration cosmopolitanism and job satisfaction among doctoral level scientists by sector in the United States labor market<sup>1</sup> – in this case government, industry or university – because a substantial number of studies have consistently shown the importance of sector context (Bullock et al., 2015; van Helden and Reichard, 2016; for an overview see Perry and Rainey, 1988). Not only do sectors tend to have different attractions but those attractions interact with the attributes of persons who choose to work in the respective sectors (Agarwal and Ohyama, 2012; Bullock et al., 2015). For example, it has been long known that persons working in government tend to place a higher priority on job security than do those choosing work in business (Lazear, 1990; Lewis and Frank, 2002). Perhaps more important for present purposes, sector context matters with respect to particular job requirements, including R&D (Bysted and Hansen, 2015). For example, academic researchers tend to have more autonomy than industry researchers and greater control of their research agendas (Box and Cotgrove, 1966; Heinze et al., 2009). This autonomy is relevant to the perceived benefits and costs of engaging in collaboration cosmopolitanism by individual researchers. Finally, studies have shown pronounced differences, by sector, in levels of job satisfaction (Kjeldsen and Hansen, 2016). In sum, though the importance of sector is in any given context an empirical question, there is much relevant research showing that expectations of variance by sector are both plausible and explicable in terms of existing theory and research.

Our paper is organized as follows. In the section immediately below, we examine the job satisfaction literature, focusing particularly on the rather modest body of work examining the job satisfaction of researchers and academic faculty, the central focus of this research. We then turn to the research collaboration literature, focusing especially on works related to collaboration cosmopolitanism. Based on this review, we present specific hypotheses about the effects of collaboration cosmopolitanism on job satisfaction in relation to the sector researchers work in. After describing our data and measures in detail we then present findings from our regression models. Finally, we discuss implications of the findings for both theory and policy.

## 2. Literature review

### 2.1. Job satisfaction among scientists

The research on job satisfaction is massive, indeed it is one of the most popular topics in organizational psychology and in management studies. While most studies of job satisfaction focus on persons working in business firms, usually at mid-management levels, the studies are so popular that by this time a number of different sectors, professions, and job settings have been examined including hospitals, nonprofit agencies, government welfare agencies, the military and there are even several studies of job satisfaction focusing on sports teams (e.g. Lillydahl and Singell, 1993; Olsen et al., 1995; Hagedorn, 1996, 2000; Hearn, 1999; Johnsrud and Rosser, 2002; Rosser, 2004; August and Waltman, 2004).<sup>2</sup> Unfortunately for our purposes, relatively few studies

<sup>1</sup> Among employed scientists and engineers whose highest degree is a STEM discipline in the United States, 71.9% work in industry, 15.6% work in education, and 12.5% work in government (National Science Board, 2016).

<sup>2</sup> We do not review the more general job satisfaction literature. Several excellent and comprehensive literature reviews are available for those wishing more expansive and in-depth treatment (see Locke, 1976; Petty et al., 1984; Judge et al., 2001a,b; Erdogan et al., 2012; Chen et al., 2016).

have explicitly examined research personnel. The findings from these studies are generally consistent – that job satisfaction predicts productivity, usually as mediated by various work climate variables (Keller, 1986; Keller et al., 1996; Jones, 1996; Chen et al., 2004). Having higher job satisfaction predicts lower absenteeism, greater work commitment, performance, and field and job retention (Koch and Steers, 1978; Locke, 1970; Tack and Patitu, 1992). However, scientists' job satisfaction is particularly noteworthy given the unique educational background, work environments, and work motivations, which create different levels of complexities and autonomy that would imply different incentives, policies, and procedures to enhance research careers and more essentially, potentials to generate novel research.

### 2.2. Job satisfaction of scientists across sector

Within the limited set of studies on research personnel, existing studies tend to focus on industry researchers and typically examine job satisfaction primarily as a predictor of research productivity and career development (Keller et al., 1996; Jones, 1996; Chen et al., 2004). Another set of job satisfaction studies, also a very small percentage of the whole, focuses exclusively on academic faculty (see Bentley et al., 2013; Bozeman and Gaughan, 2011; Lacy and Sheehan, 1997; Mamiseishvili and Rosser, 2010; Olsen et al., 1995; Sabharwal and Corley, 2009). For academics, research is central to satisfaction, especially the feeling that colleagues respect one's research work as well as the sense of supportive research and teaching community (Bentley et al., 2013; Bozeman and Gaughan, 2011; Lacy and Sheehan, 1997). The least satisfied academics are more likely to perceive that there are cumbersome administrative processes and little collegiality in decision-making in their institutions (Bentley et al., 2013).

Consistent with studies of job satisfaction among academics, pay is related to satisfaction – not absolute amounts but rather the feeling of being paid what one is worth (Bozeman and Gaughan, 2011), consistent with work in other occupational and sector domains (Kalleberg, 1977; Erez and Isen, 2002). Some studies of faculty suggest that academic researchers are high on intrinsic motivation for their work; by contrast, compared to those in other employment sectors, faculty may be less motivated by such extrinsic factors as pay, pension, benefits and geographic location (Janger and Nowotny, 2016; McKeachie, 1979; Blackburn and Lawrence, 1995; Roach and Sauermann, 2010). Academic researchers of color and women faculty members tend to have lower job satisfaction; this is attributed to encountering more barriers while advancing up the academic ladder and having access to fewer resources needed for their work (Hagedorn, 2000; Olsen et al., 1995; Sabharwal and Corley, 2009).

Given that job satisfaction is influenced by the complexities and the level of autonomy (Judge et al., 2001a,b) as well as the institutional setting (Hagedorn, 2000), examining the satisfaction of scientists in different sectors is a major objective of this paper. Our review showed that scientists working in the government sector are largely missing from the current literature of job satisfaction, a gap we fill with this research. We explore empirically the question of whether sector of employment affects job satisfaction of doctoral level scientists.

### 2.3. Research on collaboration and cosmopolitanism

The idea of collaboration cosmopolitanism draws loosely from much older conceptualizations of social cosmopolitan roles vs. social localism roles (Gouldner, 1957, 1958). Gouldner suggested that the contrasting roles provide much information about behavior and attitudes of workers. Later studies showed that measures related to Gouldner's cosmopolitanism/localism scales explained differences in performance (Abrahamson, 1965). The idea of research collaboration cosmopolitanism was first developed by Bozeman and Corley (2004) in their analysis of STEM collaborators' motives and strategies. Using questionnaire data and curricula vitae data from 1041 US academic

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