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Nita G. Brooks

Middle Tennessee State University, nita.brooks@mtsu.edu

Cynthia K. Riemenschneider

Baylor University

Deborah J. Armstrong

Florida State University

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The Information Technology Professional: A Two-wave Study of Factors Impacting Commitment and Satisfaction

Nita G. Brooks

Information Systems and Analytics
Jones College of Business
Middle Tennessee State University
nita.brooks@mtsu.edu

Cynthia K. Riemenschneider

Management Information Systems
Hankamer School of Business
Baylor University

Deborah J. Armstrong

Business Analytics, Information
Systems, and Supply Chain
College of Business
Florida State University

Abstract:

In this paper, we present a two-wave study that examined the relationships between three independent variables (professional identification, psychological contract violation, and fairness) and three dependent variables (general satisfaction, satisfaction with the information technology (IT) profession, and affective commitment to the IT profession). The constructs analyzed pertain to the IT workforce and represent areas where the literature has provided conflicting results with regard to the nature of the relationships. Due to the lack of consistency related to causality among these variables, we used 10 separate canonical correlation models to analyze the responses from two surveys distributed across three years. Results consistently revealed a significant relationship between perceived psychological contract violation and fairness with the dependent constructs related to satisfaction (general, and with the IT profession). Both gender and tenure in the IT profession played a role in the identification process for this group of individuals. We present and discuss additional findings along with limitations and directions for future research.

Keywords: IT Workforce, IT Profession, Affective Commitment, Satisfaction, Fairness, Professional Identification, Psychological Contract Violation, Canonical Correlation.

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1 Introduction

A profession constitutes a way to organize individuals who possess a specific set of skills and knowledge vital to society into a distinct occupational unit or grouping (Reed, 2007). Researchers and practitioners have long viewed information technology (IT) as a profession that features a high turnover rate, fluctuating demands for qualified workers, and change (both economic and technological) (e.g., Gannon, 2013; Gefen, Ragowsky, Miller, Licker, & Stern, 2015; Lo, 2015; Orlikowski & Baroudi, 1989). According to Longenecker, Schaffer, and Scazzero (1999) “working long hours, rushing to meet unrealistic deadlines, struggling to keep up with ever-advancing technology and ever-changing user demands—these are just some of the conditions that make a career in IT stressful” (p. 71). Additionally, for workers in knowledge-oriented, project-based environments such as IT, the concept of a “boundaryless” environment has replaced the historical idea of “the workplace” (Arthur & Rousseau, 1996). Individuals in the IT profession often work and collaborate with others across organizational, cultural, and temporal boundaries, which blurs the existence of a stable organizational environment for them.

The Bureau of Labor Statistics reports that people born between 1957 and 1964 held an average of 11.7 jobs from ages 18 to 48, whereas people born in the late 1960s to 1980s averaged two job changes by the age of 32 (U.S. Department of Labor, 2015). As Long (2016) states: “The new normal is for millennials to jump jobs four times in their first decade out of college. That’s nearly double the bouncing around the generation before them did”. We see this situation in particular with technology-related professions, which have notable talent shortages and highly competitive recruitment tactics. For IT professionals, “the ability to move from project to project and employer to employer is often key to career advancement and sustainability” (Weststar, 2015, p. 1238), and almost 42 percent of employers in the IT industry expect workers to frequently job-hop (Grasz, 2014).

Consistent with the view of the IT work environment as boundaryless, we have begun to see a shift in the IT workforce literature from a focus on IT personnel in an organizational setting to a broader focus across organizational settings (often in the form of an IT career) (e.g., Armstrong, Brooks, & Riemenschneider, 2015; Brooks, Riemenschneider, Hardgrave, & O’Leary-Kelly, 2011; Guzman & Stanton, 2009; McKinney, Wilson, Brooks, O’Leary-Kelly, & Hardgrave, 2008; Ramachandran, Rao, Goles, & Dillon, 2013). We believe that focusing research effort at the level of the profession can enhance the body of IT workforce knowledge by more holistically explaining what motivates, sustains, and invigorates current and future IT professionals. Cavanaugh and Noe (1999) note that, with layoffs, restructuring, and general changes in organizational settings, individuals can find it beneficial to focus on the type of work they do and not only on where they do it. These concepts support the importance of recognizing the individual beyond the job in an organization and focusing on how the individual relates to, and functions in, a profession over the course of the individual’s career.

Additionally, researchers have often made calls to examine workforce issues over time from different practical and theoretical perspectives. For example, Ahuja (2002) called for research to examine relationships between career choice and social expectations and the impact they have on outcomes such as commitment to IT careers over time. Newsom, Nishishiba, Morgan, and Rook (2003) emphasized the need for longitudinal research related to social exchange by highlighting the existence of conflicting relationships and the impact that negative and positive exchanges have on outcomes. They provided results from cross-sectional studies and compared them to those that examined matters across time, which indicated that “the duration of the effects of positive and negative exchanges differs” (Newsom et al., 2003, p. 747). In this study, we build on Newsom et al.’s (2003) application of social exchange theory and incorporate organizational support theory and a two-wave approach to explore the relationships between employers and employees. By examining the IT profession at two different points in time, we extend existing literature by investigating how fairness, professional identification, and perceptions of violation in the employee’s psychological contract work together to predict commitment to, and satisfaction with, the IT profession—both key outcomes that research has shown to be important specifically to the IT workforce (Joseph, Ng, Koh, & Ang, 2007). We also look at contextual factors that have traditionally played a role in the IT workforce literature: time, gender, and tenure. With our two-wave study, we can determine whether the correlation between the “IT work environment” canonical variate and the “individual attitudes toward the IT profession” canonical variate changes over time. Comparing canonical variates over time represents an appropriate method to analyze such variates (Darlington, Weinberg, & Walberg, 1973) because it decreases the probability of making type 1 errors (Hair, Tatham, Anderson, & Black, 1998) since it analyzes the independent and dependent variables collectively and not individually.

Additionally, we examine gender's role in the IT profession, which could provide insight into why IT continues to lack significant female representation (Gorbacheva, Beekhuizen, vom Brocke, & Becker, 2018; Lee & Stewart, 2016). Finally, we look at the role of tenure in the IT profession. According to Weedmark (2018):

Tech is an obvious area of interest for job tenure trends. Gen Y/Millennials have grown up to be tech-savvy workers and are at the helm of today's hottest technologies. They value job satisfaction so will move on to find it.

In focusing on the IT profession and collecting data at two points in time, we can make more definitive statements related to the profession and enhance our understanding about how these groups of variables relate. Specifically, we examine the following research questions (RQs):

RQ1: What is the relationship between profession-focused IT work environment factors and profession-focused individual attitudes?

RQ2: What impact do contextual factors have on these relationships?

RQ2a. What role does time play in explaining the relationships?

RQ2b. What impact does an individual's gender play in explaining the relationships?

RQ2c: What impact does an individual's tenure within the IT profession play in explaining the relationships?

Our examination serves as a foundation that researchers can use to better understand individuals' attitudes and behaviors related to being a member of the IT profession and to conduct future research in the areas of social exchange and support in the context of a profession.

2 Theoretical Foundation

As a foundation to examine individuals' attitudes and behaviors in the IT profession context, we draw on the idea of a social exchange (i.e., give and take). As van Knippenberg, van Dick, and Tavares (2007) propose, both exchange and identity processes work together to impact individuals in a work environment. Social exchange "supposes that, to determine the degree of their obligation to others, individuals assess the value of the resources received" (Aselage & Eisenberger, 2003 p. 498). From a social exchange perspective, organizational support theory provides a unique and expansive approach to examining employees in a work setting. In general, organizational support theory looks at relationships "between employers and employees based on social exchange" (Baran, Shanok, & Miller, 2012 p. 123). We also consider identification in our examination, since it allows one to consider the role that the self-concept has in determining outcomes: while employees' positively evaluating a social exchange between themselves and their employers can impact factors such as withdrawal, the way in which employees identify with the organization or group can as well (van Knippenberg et al., 2007).

Organizational support theory provides a means to examine the organizational environment to explain employees' perceptions and the role that they play in determining key outcomes, such as affective commitment. The theory argues that "employees pay attention to treatment offered by the organization in an effort to determine the degree to which their contributions to the organization are valued and their organizations care about them" (Zagenczyk, Gibney, Few, & Scott, 2011 p. 257). As Rhoades and Eisenberger (2002) note, three forms of favorable treatment exist for employees in terms of perceived organizational support: organizational rewards and job conditions, supervisor support, and procedural justice.

Applied to the context of the IT profession, we look at factors key to the social exchange process along with perceptions of how the individual identifies with the IT profession. Specifically related to social exchange, we consider two ways that individuals may perceive treatment: perceived fairness (favorable) and psychological contract violation (unfavorable). Research has noted that both factors relate to the social exchange between an individual and the work environment (van Knippenberg et al., 2007). Psychological contract theory also focuses on the relationship between the individual and the work environment and emphasizes how individuals perceive they are treated in an organization (Aselage & Eisenberger, 2003). The theory grounds psychological contract violations in social exchange and frames them as a comparison (e.g., "When I think about what I've given to the IT profession and what I think I should receive in return..."). The "reciprocity norm which binds the recipient to return the benefit, support,

and care offered by the other party" (Ahmed & Nawaz, 2015 p. 867) backs the relationship. When individuals perceive that the reciprocity expectation has not been met, they may perceive a violation has occurred.

We extend these theoretical perspectives to the profession because we believe other reciprocal relationships can exist beyond the individual's connection to a specific organization or job. Previous research has shown that individuals can establish perceptions based on their interactions as members of a profession that extend beyond the organization, which results in individuals' identifying as members of both their organization and their profession (Russo, 1998). To capture this duality in our research, we include perceptions of professional identification. Research has shown the level at which individuals identify with a group to impact their attitudes and behaviors, but it has also found that the interactions or exchanges individuals have with others influences their associated identity (Ashforth, Harrison, & Corley, 2008). Identification mechanisms are also linked to and impacted by the extent to which individuals perceive the group as similar to themselves and how they perceive the group overall (Brooks et al., 2011). What individuals identify with and how they perceive social exchanges in the work environment can impact outcomes (van Knippenberg et al., 2007). In Section 3, we develop and present the constructs we examined in our study. We discuss each construct and construct combination across and in groups to highlight previous research, inconsistent areas, and the importance of this examination and approach.

3 Literature Review and Model Development

We begin reviewing the literature by looking at the independent variables that research has examined and the relationships research has found among this group of factors. We then present research related to the dependent variables and discuss studies that focus on the relationships between the independent and dependent variables. We graphically represent the groups of the independent (i.e., profession-focused work environment) and dependent (i.e., profession-focused individual attitude) constructs in Figure 1. We define and provide the sources for each construct and related terms in Table 1 for ease of access and improved readability.

Table 1. Construct Definitions

Construct	Definition	Source
Fairness	The perception of the degree to which an organization allocates work outcomes (e.g. pay, workload) in an equitable manner relative to work inputs.	Niehoff and Morman (1993)
Psychological contract	The beliefs about the reciprocal obligations between the two parties.	Rousseau (1989)
Psychological contract breach	A perception that one's profession has failed to adequately fulfill the established obligations.	Robinson & Rousseau (1994)
Psychological contract violation	An emotional or affective reaction of anger and/or betrayal that may develop from a perceived psychological contract breach.	Robinson & Morrison (2000)
Professional identification	"The extent to which a professional employee experiences a sense of oneness with the profession".	Hekman, Steensma, Bigley, & Hereford (2009, p. 1326)
Affective commitment to the IT profession	An individual's emotional attachment to or feelings of belonging with the IT profession.	Meyer, Allen, & Topolnytsky (1998)
General satisfaction	The pleasurable or positive emotional state resulting from appraising one's profession.	Locke & Lathan (1976), Hackman & Oldham (1976)
Satisfaction with the IT profession	An individual's evaluation of the individual's progress toward meeting self-identified career goals or career-related successes.	Greenhaus, Parasuraman, & Wormley (1990), Spurk, Abele, & Volmer (2011)

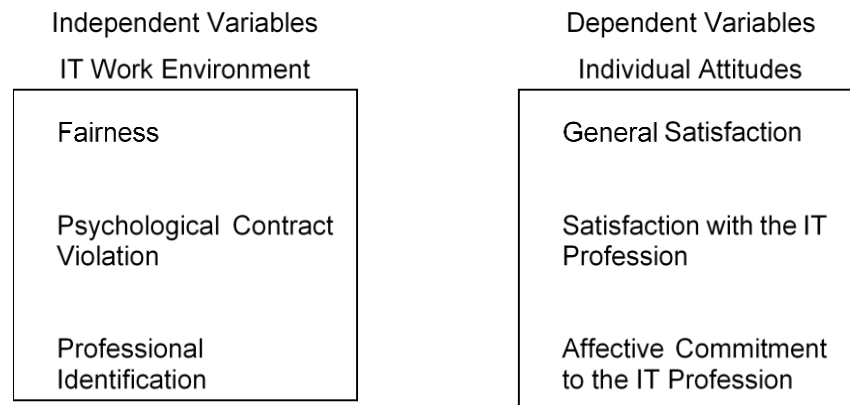


Figure 1. Independent and Dependent Variables in Model

3.1 Independent Variables and Relationships

We chose the following constructs as independent variables in the analysis: fairness, professional identification, and psychological contract violation (i.e., all IT work environment factors). We chose the following constructs as dependent variables: affective commitment to the IT profession, general satisfaction, and satisfaction with the IT profession. We present extant research that has examined the various relationships among these three independent variables and among the three dependent variables and between independent and dependent variables in the following paragraphs. In order to provide quick and easy access for the reader, we summarize the pertinent results from previous research in Table 2 and Figure 2.

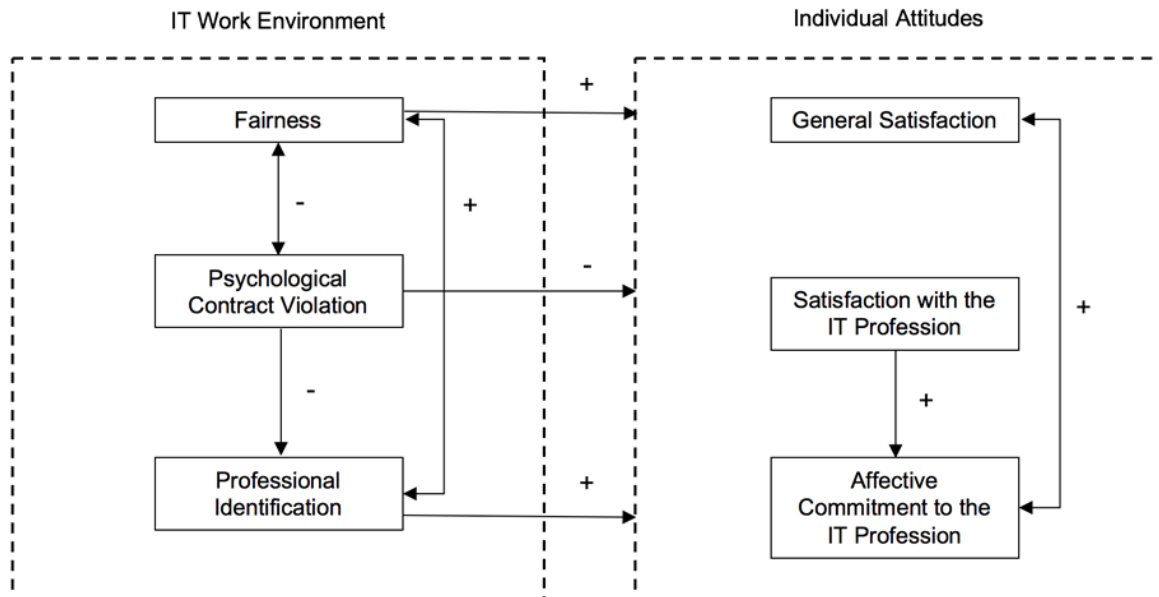


Figure 2. Previous Research Relationship Summary

Table 2. Summary of Previous Research

Relationships	Direction	Source
Between independent variables		
Fairness > Psychological Contract Violation	Negative	Goles, Lee, Rao, & Warren (2009), Hsieh (2012)
Psychological Contract Violation > Fairness	Negative	Eckerd, Hill, Boyer, Donohue, & Ward (2013)
Identity > Fairness	Positive	Bradford (2014), Hiemstra, Derous, Serlie, & Born (2012), Konrad, Ross, & Linnehan (2006)
Fairness > Identity	Positive	Johnson, Chang, & Rosen (2010)
Psychological Contract Breach/Violation > Identification	Negative	Epitropaki (2013), Restubog, Hornsey, Bordia, & Esposito (2008)
Psychological Contract Breach/Violation <> Identification	Negative Correlation	Kreiner & Ashforth (2004), Gibney, Zagenczyk, Fuller, Hester, & Caner (2011)
Between dependent variables		
General Satisfaction > Affective Organizational Commitment	Positive	Bluedorn (1982), Johnston, Parasuraman, Futrell, & Black (1990), Eby, Freeman, Rush, & Lance (1999)
Affective Organizational Commitment > General Satisfaction	Positive	Vandenberg & Lance (1992), Bateman & Strasser (1984)
Satisfaction with the IT Profession > Affective Commitment to the IT Profession	Positive	Brooks, Hardgrave, O'Leary-Kelly, McKinney, & Wilson (2015)
Between independent and dependent variables		
Fairness > General Satisfaction	Positive	McFarlin & Sweeney (1992), Roberts, Coulson, & Chonko, (1999), Flower, Demir, McWilliams, & Johnson (2015)
Fairness > Affective Organizational Commitment	Positive	Ha & Ha (2015) Roberts et al. (1999), Dubinsky & Levy (1985), Lowe & Vodanovich (1995)
Psychological Contract Violation > General Satisfaction	Negative	Cavanaugh & Noe (1999), Tekleab, Orvis, & Taylor (2012), Flower et al. (2015)
Psychological Contract Violation > Organizational Commitment	Negative	Gakovic & Tetrick (2003)
Professional Identification > General Satisfaction	Positive	Scott et al. (1999), Loi, Hang-yue, & Foley (2004), Lui, Ngo, & Tsang (2001)
Professional Identification > Affective Commitment to the IT Profession	Positive	Brooks, Hardgrave, O'Leary-Kelly, McKinney, & Wilson (2015)

3.1.1 Fairness and Psychological Contract Violation

In studies that have examined employees who face losing their jobs, researchers have found that layoffs often cause both psychological contract breach (predecessor to violation) and injustice perceptions (Datta, Guthrie, Basuil, & Pandwy, 2010; Parzefall, 2012). Researchers have asserted that employees may assess unfairness in the workplace as violating their psychological contract (Epitropaki, 2013; Rosen, Chang, Johnson, & Levy, 2009). Thus, while research has found that these two concepts correlate (as Table 2 notes); it has found mixed results about the direction of influence between them.

3.1.2 Fairness and Professional Identification

In addition to exploring the directionality of these two concepts, previous research has explored the concepts of fairness and identity together in a single study. For example, in the justice literature, Kim and Lee (2014) found that transitioning temporary employees into permanent workers fostered both fairness perceptions and organizational identity. Similarly, Alvarez (2008) found that introducing a new enterprise system into an organization produced changes in perceptions of fairness and challenged existing professional identities. As Table 2 notes, research has found that these two concepts correlate, it has found mixed results about the direction of influence between them.

3.1.3 Psychological Contract Violation and Professional Identification

As with the process of organizational identification (Ashforth & Mael, 1989), individuals may become attached to their profession by integrating the attributes they perceive positively about it into their own self-concept. Employees who identify with the “IT professional” group will likely discuss important aspects of their psychological contract with other members of that group while comparing their situation with that of other occupational groups. Research has found these concepts to correlate (as Table 2 notes), but we still need work that examines the direction of influence between them.

3.2 Dependent Variables and Relationships

Based on previous work that has found factors to constitute important outcomes in a work context, we treated general satisfaction, satisfaction with the IT profession, and affective commitment to the IT profession as dependent variables in our study (Brooks et al., 2015; Meyer, Allen, & Smith, 1993). The relationship between satisfaction and affective commitment exists at both the job level and the profession level (Brooks et al., 2015; Gupta, Guimaraes, & Raghunathan, 1992; Thatcher, Stepina, & Boyle, 2003). While research has shown the constructs to have a positive and strong relationship with one another, it has found differing results about the exact direction of the relationship (see Table 2). These inconsistencies support the approach we take in the current study to better understand these important constructs at the profession level.

3.3 Relationships between Independent and Dependent Variables

In addition to the findings about each dependent and independent variable groups that we present above, we also present a variety of results that look at relationships between individual independent and dependent variables. In this section, we present each combination of independent/dependent variable relationships with references from existing research.

3.3.1 Fairness and Satisfaction

Previous research has shown that perceptions of justice (i.e., fairness) relate highly to job satisfaction (Dubinsky & Levy, 1985; Flower et al., 2015; McFarlin & Sweeney, 1992; Roberts et al., 1999). Indeed, Flower et al. (2015, p. 108) notes: “Among various occupational groups organisational justice has been linked with a range of employee outcomes, ...[such as] job satisfaction, organisational commitment, and mental health outcomes”.

3.3.2 Fairness and Affective Commitment

According to previous research, fairness (distributive justice) represents an important factor when individuals determine affective commitment to an organization (Dubinsky & Levy, 1985; Ha & Ha, 2015; Lowe & Vodanovich, 1995; Roberts et al., 1999). Hopkins and Weathington (2006) also note that fairness-related issues around downsizing and threats to job security can play an important role in determining an individual's level of affective commitment to an organization.

3.3.3 Psychological Contract Violation and Satisfaction

Research has found obligations related to one's psychological contract to be associated with job satisfaction and intention to leave (Tekleab et al., 2012). Specifically, research has found breach of the psychological contract to be associated with lower levels of job satisfaction (Flower et al., 2015) and fulfillment of the psychological contract with higher levels of job satisfaction (e.g. Gakovic & Tetrick, 2003; Flower et al., 2015).

3.3.4 Psychological Contract Violation and Affective Commitment

Cavanaugh and Noe (1999 p. 328) note that: “Employees who have experienced greater amounts of unfulfilled obligations are more likely to distrust the organization and have lower expectations regarding the organization's role in the employment relationship”. Research has found that, when obligations are met, a positive relationship with affective organizational commitment results (Gakovic & Tetrick, 2003). We assert that a similar outcome will exist at the profession level.

3.3.5 Professional Identification and Satisfaction

Research has acknowledged the importance of satisfaction to the formation and existence of identification processes as it relates to an individual's identity (McCall, 1977). Research has established that people tend to identify with groups as a means to positively enhance their view of the self. Historically, in the IT literature, research has examined satisfaction primarily at the job level (Bartol, 1983; Gallivan, 2004; Goldstein & Rockart, 1984; Igbaria & Greenhaus, 1992), and studies from other disciplines have found a positive link between job satisfaction and professional identification (Loi et al., 2004; Lui et al., 2001; Scott et al., 1999). We extend this examination to more thoroughly look at the IT profession and the role of identification in determining two forms of satisfaction.

3.3.6 Professional Identification and Affective Commitment

In an IT context, Joseph et al. (2007) have called for researchers to more extensively examine affective commitment as it relates to the IT profession beyond analyzing only organizational commitment. Stets and Burke (2000) note that, when individuals identify with a social group, their commitment to the group increases. Cheney (1983) refers to affective commitment as a manifestation of an individual's identification with a group, but, while similar, the two constructs differ according to research (Mael & Tetrick, 1992). Brooks et al. (2015) examined the relationship between identification and affective commitment to the IT profession and found a positive relationship. We examine identification and affective commitment to more thoroughly understand their relationship.

3.4 Contextual Factors in the IT Profession

Historically, the IT workforce has comprised disproportionately more men than women. In recently examining women in IT occupations, the National Center for Women and Information Technology (NCWIT) found that women held only 25 percent of computing-related occupations in 2015 (Ashcraft, McLain, & Eger, 2016), while, across all professional occupations, women comprised 57 percent of the U.S. workforce. Recent research on the IT profession has highlighted the potential consequences of this type of disparity and called for further examination (Gorbacheva, et al., 2018).

In this study, we have a unique opportunity to explore the role of gender since we could obtain a sample that comprised more than the expected number of female participants when compared to figures that represent estimates of the IT workforce population. Specifically related to the variables we submit here for examination, previous research has found that gender can play a significant role. For example, studies have found that psychological contracts impact men and women differently such that they impacted intentions to leave for males but not for females (Blomme, van Rheede, & Tromp, 2010). Sweeney and McFarlin (1997) highlight differences in perceptions of justice when comparing males and females and found that perceptions of distributive justice impact males more in relation to determining outcomes such as intention to stay and organizational commitment.

In reference to findings related to the dependent variables, Scandura and Lankau (1997) provide examples where men had higher levels of organizational commitment than women, women had higher levels of organizational commitment than men, and no differences across gender groups existed. Specifically, Scandura and Lankau (1997) found that women had higher levels of commitment and satisfaction in situations where flexibility was considered as an aspect in the psychological contract. Research on individuals in the IT profession has found that both satisfaction related to aspects of job security and the degree to which certain factors (e.g., work family culture) influence occupational commitment differ across gender groups (Major, Morganson, & Bolen, 2013).

Research has found tenure to be associated with several desirable organizational outcomes. For example, Chao, O'Leary-Kelly, Wolf, Klein, and Gardner (1994) found that organizational tenure had a positive impact on organizational commitment and job satisfaction. In studying trial lawyers, Loi et al. (2004) found that the relationship between professional identification and job satisfaction relationship was stronger when an individual had longer organizational tenure. Jiang and Klein (1999) found that individuals new to the IT profession had higher levels of satisfaction in instances where they received support, which indicates the negative influence of tenure. Based on these examples, we would expect tenure to play a role in determining the impact that profession-related perceptions have on outcomes for individuals. As English, Morrison, and Chalon (2010) note, previous research that has examined the relationship between tenure and affective commitment, one of our key dependent variables, has produced inconsistent results (i.e., it has shown a positive relationship, a negative relationship, and no relationship).

Due to these discrepancies and previous research that has highlighted the importance of tenure in explaining work-related behavior, we extend research on this topic by including tenure in examining the IT profession.

As we note, multiple issues warrant a new perspective and approach to better understand profession-level work environment factors and profession-level individual attitudes. First, research related to the independent variables, dependent variables, and relationships between the constructs has found inconsistent results. Additionally, research related to contextual factors has established their importance but found inconclusive results. In Section 4, we describe the research method we adopted to better understand these issues by answering our research questions and strengthening the foundation of literature related specifically to understanding the IT profession and the individuals that work in it.

4 Research Method

As previous research has noted, each variable (psychological contract violation, identification, and fairness) independently influences affective commitment and satisfaction. Additionally, one cannot absolutely identify the order of causality between the independent variables and dependent variables; therefore, we believe looking at the influence that the group of independent variables has on the group of dependent variables via using canonical correlation represents an appropriate step toward better understanding the relationships.

Canonical correlation constitutes a method for investigating the relationship between two sets of variables (Thompson, 1991; Tschannen-Moran, 2001). Canonical correlation analysis identifies a linear combination of variables in one set that have the highest correlation with a linear combination of variables in another set (Johnson & Wichern, 1992). It is a multivariate analytic technique that assesses linear combinations of dependent and independent variables:

Such that the pairs of linear combinations (canonical variables) best express the correlations between the two variable sets (canonical correlations). The standardized weights (canonical coefficients) used to create the canonical variables can be used to assess the relative importance of original independent and dependent variables' contributions for a given canonical correlation. (Kelly, Sereika, Battista, & Brown, 2007, p. 321)

For over 25 years, the IT literature has used this method to explore various domains. Gemoets and Mahmood (1990) used it to determine the effect that user documentation variables have on user satisfaction variables. Researchers have also used it to examine the importance of various data-management issues (e.g., security) (Koh & Watson, 1998), how electronic commerce application types collectively associate with the collection of specific implementation benefits (Jih, 2002), and the relationship between flexible IT infrastructure factors and the measures of competitive advantage (Byrd & Turner, 2001). Sarathy and Muralidhar (2002) found that one could suitably use canonical correlation analysis to evaluate the level of security when estimating linear combinations of the (unobservable) confidential attributes using the (observable) non-confidential attributes. Aksin and Masini (2008) used canonical correlation to identify four dominant strategies for firms that employed shared services (internal outsourcing and offshoring.)

Additionally, researchers have used this method to study IT workforce issues such as the influence of job characteristics (e.g., task variety) and work experiences (inter-role conflict) (Reid, Riemenschneider, Allen, & Armstrong, 2008). Byrd, Lewis, and Turner (2004) used canonical correlation analysis to explore the relationship between: 1) IT personnel knowledge, skills, and the flexibility of the information infrastructure of organizations and 2) IT personnel knowledge, skills, and IT technology variables associated with enabling competitive advantage. Thus, we selected canonical correlation analysis as the analysis method evaluate the nature and degree of association between the sets of independent and dependent variables in this study.

4.1 Sample

Prior to collecting data for our main study, we performed a pilot study with 63 IT professionals. Analyzing the pilot data provided construct validity at the profession level and confirmation to proceed with the full data collection. We collected data for the study at two points (year one and year three) in time from individuals working in the IT profession across several industries such as healthcare, transportation,

government, and IT services. The CIO of each organization served as the initial point of contact for the individuals we contacted to participate in the study. We informed the individuals that, by agreeing to participate in year one, we would ask them to continue participation in a larger study for which we would need to collect additional data. After the initial contact, we emailed individuals directly with a link to the survey. We began collecting data in 2004 and finished doing so in 2006; in total, 812 IT professionals participated in year one and 360 participated in year three. This two-year interval between collection points meets or exceeds the time gap that one can find in previous research (e.g., Bala & Bhagwatwar, 2018; Allan, 2017; Quinones, Griffiths, & Kakabadse, 2016; Ma, Kim, & Kim, 2014; Bhattacharjee, Perols, & Sanford, 2008). We could use a total of 324 responses from individuals who participated in both data collections (years one and three) (no missing data etc.).

5 Analysis and Results

We adapted measures for this study to the IT profession from previously validated instruments. We measured all items on a seven-point Likert-type scale anchored from strongly disagree (1) to strongly agree (7). Table 3 provides construct source and reliability information. Measures exhibited reliability ranging from .805 to .886 in year one and .864 to .930 in year three. We provide a complete list of construct items that we used in this study in the Appendix.

Table 3. Construct Source and Reliability Summary

Construct	No. of items	Y1	Y3	Source
Fairness	5	.868	.869	Niehoff & Moorman (1993)
Professional identification	6	.863	.878	Mael & Ashforth (1992)
Psychological contract violation	5	.867	.903	Robinson & Morrison (2000)
General satisfaction	2	.866	.864	Hackman & Oldham (1976)
Satisfaction with the IT profession	5	.886	.930	Greenhaus et al. (1990)
Affective commitment to the IT profession	5	.805	.850	Allen & Meyer (1990)

Of the individuals that responded in both time periods, 61.1 percent were male and 38.6 percent were female. In the first data collection, only 29.3 percent indicated that they had supervisory responsibilities, which increased to 34.9 percent in year three. Table 4 shows the descriptive statistics for the demographic variables. We analyzed the data using SPSS 21. We also calculated descriptive statistics and correlations and provide them in Tables 5-8.

Table 4. Demographic Information for All of the Data

Gender	
Male	61.1%
Female	38.6%
Missing	.3%
Ethnicity	
White	92.6%
African American	5.2%
Hispanic	.9%
Other	.9%
Missing	.3%
Education	
Some college	9.6%
Associates degree	7.4%
Undergraduate degree	61.4%
Master's degree	14.8%
Other	.9%

Table 4. Demographic Information for All of the Data

Missing	5.9%	
Age		
20-29	16.4%	
30-39	33.9%	
40-49	30.7%	
50-59	14%	
60+	1.8%	
Missing	3.1%	
Supervisory responsibilities		
	Year one	Year three
Yes	29.3%	34.9%
No	67.6%	65.1%
Missing	3.1%	
Years in IT profession		
0-6	24.4%	
7-13	24.4%	
14-20	22.6%	
20+	22%	
Missing	6.5%	
Industry		
IT Services	54%	
Healthcare	18.2%	
Transportation	11.7%	
Government	7.7%	
Other	6.5%	
Missing	1.9%	

Table 5. Descriptive Statistics

	Mean	Std. deviation
Year one fairness (y1_fair)	5.138	1.127
Year three fairness (y3_fair)	5.267	1.127
Year one psychological contract violation (y1_pcv)	2.448	1.372
Year three psychological contract violation (y3_pcv)	2.838	1.394
Year one professional identification (y1_profid)	3.709	1.266
Year three professional identification (y3_profid)	3.827	1.236
Year one affective commitment (y1_ac)	4.366	1.241
Year three affective commitment (y3_ac)	3.993	1.317
Year one satisfaction with IT profession (y1_satitp)	4.867	1.197
Year three satisfaction with IT profession (y3_satitp)	4.569	1.357
Year one satisfaction general (y1_sat)	5.403	1.094
Year three satisfaction general (y3_sat)	5.066	1.254

Table 6. Year One Correlations Table

	y1_ac	y1_profid	y1_pcv	y1_fair	y1_satitp	y1_sat
y1_ac	1					
y1_profid	.443**	1				
y1_pcv	-.298**	-.026	1			
y1_fair	.097	-.005	-.470**	1		
y1_satitp	.353**	.112*	-.587**	.497**	1	
y1_sat	.566**	.280**	-.431**	.331**	.578**	1

Table 7. Year Three Correlations Table

	y3_ac	y3_profid	y3_pcv	y3_fair	y3_satitp	y3_sat
y3_ac	1					
y3_profid	.490**	1				
y3_pcv	-.428**	-.138*	1			
y3_fair	.268**	.121*	-.619**	1		
y3_satitp	.407**	.215**	-.585**	.432**	1	
y3_sat	.657**	.307**	-.561**	.402**	.573**	1

Table 8. Years One and Three Correlations Table

	y1_ac	y1_profid	y1_pcv	y1_fair	y1_satitp	y1_sat	y3_ac	y3_profid	y3_pcv	y3_fair	y3_satitp	y3_sat
y1_ac	1											
y1_profid	.443**	1										
y1_pcv	-.298**	-.026	1									
y1_fair	.097	-.005	-.470**	1								
y1_satitp	.353**	.112*	-.587**	.497**	1							
y1_sat	.566**	.280**	-.431**	.331**	.578**	1						
y3_ac	.600**	.318**	-.190	.092	.258**	.432**	1					
y3_profid	.361**	.642**	.001	.006	.163**	.237**	.490**	1				
y3_pcv	-.261**	-.004	.456**	.163**	-.398**	-.352**	-.428**	-.138*	1			
y3_fair	.102	.048	-.270**	.387**	.314**	.235**	.268**	.121*	-.619**	1		
y3_satitp	.222**	.125	-.338**	.226**	.526**	.292**	.407**	.215**	-.585**	.432**	1	
y3_sat	.345**	.180**	-.277**	.174**	.460**	.460**	.657**	.307**	-.561**	.402**	.573**	1

As we discuss in Section 4, we used the canonical correlation method to analyze the model for this research study. This method investigates the relationship between two sets of variables (Thompson, 1991; Tschannen-Moran, 2001) and identifies a linear combination of variables in one set that have the highest correlation with a linear combination of variables in another set (Johnson & Wichern, 1992). As Rodriguez and Cano (2007, p. 657) note: “The canonical correlation for the variates measures how strongly the two sets of variates relate to each other. The squared correlation represents the

corresponding overlapping variance.”. The standardized canonical coefficients indicate the relative importance of each of the independent and dependent variables in determining the value of the variate.

This technique conceptually relates to:

Regression analysis and factor analysis, [which] can be used to evaluate if and how two sets of variables, each having more than one variable, are linearly related to one another. Linear combinations of the independent variables and corresponding linear combinations of the dependent variables are found such that the pairs of linear combinations (canonical variables) best express the correlations between the two variable sets (canonical correlations). The standardized weights (canonical coefficients) used to create the canonical variables can be used to assess the relative importance of original independent and dependent variables' contributions for a given canonical correlation. (Kelly et al., 2007, p. 321)

Examining both the strength and direction of the relationships between sets of variables provides researchers the opportunity to determine which independent variables have the larger impact on the dependent canonical variate by examining canonical cross loadings.

The value of the canonical correlation may fall between 0 and +1. Hair et al. (1998) provide three questions that serve as guidelines to examine the different canonical functions: 1) “is the canonical function significant?”, 2) “what is the magnitude of the canonical correlation?”, and 3) “what is the value of the redundancy index?” (Stewart & Love, 1968). Based on the answers to these three questions, one makes a judgment about which canonical functions to retain. In Sections 5.1 to 5.5, we provide the results of the analyses.

5.1 Full Data Set: Year-one Data

We performed the first canonical correlation analysis with the year-one data. From this examination, three canonical functions emerged. Only two functions showed significance (first function: Wilks' lambda = .448 ($p = .000$); second function: Wilks' lambda = .803 ($p = .000$)). Based on the lack of statistical significance, we did not consider the third function further. Second, we analyzed the magnitude of the canonical correlation. Both the first and second functions had an acceptable correlation (.665 and .441, respectively). Third, we analyzed the value of the redundancy index (i.e., an average R^2). According to Hair et al. (1998, p. 451), “the redundancy measure is perfectly analogous to multiple regression's R^2 statistic, and its value as an index is similar”. We found that the first function had a redundancy index of .206 and the second a redundancy index of .067. Based on this result, we retained only the first function for the year-one data.

Since the first function was retained, we next analyzed the cross loadings for the dependent and independent variables. The second column in Table 9 shows the cross loadings for each of the three independent variables and the three dependent variables. Following Mahmood and Mann (1993), we used the value $|.40|$ as the minimum cutoff for the cross loadings. Both professional identification and affective commitment to the IT profession had cross loadings below the cutoff; thus, we dropped them from the next run.

We performed the second canonical correlation with the year-one data after we removed professional identification and affective commitment to the IT profession, which provided only one significant canonical function (first function: Wilks' lambda = .558 ($p = .000$)). The third column in Table 9 shows the cross loadings for the dependent and independent variables. The first function had a correlation of .641, and the dependent variables had a redundancy index of .302, which indicates that the canonical function of the independent variables explained 30 percent of the variance of the dependent variables. The independent variables had a redundancy index of .298. Examining the cross loadings from the third column in Table 9 shows that psychological contract violation had an inverse relationship with the dependent variables while fairness had a direct relationship with them. Analyzing the correlation cross loadings, we can square the cross loading to get an approximation of the variance that the opposite canonical variate explained. For example, we found that the independent canonical variate explained 39.8 percent of the variance in satisfaction with the IT profession and 20.5 percent of the variance with general satisfaction. For the independent variables, the dependent canonical variate explained approximately 34.6 percent of the variance in psychological contract violation and 24.8 percent of the variance in fairness.

5.2 Full Data Set: Year-three Data

We performed the third canonical correlation analysis with the year-three data. From this examination, three canonical functions emerged. First, two functions showed significance (first function: Wilks' lambda = .443 ($p = .000$); second function: Wilks' lambda = .873 ($p = .000$)). Second, the first and second functions had a correlation of .710 and 0.360, respectively. Third, the dependent variables for the first function had a redundancy index of .349, which indicates that the canonical function of the independent variables explained almost 35 percent of the variance of the dependent variables. The dependent variables for the second function had a redundancy index of .020. The independent variables for the first and second functions had a redundancy index of .253 and 0.43, respectively.

Based on these indices, we dropped the second function. The fourth column in Table 9 shows the cross loadings for the dependent and independent variables for the first function. Due to the large cross loadings, we retained all six variables. Interpreting the signs on the cross loading values shows that psychological contract violation had an inverse relationship while professional identification and fairness had a direct relationship with the three dependent variables. General satisfaction, satisfaction with the IT profession, and affective commitment to the IT profession all had high correlations with the independent canonical variate such that the function explained 37 percent, 34.7 percent, and 33.1 percent of their variance, respectively. Psychological contract violation had the highest cross loading with the dependent variables: the dependent canonical variate explained approximately 40.2% percent of its variance.

Table 9. Cross Loadings for Independent and Dependent Variables

Variable	Initial run All year-one data	Second run All year-one data	Initial run All year-three data
Professional identification	-.240		-.400
Psychological contract violation	.587	-.589	.634
Fairness	-.463	.498	-.444
<i>Affective commitment</i>	-.397		-.575
<i>Satisfaction with the IT profession</i>	-.627	.631	-.589
<i>General satisfaction</i>	-.520	.453	-.608

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.3 Split Data Set: Males

5.3.1 Year-one Data

To further analyze the data, we split the sample based on 1) gender and 2) IT tenure (i.e., years in the IT field). We address the analysis based on gender first. We continued to use canonical correlation as the analysis method, so we could compare multiple variables that constitute the "IT work environment" and the "individual attitudes toward the IT profession" for gender. This approach minimizes the probability of type 1 errors that would exist if we used a series of multiple regression analyses or paired t-tests for each variable comparison. We first performed a canonical correlation analysis for the males with only year-one data. From this examination, three canonical functions emerged. Two of the three canonical functions showed significance (first function: Wilks' lambda = .436 ($p = .000$); second function: Wilks' lambda = .764 ($p = .000$)). The first and second functions had a correlation of .655 and .482, respectively. Further, the dependent variables for the first and second functions had a redundancy index of 0.274 and 0.54, respectively. The independent variables for the first and second functions had a redundancy index of .192 and .082, respectively. The second column in Table 10 shows the cross loadings. The cross loading for professional identification did not reach the $|\cdot40|$ threshold, so we dropped it. We conducted a second canonical correlation with the remaining five variables. We found two significant canonical functions (first function: Wilks' lambda = .578 ($p = .000$); second function: Wilks' lambda = .950 ($p = .007$)). The first function had a correlation of .626, and the second function had a correlation of .224. Further, the dependent variables for the first and second functions had a redundancy index of .212 and .015, respectively. The independent variables for the first and second functions had a redundancy index of .280 and .014, respectively. Thus, we retained only the first function. As the third column in Table 10 shows, affective commitment had a low cross loading; thus, we needed to drop this variable and rerun the canonical correlation. The third run provided one significant canonical function (first function: Wilks'

lambda = .607 ($p = .000$) with a correlation of .625, a redundancy index of .291 for the dependent variables and .279 for the independent variables. The fourth column in Table 10 shows that the four cross loadings exceeded the minimum threshold. For example, the first function explained 38.2 percent of the variance in satisfaction with the IT profession and approximately 20 percent of the variability in general satisfaction. Additionally, the dependent canonical variate explained 33.1 percent of the variance in psychological contract violation and 22.7 percent of the variance in fairness. As we state above, psychological contract violation had an inverse relationship with the two dependent variables while fairness had a direct relationship. The fourth column in Table 10 shows that the four cross loadings exceeded the minimum threshold.

Table 10. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Male only Year-one data	Second run Male only Year-one data	Third run Male only Year-one data
Professional identification	-.306		
Psychological contract violation	.570	.572	-.575
Fairness	-.414	-.483	.476
<i>Affective commitment to the IT profession</i>	-.424	-.234	
<i>Satisfaction with the IT profession</i>	-.605	-.618	.618
<i>General satisfaction</i>	-.527	-.446	.447

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.3.2 Year-three Data

Next we performed a canonical correlation analysis for the males only using year-three data. From this examination, three canonical functions emerged. Again, only two showed significance (first function: Wilks' lambda = .368 ($p = .000$); second function: Wilks' lambda = .828 ($p = .000$)). The first and second functions had a correlation of .746 and .410, respectively. Further, the dependent variables for first and second functions had a redundancy index of .415 and .023, respectively. The independent variables for first and second functions had a redundancy index of .284 and .051, respectively. Thus, we retained only the first function. The second column in Table 11 shows that the cross loadings for all six variables exceeded the minimum; thus, we retained them. In fact, the independent canonical variate explained the largest percentage of variance for these six variables in the study than in any other run we conducted and present in this study. Furthermore, the dependent canonical variate explained 83.5 percent of the variance in psychological contract violation. Thus, we retained only the first function.

Table 11. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Male only Year-three data
Professional identification	-.587
Psychological contract violation	.914
Fairness	-.596
<i>Affective commitment with the IT profession</i>	-.856
<i>Satisfaction with the IT profession</i>	-.874
<i>General satisfaction</i>	-.861

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.4 Split Data Set: Females

5.4.1 Year-one Data

After examining data for only males, we performed canonical correlation analyses for only females. The first run looked at only year-one data. From this examination, three canonical functions emerged. We found that two showed significance (first function: Wilks' lambda = .457 ($p = .000$); second function: Wilks'

lambda = .855 ($p = .001$)). The first and second functions had a correlation of .683 and .379, respectively. The dependent variables for the first and second functions had a redundancy index of .271 and .040, respectively. The independent variables for the first and second functions had a redundancy index of .226 and .047, respectively. Thus, we retained only the first function. The second column in Table 12 shows the cross loadings. The cross loading for professional identification and affective commitment did not meet the $|\lambda| \geq .40$ threshold, so we dropped them. We conducted another canonical correlation with only four variables. We found only one significant canonical function (Wilks' lambda = .557 ($p = .000$)) that had a correlation of .665, a redundancy index of .315 for the dependent variables and .335 for the independent variables, and acceptable cross loadings (see third column in Table 12). The independent canonical variate explained 42.2 percent of the variance in satisfaction with the IT profession, while the dependent canonical variate explained 35.5 percent of the variance in psychological contract violation.

Table 12. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Female only Year-one data	Second run Female only Year-one data
Professional identification	-.147	
Psychological contract violation	.603	-.604
Fairness	-.541	.553
<i>Affective commitment</i>	-.369	
<i>Satisfaction with the IT profession</i>	-.650	.650
<i>General satisfaction</i>	-.504	.456

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.4.2 Year-three Data

We obtained three canonical functions when we ran the canonical correlation analysis for only females with the year-three data. We found that only two showed significance (first function: Wilks' lambda = .503 ($p = .000$); second function: Wilks' lambda = .889 ($p = .007$)). The first and second functions had a correlation of .659 and .313, respectively. The dependent variables for the first and second functions had a redundancy index of .265 and .021, respectively. The independent variables for the first and second functions had a redundancy index of .211 and .036. Thus, we retained only the first function. The second column in table 13 shows the cross loadings. Once again, the cross loading for professional identification did not reach threshold, so we conducted an additional run with only five variables. One significant canonical function (Wilks' lambda = .635 ($p = .000$)) resulted with a correlation of .589, a redundancy index of .196 for the dependent variables and .279 for the independent variables, and one unacceptable cross loading (affective commitment) (see third column in Table 13). As such, we dropped affective commitment and ran a third run with four variables. We found one significant canonical function (Wilks' Lambda = .651 ($p = .000$)) with a correlation of .588 and a redundancy index of .245 for the dependent variables and .279 for the independent variables. The fourth column in Table 13 shows that the remaining variables had acceptable cross loadings.

Table 13. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Female only Year-three data	Second run Female only Year-three data	Third run Female only Year-three data
Professional identification	-.338		
Psychological contract violation	.539	-.547	.544
Fairness	-.478	.509	-.511
<i>Affective commitment</i>	-.481	.312	
<i>Satisfaction with the IT profession</i>	-.480	.484	-.484
<i>General satisfaction</i>	-.578	.506	-.507

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.5 Split Data Set: Years in IT

For the second split data analysis, we looked at tenure in the IT profession. Once again, we continued to use canonical correlation so that we could compare the “IT work environment” variate and the “individual attitudes toward the IT profession” variate based on tenure in IT. Admittedly, we could have conducted a series of t-tests, but this approach would have inflated the probability of a type 1 error. We took those IT professionals who had more years in IT than the mean years of the overall data set versus those that had fewer years in IT than the mean for the year-one and year-three data. In Sections 5.5.1 and 5.5.2, we present the results.

5.5.1 Years in IT Below the Mean

We obtained three canonical functions from the canonical correlation analysis for year one and three data. We found that two showed significance (first function (year-one data): Wilks’ lambda = .438 (p = .000); first function (year-three data): Wilks’ lambda = .469 (p = .000); second function (year-one data): Wilks’ lambda = .803 (p = .000); second function (year-three data): Wilks’ lambda = .912 (p = .003)). The first and second functions had a correlation of .674 and .434 for the year-one data and .697 and .283 for the year-three data, respectively. The dependent variables for the first and second functions had a redundancy index of .297 and .043 for the year-one data and .327 and .014 for the year-three data, respectively. The independent variables for the first and second functions had a redundancy index of .205 and .065 for the year-one data and .248 and .027 for the year-three data, respectively. Thus, we retained only the first function for years one and three. Table 14 indicates that all six variables had sufficient cross loadings for the first function for the year-one data (second column) and the first function for the year-three data (column three) for those IT professionals who had below the mean number of years in IT compared to the overall dataset.

Table 14. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Below the mean years IT Year-one data	Initial run Below the mean years IT Year-three data
Professional identification	-.439	-.720
Psychological contract violation	.826	.815
Fairness	-.692	-.590
<i>Affective commitment with the IT profession</i>	-.696	-.930
<i>Satisfaction with the IT profession</i>	-.903	-.692
<i>General satisfaction</i>	-.812	-.823

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

5.5.2 Years in IT above the Mean

We obtained three canonical correlation functions for the canonical correlation analysis with those IT professionals who had more years in IT compared to the mean. We found that two showed significance (first function (year one): Wilks’ Lambda = .414 (p = .000); first function (year three): Wilks’ lambda = .342 (p = .000); second function (year one): Wilks’ lambda = .810 (p = .000); second function (year three): Wilks’ lambda = .856 (p = .000)). The first and second functions had a correlation of .699 and .436 for the year-one data and .775 and .344 for the year-three data, respectively. The dependent variables for the first and second functions had a redundancy index of .281 and .054 for the year-one data and .380 and .031 for the year-three data. The independent variables for the first and second functions had a redundancy index of .236 and .063 for the year-one data and .312 and .038 for the year-three data, respectively. Thus, we retained only the first function for the year-one and year-three data. The second and third columns in Table 15 indicate that professional identification did not meet the |.40| threshold for an acceptable cross loading in the year one or year-three data. Therefore, we dropped professional identification and reran the canonical correlation.

Table 15. Cross Loadings for Independent and Dependent Variables

Variable	Initial run Above the mean years IT Year-one data	Initial run Above the mean years IT Year-three data
Professional identification	-.229	-.268
Psychological contract violation	.941	.974
Fairness	-.715	-.733
<i>Affective commitment with the IT profession</i>	-.451	-.577
<i>Satisfaction with the IT profession</i>	-.975	-.947
<i>General satisfaction</i>	-.752	-.818

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

For the subsequent run in which we dropped professional identification for those with IT tenure (i.e., years in IT) above the mean, the cross loading for affective commitment to the IT profession did not meet the threshold for the year one or year-three data, so we dropped it. For space purposes, we do not show each iteration. However, Table 16 shows the final run with acceptable cross loadings. For the year-one data, we found one significant canonical function (Wilks' lambda = .515 (p = .000)) that had a correlation of .694 and a redundancy index of .363 for the dependent variables and .363 for the independent variables. For the year-three data, we found one significant canonical function (Wilks' lambda = .408 (p = .000)) that had a correlation of .764 and a redundancy index of .454 for the dependent variables and .449 for the independent variables.

Table 16. Cross Loadings for Independent and Dependent Variables

Variable	Final run Above the mean years IT Year-one data	Final run Above the mean years IT Year-three data
Psychological contract violation	-.653	-.757
Fairness	.517	.570
<i>Satisfaction with the IT profession</i>	.685	.735
<i>General satisfaction</i>	.508	.606

Note: **bold** numbers indicate the largest cross loadings; *italicized* items indicate the dependent variables.

Table 17 summarizes the findings by variables that showed acceptable cross loadings and data slice.

Table 17. Summary of Findings

	Time		Gender				Tenure			
	All data		Male only		Female only		Years in IT above the mean		Years in IT below the mean	
Data-collection wave	Y1	Y3	Y1	Y3	Y1	Y3	Y1	Y3	Y1	Y3
Analysis reference*	A	B	C	D	E	F	G	H	I	J
Professional identification		X		X					X	X
Psychological contract violation	X	X	X	X	X	X	X	X	X	X
Fairness	X	X	X	X	X	X	X	X	X	X
<i>Affective commitment to the IT profession</i>		X		X					X	X
<i>Satisfaction with the IT profession</i>	X	X	X	X	X	X	X	X	X	X
<i>General satisfaction</i>	X	X	X	X	X	X	X	X	X	X

* We use these letters in Section 6 to refer to each specific analysis. *Italicized* items indicate the dependent variables.

6 Discussion

Insufficient research in the IT field has looked at the overall profession (e.g., see Armstrong et al., 2015; Brooks et al., 2011; McKinney et al., 2008) and considered the combination of IT work environment (independent) variables and individual attitude (dependent) variables focused on the profession level. We conducted this study to better understand the relationships between profession-focused IT work environment variables and profession-focused individual attitude variables (RQ1). To address the results relevant to answering this question, we report on all 10 analyses that we conducted collectively and highlight some of the consistencies we found. Furthermore, throughout the discussion, we emphasize the two-wave design approach (RQ2a) and note the similarities and differences we found between the year-one and year-three data. The remaining discussion focuses on our research questions associated with the role of gender (RQ2b) and tenure (RQ2c).

In reviewing the findings for the group of independent variables (fairness, psychological contract violation (PCV) and professional identification), we found PCV and fairness to be associated with satisfaction with the IT profession and general satisfaction in all ten (see Table 17) canonical correlation analyses we performed regardless of how we sliced the data. For analyses (see analysis reference* row in Table 17) D, I, and J, we found professional identification, PCV, and fairness to be associated with affective commitment to the IT profession, satisfaction with the IT profession, and general satisfaction. All of the independent variables we used in this study were associated with all of the dependent variables in the male-only year-three data (analysis D) and in the year-one and year-three data for employees who had worked in IT fewer years than the mean (analysis I and J). For analysis B (all year-three data), professional identification, PCV, and fairness were associated with satisfaction with the IT profession and general satisfaction.

For the variables that showed acceptable cross loadings across all 10 analyses, PCV and fairness strongly contributed to the variance explained in satisfaction with the IT profession and general satisfaction. Managers should recognize how employees perceive the profession's fairness and PCV due to the influence that these constructs have on both types of satisfaction. As a practical implication, both psychological contract theory and social exchange theory arguably justify managers' supporting and facilitating IT professionals' participation in professional organizations and events. By offering sponsorships for professional organization events or compensating IT employees' time to participate in professional organizations, managers may improve how the employees perceive fairness with respect to the profession and organization while minimizing perceptions of PCV both with the organization and profession. For example, KPMG sponsors a Women's Leadership Summit, an annual event that brings together accomplished leaders in business, politics, sports and media to inspire the next generation of women leaders. Organizations could also sponsor local professional organizations (e.g., AITP) or alliances (e.g., TalTech) of businesses, academics, and entrepreneurs invested in promoting technology-based innovation and networking. Our findings at the profession level concur with the job-level findings from Cavanaugh and Noe (1999) related to the connections between psychological contract violation and job satisfaction and the links that Flower et al. (2015) found between fairness and job satisfaction.

The fact that PCV and fairness were significant across all 10 analyses provides additional support for the importance of using psychological contract theory at the profession level and not applying this theory only at the organizational level. Additionally, to build on our findings about the importance that psychological contracts and psychological contract theory have at the profession level, future research should consider the prestige and integrity of the profession as well.

In considering the differences across time (RQ2a), we conducted a paired samples t-test with the professional identification mean for the year-one data and the professional identification mean for the year-three data and found a significant difference between the two means with a p-value of .046. We conducted an additional analysis using a t-test that found affective commitment to the profession to significantly differ in both the year-one and year-three data (p-values of .014 and .000, respectively).

When considering differences across gender (RQ2b), we note that professional identification influenced the profession-focused individual attitude variables only in analyses B, I, and J. In other words, professional identification did not have an impact on any of the dependent variables for the women in this sample nor for the men in year one. Our study differs from the one that McKinney et al. (2008) conducted in that they did not find any difference between men and women in their professional identification. This finding has both managerial and theoretical implications. First, managers of IT professionals need to understand that professional identification may not be consistent across the men and women they

supervise. Managers cannot use a “one-size-fits-all” technique or tactic to support employee professional identification; clearly, the men in this sample cared more about professional identification than the women. Future research should examine this finding to tease out the prominent antecedents to IT professional identification based on gender. Concurrently, research should further investigate the theoretical implications of applying psychological contract theory and social exchange theory to the IT profession from a gendered perspective.

As it relates to the role of tenure in the profession (RQ2c), we note that, for IT professionals who had more than the mean number of years of experience in the field, their professional identification did not influence the year one or year-three data (analyses G and H). Bal, De Cooman, and Mol (2013) found similar results in the relationship between employer fulfillment and work engagement, which was significantly stronger for employees with low tenure than for employees with high tenure. They state (p. 108):

Previous research has shown that exchange norms guide the behavior of new employees in particular, whereas longer tenured employees have more stable relationships with their organizations, which are more likely to be driven by the long-term commitments of both parties.

Looking at analyses A, B, G, H, I, and J, we see time played a factor in the results. More tenured individuals more strongly influenced the results at year one, whereas less-tenured individuals more strongly influenced the results at year three. Thus, it appears that the relationships are more complex than we anticipated. Future research that applies social exchange theory and psychological contract theory should investigate both organizational tenure and professional tenure across time to better understand the importance of these variables for IT professionals.

Furthermore, Rousseau and Parks (1993) have claimed that loyalty drives long-tenured employees, while Wright and Bonett (2002) have claimed that reciprocity norms drive short-tenured employees. The experiences that longer-tenured employees have had with the firm over time may be more influential than their professional identification. Bal et al. (2013, p. 108) claim that “other factors than exchange norms” drive behavior of long-tenured employees. Future research should address this finding to further explore the relationship between professional identification and commitment to the profession and give consideration to the professional tenure of IT employees.

When looking across Table 17 at the affective commitment to the IT profession dependent variable, one can see that it was significant in only three analyses: analyses D, I, and J. Additional analysis from a t-test found affective commitment to the IT profession to differ significantly in years one and three (p-values of .014 and .000, respectively) when looking at the average time spent in the IT profession. The individuals that had been in IT longer (categorized as above the mean) had lower levels of affective commitment—an interesting and unexpected finding, though previous research on psychological climate factors may explain it. Psychological climate factors include items such as perceived support from a supervisor or the organization’s prestige. English, Morrison, and Chalon (2010) found that the longer an employee works with an organization, the higher the level of affective commitment the employee has to it but the less positively the employee evaluates psychological climate factors. As the findings here do not agree with what research has previously found, future research could examine the impact of different psychological climate factors (perceived organizational support, supervisor support, work group support, etc.) on the relationship between affective commitment and time in the IT profession. When looking across time in the profession as opposed to the organization, differences in these factors may emerge and play a more significant role in determining attitudes and behaviors. The differences may relate to the context of the study, which would highlight the potential importance of examining the profession as a separate area of influence in workforce research beyond the influence of a job or organization.

Additionally, we may explain the significance of affective commitment to males in year three with the way they perceived these psychological climate factors as well. For instance, one would expect that a factor, such as the ability to secure a different position/different employer at any time during an IT professional’s career, would be solidified the longer the individual remains a member of the profession. Previous research on the IT workforce has indicated that men and women differ as it relates to satisfaction with job security (Major, et al., 2013). IT has historically been (and remains) a male-dominated profession; it could be that the longer a male IT professional belongs to the profession, the stronger the influence of other factors. Future research should examine this possibility.

7 Limitations and Future Research

As with any study, our study has limitations that we must acknowledge. First, we applied a cross-sectional design at two points in time (two years apart) to capture the data. Even though we collected the data with a survey instrument, we could fortunately capture data from the same individuals at two time periods. Future research could perhaps confirm or refute these findings by increasing the time gap in the data-collection points (e.g., three years or more) and/or conducting three data-collection waves. Future studies could employ a mixed-methods approach that included individual interviews or focus group interviews to capture qualitative data to more fully explain the nature and/or development of the relationships between these combinations of IT profession-focused work environment variables and IT profession-focused individual attitudes. Capturing individual stories and experiences through qualitative methods may more richly explain our quantitative findings.

A second limitation concerns the generalizability of our findings. Researchers should use care when attempting to apply these findings to professions besides IT; however, based on comparisons with extant research as we present in Section 6, we postulate that these relationships may hold in other contexts. For example, researchers often define the IT profession as being boundaryless (Arthur & Rousseau, 1996) and having high stress (Longenecker et al. 1999). Researchers could examine other professions that have similar characteristics to see if a connection between the defining outcomes exists. Additionally, researchers should expand our work to look at distinct IT jobs in the profession (examining professional vs. technical positions, different job titles, etc.) to better understand how these issues operate. Another opportunity would be for additional studies that compared our findings with IT professionals to findings with individuals in other professions.

A third limitation concerns our using canonical correlation rather than some other analysis methodology, such as regression analysis or structural equation modeling. We acknowledge that we could have conducted other types of analyses, but we assert that, since researchers have not definitively identified the order of causality between the independent variables and dependent variables, looking at the influence of the group of independent variables on the group of dependent variables via using canonical correlation represents an appropriate step toward better understanding these complex relationships.

A final limitation concerns the potential for response bias. Since the CIO of each organization in this study encouraged the IT professionals to participate, some or all CIOs possibly unduly influenced their employees to participate or not participate. Considering our focus on collecting data at two distinct points in time, we note that the CIO only contacted the potential respondents at the first data collection and did not participate in any way in the subsequent data-collection efforts. Additionally, we report respondent's responses only in aggregate form and guaranteed each respondent's anonymity. We created a coding scheme that only we knew to match participant responses over time. Still, future research could explore other data-collection mechanisms to ensure minimal response bias.

8 Conclusion

In this study, we examine the interplay between a group of independent variables (professional identification, psychological contract violation, and fairness) and a group of dependent variables (affective commitment to the IT profession, satisfaction with the IT profession, and general satisfaction) simultaneously. Consistent with previous research related to the IT workforce (e.g. Reid et al., 2008; Byrd et al., 2004), we used the canonical correlation analysis method, which provided the opportunity to examine the relationship between these two sets of variables (Thompson, 1991; Tschannen-Moran, 2001). Our findings show that social exchange theory and the idea of reciprocal relationships clearly impact satisfaction and commitment with the IT profession. Specifically, perceptions of violations in the psychological contract influenced the satisfaction components we examined. Finally, differences found in the relationships between the groups of variables related to gender and tenure in the IT field deserves further examination.

References

- Ahmed, I., & Nawaz, M. M. (2015). Antecedents and outcomes of perceived organizational support: A literature survey approach. *Journal of Management Development, 31*(7), 867-880.
- Ahuja, M. K. (2002). Women in the information technology profession: A literature review, synthesis and research agenda. *European Journal of Information Systems, 11*(1), 20-34.
- Aksin, O. A., & Masini, A. (2008). Effective strategies for internal outsourcing and offshoring of business services: An empirical investigation. *Journal of Operations Management, 26*, 239-256.
- Allan, B. A. (2017). Task significance and meaningful work: A longitudinal study. *Journal of Vocational Behavior, 102*, 174-182.
- Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance, and normative commitment to the organization. *Journal of Occupational and Organizational Psychology, 63*(1), 1-18.
- Alvarez, R. (2008). Examining technology, structure and identity during an enterprise system implementation. *Information Systems Journal, 18*(2), 203-224.
- Armstrong, D. J., Brooks, N. G., & Riemenschneider, C. K. (2015). Exhaustion from information systems career experience: Implications for turnaway intention. *MIS Quarterly, 39*(3), 713-728.
- Arthur, M., & Rousseau, D. (1996). Introduction: The boundaryless career as a new-employment principle. In M. Arthur & D. Rousseau (Eds.), *The boundaryless career* (pp. 3-20). New York, NY: Oxford University Press.
- Aselage, J., & Eisenberger, R. (2003). Perceived organizational support and psychological contracts: A theoretical integration. *Journal of Organizational Behavior, 24*(5), 491-509.
- Ashcraft, C., McLain, B., & Eger, E. (2016). *Women in tech: The facts 2016 update // see what's changed and what hasn't*. Retrieved from https://www.ncwit.org/sites/default/files/resources/womenintech_facts_fullreport_05132016.pdf
- Ashforth, B. E., Harrison, S. H., Corley, K. G. (2008). Identification in organizations: An examination of four fundamental questions. *Journal of Management, 34*(3), 325-374.
- Ashforth, B. E., & Mael, F. (1989). Social identity theory and the organization. *Academy of Management Review, 14*(1), 20-39.
- Bal, P. M., De Cooman, R., & Mol, S. T. (2013). Dynamics of psychological contracts with work engagement and turnover intention: The influence of organizational tenure. *European Journal of Work and Organizational Psychology, 22*(1), 107-122.
- Bala, H. & Bhagwatwar, A. (2018). Employee dispositions to job and organization as antecedents and consequences of information systems use. *Information Systems Journal, 28*(4), 650-683.
- Baran, B., Shanock, L., & Miller, L. (2012). Advancing organizational support theory into the twenty-first century world of work. *Journal of Business and Psychology, 27*(2), 123-147.
- Bartol, K. M. (1983). Turnover among DP personnel: A causal analysis. *Communications of the ACM, 26*(10), 807-811.
- Bateman, T. S., & Strasser, S. 1984. A longitudinal analysis of the antecedents of organizational commitment. *Academy of Management Journal, 27*(1), 95-112.
- Bhattacharjee, A., Perols, J., & Sanford, C. (2008). Information technology continuance: A theoretic extension and empirical test. *The Journal of Computer Information Systems, 49*(1), 17-26.
- Blomme, R. J., van Rheede, A., & Tromp, D. M. (2010). The use of the psychological contract to explain turnover intentions in the hospitality industry: A research study on the impact of gender on the turnover intentions of highly educated employees. *The International Journal of Human Resource Management, 21*(1), 144-162.
- Bluedorn, A. C. (1982). A unified model of turnover from organizations. *Human Relations, 35*(2), 135-153.

- Bradford, B. (2014). Policing and social identity: Procedural justice, inclusion and cooperation between police and public. *Policing & Society*, 24(1), 22-43.
- Brooks, N. G., Riemenschneider, C. K., Hardgrave, B. C., & O'Leary-Kelly, A. M. (2011). IT professional identity: Needs, perceptions, and belonging. *European Journal of Information Systems*, 20(1), 87-102.
- Brooks, N. G., Hardgrave, B. C., O'Leary-Kelly, A. M., McKinney, V., & Wilson, D. D. (2015). Identifying with the information technology profession: Implications for turnover for IT professionals. *The DATABASE for Advances in Information Systems*, 46(1), 8-23.
- Byrd, T. A., Lewis, B. R., & Turner, D. E. (2004). The impact of IT personnel skills on IS infrastructure and competitive IS. *Information Resources Management Journal*, 17(2), 38-68.
- Byrd, T. A., & Turner, D. E. (2001). An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage. *Information & Management*, 39(1), 41-52.
- Cavanaugh, M. A., & Noe, R. A. (1999). Antecedents and consequences of relational components of the new psychological contract. *Journal of Organizational Behavior*, 20(3), 323-340.
- Chao, G. T., O'Leary-Kelly, A. M., Wolf, S., Klein, H. J., & Gardner, P. D. (1994). Organizational socialization: Its context and consequences. *Journal of Applied Psychology*, 79(5), 703-743.
- Cheney, G. (1983). On the various and changing meanings of organizational membership: A field study of organizational identification. *Communication Monographs*, 50(4), 442-362.
- Darlington, R. B., Weinberg, S. L., & Walberg, H. J. (1973). Canonical variate analysis and related techniques. *Review of Educational Research*, 43(4), 433-454.
- Datta, D. K., Guthrie, J. P., Basuil, D. & Pandey, A. (2010). Causes and effects of employee downsizing: A review and synthesis. *Journal of Management*, 36(1), 281-348.
- Dubinsky, A. J., & Levy, M. (1985). Ethics in retailing: Perceptions of retail salespeople. *Journal of the Academy of Marketing Science*, 13(1-2), 1-16.
- Eby, L. T., Freeman, D. M., Rush, M. C., & Lance, C. E. (1999). Motivational bases of affective organizational commitment: A partial test of an integrative theoretical model. *Journal of Occupational and Organizational Psychology*, 72, 463-483.
- Eckerd, S., Hill, J., Boyer, K., Donohue, K., & Ward, P. (2013). The relative impact of attribute, severity, and timing of psychological contract breach on behavioral and attitudinal outcomes. *Journal of Operations Management*, 31(7-8), 567-578.
- English, B., Morrison, D., & Chalon, C. (2010). Moderator effects of organizational tenure on the relationship between psychological climate and affective commitment. *Journal of Management Development*, 29(4), 394-408.
- Epitropaki, O. (2013). A multi-level investigation of psychological contract breach and organizational identification through the lens of perceived organizational membership: Testing a moderated-mediated model. *Journal of Organizational Behavior*, 34(1), 65-86.
- Flower, R., Demir, D., McWilliams, J., & Johnson, D. (2015). Perceptions of fairness in the psychological contracts of allied health professionals. *Asia-Pacific Journal of Business Administration*, 7(2), 106-116.
- Gakovic, A., & Tetrick, L. E. (2003). Psychological contract breach as a source of strain for employees. *Journal of Business and Psychology*, 18(2), 235-246.
- Gallivan, M. J. (2004). Examining IT professionals' adaptation to technological change: The influence of gender and personal attributes. *The Database for Advances in Information Systems*, 35(3), 28-49.
- Gannon, B. (2013). Outsiders: An exploratory history of IS in corporations. *Journal of Information Technology*, 28(1), 50-62.
- Gefen, D., Ragowsky, A., Miller, J., Licker, P., & Stern, M. (2015). The center cannot hold: How leading firms are managing the changing IT boundaries. *Communications of the Association for Information Systems*, 36, 655-667.

- Gemoets, L. A., & Mahmood, M. O. (1990). Effect of the quality of user documentation on user satisfaction with information systems. *Information & Management*, 18(1), 47-54.
- Gibney, R., Zagenczyk, T. J., Fuller, J. B., Hester, K., & Caner, T. (2011). Exploring organizational obstruction and the expanded model of organizational identification. *Journal of Applied Social Psychology*, 41(5), 1083-1109.
- Goldstein, D. K., & Rockart, J. F. (1984). An examination of work-related correlates of job satisfaction in programmer/analysts. *MIS Quarterly*, 8(2), 103-115.
- Goles, T., Lee, S., Rao, S. V., & Warren, J. (2009). Trust violation in electronic commerce: Customer concerns and reactions. *The Journal of Computer Information Systems*, 49(4), 1-9.
- Gorbacheva, E., Beekhuyzen, J., vom Brocke, J., & Becker, J. (2018). Directions for research on gender imbalance in the IT profession. *European Journal of Information Systems*, 28(1), 43-67.
- Grasz, J. (2014). Nearly one-third of employers expect workers to job-hop. *CareerBuilder.com*. Retrieved from <http://www.careerbuilder.com/share/aboutus/pressreleasesdetail.aspx?id=pr824&sd=5/15/2014&ed=05/15/2014>
- Greenhaus, J. H., Parasuraman, S., & Wormley, W. M. (1990). Effects of race on organizational experiences, job performance evaluations, and career outcomes. *Academy of Management Journal*, 33(1), 64-86.
- Gupta, Y. P., Guimaraes, T., & Raghunathan, T. S. (1992). Attitudes and intentions of information center personnel. *Information & Management*, 22(3), 151-160.
- Guzman, I. R., & Stanton, J. M. (2009). IT occupational culture: The cultural fit and commitment of new information technologists. *Information Technology & People*, 22(2), 157-187.
- Ha, J., & Ha, J. (2015). Organizational justice-affective commitment relationship in a team sport setting: The moderating effect of group cohesion. *Journal of Management and Organization*, 21(1), 107-124.
- Hair, J. F., Tatham, R. L., Anderson, R. E., & Black, W. (1998). *Multivariate data analysis* (5th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16, 250-279.
- Hekman, D. R., Steensma, H. K., Bigley, G. A., & Hereford, J. F. (2009). Effects of organizational and professional identification on the relationship between administrators' social influence and professional employees' adoption of new work behavior. *Journal of Applied Psychology*, 94(5), 1325-1335.
- Hiemstra, A. M. F., Deros, E., Serlie, A. W., & Born, M. P. (2012). Fairness perceptions of video resumes among ethnically diverse applicants. *International Journal of Selection and Assessment*, 20(4), 423-433.
- Hopkins, S. M., & Weathington, B. L. (2006). The relationships between justice perceptions, trust, and employee attitudes in downsized organizations. *The Journal of Psychology*, 140(5), 477-498.
- Hsieh, P. L. (2012). Why e-return services fail: A psychological contract violation approach. *Cyberpsychology, Behavior, and Social Networking*, 15(12), 655-662.
- Igbaria, M., & Greenhaus, J. (1992). Determinants of MIS employees' turnover intentions. *Communications of the ACM*, 35(2), 35-49.
- Jiang, J., & Klein, G. (1999). Risks to different aspects of system success. *Information and Management*, 36(5), 263-271.
- Jih, W. K. (2002). Effects of electronic commerce implementation in Taiwan. *The Journal of Computer Information Systems*, 42(3), 68-76
- Johnson, R. A., & Wichern, D. W. (1992). *Applied multivariate statistical analysis* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.

- Johnson, R. E., Chang, C., & Rosen, C. C. (2010). Who I am depends on how fairly I'm treated: Effects of justice on self-identity and regulatory focus. *Journal of Applied Social Psychology, 40*(12), 3020-3058.
- Johnston, M. W., Parasuraman, A., Futrell, C. M., & Black, W. C. (1990). A longitudinal assessment of the impact of selected organizational influences on salespeople's organizational commitment during early employment. *Journal of Marketing Research, 27*(3), 333-344.
- Joseph, D., Ng, K., Koh, C., & Ang, S. (2007). Turnover of information technology professionals: A narrative review, meta-analytic structure equation modeling, and model development. *MIS Quarterly, 31*(3), 547-577.
- Kelly, M. A., Sereika, S. M., Battista, D. R., & Brown, C. (2007). The relationship between beliefs about depression and coping strategies: Gender differences. *British Journal of Clinical Psychology, 46*(3), 315-332.
- Kim, H., & Lee, D. (2014). The relationship between the internal labour market and transitions from temporary to permanent employment in Korea. *Relations Industrielles, 69*(3), 597-620.
- Kreiner, G. E., & Ashforth, B. E. (2004). Evidence toward an expanded model of organizational identification. *Journal of Organizational Behavior, 25*(1), 1-27.
- Koh, C. E., & Watson, H. J. (1998) Data management in executive information systems. *Information & Management, 33*(6), 301-312.
- Konrad, A. M., Ross, G., & Linnehan, F. (2006). Is promoting an African American unfair? The triple interaction of participant ethnicity, target ethnicity, and ethnic identity. *Journal of Applied Social Psychology, 36*(5), 1215-1233.
- Lee, P., & Stewart, D. (2016). *Women in IT jobs: It is about education, but also about more than just education*. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tech-nology-Media-Telecommunications/gx-tmt-prediction2016-women-it-jobs.pdf>.
- Lo, J. (2015). The information technology workforce: A review and assessment of voluntary turnover research. *Information Systems Frontiers, 17*(2), 387-411.
- Locke, E. A., & Lathan, G. P. (1976). *Theory of goal setting and task performance*. Englewood Cliffs, N.J: Prentice Hall.
- Loi, R., Hang-yue, N., & Foley, S. (2004). The effect of professional identification on job attitudes: A study of layers in Hong Kong. *Organizational Analysis, 12*(2), 109-128.
- Long, H. (2016). The new normal: 4 job changes by the time you're 32. *CNN Money*. Retrieved from <http://money.cnn.com/2016/04/12/news/economy/millennials-change-jobs-frequently/>
- Longenecker, C. O., Schaffer, C. J., & Scazzero, J. A. (1999). Causes and consequences of stress in the IT profession. *Information Systems Management, 16*(3), 71-77.
- Lowe, R. H., & Vodanovich, S. J. (1995). A field study of distributive and procedural justice as predictors of satisfaction and organizational commitment. *Journal of Business and Psychology, 10*(1), 99-114.
- Lui, S. S., Ngo, H. Y., & Tsang, A. W. (2001). Interrole conflict as a predictor of job satisfaction and propensity to leave: A study of professional accountants. *Journal of Managerial Psychology, 16*(6), 469-484.
- Ma, X., Kim, S. H., & Kim, S. S. (2014). Online gambling behavior: The impacts of cumulative outcomes, recent outcomes, and prior use. *Information Systems Research, 25*(3), 511-527.
- Mael, F. A., & Ashforth, B. E. (1992). Alumni and their alma mater: A partial test of the reformulated model or organizational identification. *Journal of Organizational Behavior, 13*(2), 103-123.
- Mael, F. A., & Tetrick, L. E. (1992). Identifying organizational identification. *Educational and Psychological Measurement, 52*(4), 813-824.
- Mahmood, M. A., & Mann, G. J. (1993). Measuring the organizational impact of information technology investment: An exploratory study. *Journal of Management Information Systems, 10*(1), 97-122.

- Major, D., Morganson, V. J., & Bolen, H. M. (2013). Predictors of occupational and organizational commitment in information technology: Exploring gender differences and similarities. *Journal of Business Psychology, 28*(3), 301-314.
- McCall, G. J. (1977). Making oneself behave: A critique of the behavioral paradigm and an alternative conceptualization. In T. Mischel (Ed.), *The self, psychological and philosophical issues*. Oxford, UK: Basil Blackwell.
- McFarlin, D. B., & Sweeney, P. D. (1992). Distributive and procedural justice as predictors of satisfaction with personal and organizational outcomes. *Academy of Management Journal, 35*(3), 626-637.
- McKinney, V. R., Wilson, D. D., Brooks, N. G., O'Leary-Kelly, A. M., & Hardgrave, B. C. (2008). Women and men in the IT profession. *Communications of the ACM, 51*(2), 81-84.
- Meyer, J. P., Allen, N. J., & Smith, C. (1993). Commitment to organizations and occupations: Extension and test of a three component conceptualization. *Journal of Applied Psychology, 78*(4), 538-551.
- Meyer, J. P., Allen, N. J., & Topolnysky, L. (1998). Commitment in a changing world of work. *Canadian Psychology, 39*(1-2), 83-93.
- Newsom, J. T., Nishishiba, M., Morgan, D. L., & Rook, K. S. (2003). The relative importance of three domains of positive and negative social exchanges: A longitudinal model with comparable measures. *Psychology and Aging, 18*(4), 746-754.
- Niehoff, B. P., & Moorman, R. H. (1993). Justice as a mediator of the relationship between methods of monitoring and organizational citizenship behavior. *Academy of Management Journal, 36*(3), 527-556.
- Orlikowski, W. J., & Baroudi, J. J. (1989). The information systems profession: Myth or reality? *Office: Technology and People, 4*(1), 13-30.
- Parzefall, M.-R. (2012). A close call: Perceptions of alternative HR arrangements to layoffs. *Journal of Managerial Psychology, 27*(8), 799-813.
- Quinones C., Griffiths, M. D., & Kakabadse, N. K. (2016). Compulsive Internet use and workaholism: An exploratory two-wave longitudinal study. *Computers in Human Behavior, 60*(C), 492-499.
- Ramachandran, S., Rao, C., Goles, T., & Dhillon, G. (2013). Variations in information security cultures across professions: A qualitative study. *Communications of the Association for Information Systems, 33*, 163-204.
- Reed, M. (2007). Engineers of human souls, faceless technocrats, or merchants of morality? Changing professional forms and identities in the face of the neoliberal challenge. In A. Pinnington, R. Macklin, & T. Campbell (Eds.), *Human resource management: Ethics and employment* (pp. 171-189). Oxford, UK: Oxford University Press.
- Reid, M. F., Riemenschneider, C. K., Allen, M. W., & Armstrong, D. J. (2008). Information technology employees in state government. *American Review of Public Administration, 38*(1), 41-61.
- Restubog, S. L., Hornsey, M., Bordia, P., & Esposito, S. R. (2008). Effects of psychological contract breach on organizational citizenship behaviour: Insights from the group value model. *Journal of Management Studies, 45*(8), 1377-1400.
- Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *Journal of Applied Psychology, 87*(4), 698-714.
- Roberts, J. A., Coulson, K. R., & Chonko, L. B. (1999). Salesperson perceptions of equity and justice and their impact on organizational commitment and intent to turnover. *Journal of Marketing Theory and Practice, 7*(1), 1-16.
- Robinson, S. L., & Morrison, E. W. (2000). The development of psychological contract breach violation: A longitudinal study. *Journal of Organizational Behavior, 21*(5), 525-546.
- Robinson, S. L., & Rousseau, D. M. (1994). Violating the psychological contract: Not the exception but the norm. *Journal of Organizational Behavior, 15*(3), 245-259.
- Rodriguez, L., & Cano, F. (2007). The learning approaches and epistemological beliefs of university students: A cross-sectional and longitudinal study. *Studies in Higher Education, 32*(5), 647-667.

- Rosen, C. C., Chang, C. H., Johnson, R. E., & Levy, P. E. (2009). Perceptions of the organizational context and psychological contract breach: Assessing competing perspectives. *Organizational Behavior and Human Decision Processes*, 108(2), 202-217.
- Rousseau, D. M. (1989). Psychological and implied contracts in organization. *Employee Responsibilities and Rights Journal*, 2, 121-139.
- Rousseau, D. M., & Parks, J. M. (1993). The contracts of individuals and organizations. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (vol. 15, pp. 1-43). Greenwich, CT: JAI Press.
- Russo, T. C. (1998). Organizational and professional identification: A case of newspaper journalists. *Management Communication Quarterly*, 12(1), 72-111.
- Sarathy, R., & Muralidhar, K. (2002). The security of confidential numerical data in databases. *Information Systems Research*, 13(4), 389-403.
- Scandura, T. A., & Lankau, M. J. (1997). Relationships of gender, family responsibility and flexible work hours to organizational commitment and job satisfaction. *Journal of Organizational Behavior*, 18(4), 377-391.
- Scott, C. R., Connaughton, S. L., Diaz-Saenz, H. R., Maguire, K., Ramirez, R., Richardson, B., Shaw, S. P., & Morgan, D. (1999). The impacts of communication and multiple identifications on intent to leave: A multimethodological exploration. *Management Communication Quarterly*, 12(3), 400-435.
- Spurk, D., Abele, A. E. & Volmer, J. (2011). The career satisfaction scale: Longitudinal measurement invariance and latent growth analysis. *Journal of Occupational and Organizational Psychology*, 84(2), 315-326.
- Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social Psychology Quarterly*, 63(3), 224-237.
- Stewart, D., & Love, W. (1968). A general canonical correlation index. *Psychological Bulletin*, 70(3), 160-163.
- Sweeney, P. D., & McFarlin, D. B. (1997). Process and outcome: Gender differences in the assessment of justice. *Journal of Organizational Behavior*, 18(1), 83-98.
- Tekleab, A. G., Orvis, K. A., & Taylor, M. S. (2012). Deleterious consequences of change in newcomers' employer-based psychological contract obligations. *Journal of Business and Psychology*, 28(3), 1-14.
- Thatcher, J. B., Stepina, L. P., & Boyle, R. J. (2003). Turnover of IT workers: Examining empirically the influence of attitudes, job characteristics, and external markets. *Journal of Management Information Systems*, 19(3), 231-261.
- Thompson, B. (1991). *Canonical correlation analysis: Uses and interpretation*. Thousand Oaks, CA: Sage.
- Tschannen-Moran, M. (2001). Collaboration and the need for trust. *Journal of Educational Administration*, 39(4), 308-331.
- U.S. Department of Labor. (2015). *Number of jobs held, labor market activity, and earnings growth among the youngest baby boomers: Results from a longitudinal survey*. Retrieved from <https://www.bls.gov/news.release/pdf/nlsoy.pdf>
- van Knippenberg, D., van Dick, R., & Tavares, S. (2007). Social identity and social exchange identification, support, and withdrawal from the job. *Journal of Applied Social Psychology*, 37(3), 457-477.
- Vandenberg, R. J., & Lance, C. E. (1992). Examining the causal order of job satisfaction and organizational commitment. *Journal of Management*, 18(1), 153-167.
- Weedmark, D. (2018). Job tenure and the myth of job hopping. *The Balance*. Retrieved from <https://www.thebalancecareers.com/job-tenure-and-the-myth-of-job-hopping-2071302>
- Weststar, J. (2015). Understanding video game developers as an occupational community. *Information, Communication & Society*, 18(10), 1238-1252.

- Wright, T. A., & Bonett, D. G. (2002). The moderating effects of employee tenure on the relation between organizational commitment and job performance: A meta-analysis. *Journal of Applied Psychology*, 87(6), 1183-1190.
- Zagenczyk, T. J., Gibney, R., Few, T. W., & Scott, K. L. (2011). Psychological contracts and organizational identification: The mediating effect of perceived organizational support. *Journal of Labor Research*, 32(3), 254-281.

Appendix

Table A1. List of Construct Items

Construct	Items (variable name)
Fairness	My work schedule has been fair. I think that my level of pay has been fair. I consider my workload to have been fair. I feel that my job responsibilities have been fair. Overall, the rewards I received have been fair.
Professional Identification	When someone criticizes the IT profession, it feels like a personal insult. I'm very interested in what others think about the IT profession. When I talk about people in the IT profession, I usually say "we" rather than "they". The IT profession's successes are my successes. When someone praises the IT profession, it feels like a personal compliment. If a story in the media criticized the IT profession, I would feel embarrassed.
Psychological contract violation*	Angry Cheated Pleased (R) Disillusioned Frustrated
General Satisfaction	In general, I feel satisfied with this profession. Overall, I feel satisfied with the kind of work I do in this profession.
Satisfaction with the IT profession	I am satisfied with the success I have achieved in my career. I am satisfied with the progress I have made toward meeting my overall career goals. I am satisfied with the progress I have made toward meeting my goals for income. I am satisfied with the progress I have made toward meeting my goals for advancement I am satisfied with the progress I have made toward meeting my goals for the development of new skills.
Affective commitment to the IT profession	I would be very happy to spend the rest of my career in this profession I enjoy discussing my profession with people outside it. I think that I could easily become as attached to another profession as I am to this one. I do not feel 'emotionally attached' to this profession. I do not feel a strong sense of belonging to my profession.
(R) Reverse coded item * Stem: When I think about what I've given to the IT profession and what I think I should receive in return...	

About the Authors

Nita G. Brooks is an Associate Professor of Information Systems and Analytics in the Jennings A. Jones College of Business at Middle Tennessee State University. Her research interests are largely focused on the IT profession, professional identification, gender issues, and turnaway. Her publications have appeared in MIS Quarterly, European Journal of Information Systems, Communications of the ACM, The DATABASE for Advances in Information Systems, and others.

Cynthia K. Riemenschneider is associate dean for research and faculty development and professor of Information Systems in the Hankamer School of Business at Baylor University. She also holds the Helen Ligon Professorship in Information Systems. Her publications have appeared in MIS Quarterly, Information Systems Research, Journal of Management Information Systems, Information Systems Journal, European Journal of Information Systems, IEEE Transactions on Software Engineering, and others. She currently conducts research on IT work force issues, women and minorities in IT, IT professional turnover and turnaway intention as well as ethical issues surrounding IT use.

Deborah J. “Deb” Armstrong is an Associate Professor of Management Information Systems in the College of Business at Florida State University. Deb’s research is programmatic in its focus at the nexus of information systems (IS) - where people, process, and technology coalesce. Specifically, her research interests cover issues at the intersection of IS personnel and cognition, involving the human aspects of technology, change, and learning. Many of the research problems that Deb finds interesting involve gender-related IS workforce issues. Deb thanks God for all of His blessings, especially her published articles in such journals as MIS Quarterly, the Journal of Management Information Systems, the European Journal of Information Systems and Communications of the ACM.

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