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Influencing organizational commitment through office redesign

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ABSTRACT

Prior research on the effects of office redesign on work-related outcomes has been largely atheoretical and yielded mixed and conflicting findings. Expanding on individual reactions to office design changes as specified by social interference theory, we propose that office redesign affects organizational commitment and this relationship is mediated by employee perceptions of the broader work environment. This conceptual model is tested using 121 financial services employees who experience office redesign and 136 who do not. Results indicate that perceptions of innovation and collaboration mediate the effects of office redesign over and above negative personal reactions such that affective organizational commitment is enhanced among those experiencing reconfigured offices. Findings provide support for an expanded rendition of social interference theory that provides for favorable (as well as unfavorable) employee reactions to office redesign. Such a theoretical explanation is asserted to increase understanding of how the physical environment influences employee attitudes.

1. Introduction

There is sustained interest in how physical workspaces influence employee interaction in the conduct of work and employee satisfaction (e.g., Elsbach & Bechky, 2007; Hua, Loftness, Heerwagen, & Powell, In press). Unfortunately these relations are not well understood. How the design of office environments, for example, affects employee attitudes and behaviors, has yielded a wide array of disparate empirical findings (Elsbach & Pratt, 2007; McElroy & Morrow, 2010). One possible explanation for these mixed findings is that a theoretical perspective has seldom guided examination of these relations.

The purpose of this paper is to increase our understanding of how office design affects employee attitudes based on an expanded model of social interference theory. We propose an extension of this theory and then test it by examining how specific office design elements can be used to influence one employee attitude, organizational commitment. We focus on organizational commitment for several reasons. Organizational commitment continues to be valued by organizational leaders (Morrow, 2011) despite the fact that organizations are currently operating in an historical era no longer characterized by long term employment (e.g., Cappelli, 2000). In addition, downsizing and the emergence of a new generation of employees have been identified as possible explanations for lower commitment levels (D'Amato & Herzfeldt, 2008). Given this, there is increasing concern over how organizations can establish and restore organizational commitment among employees and the idea of redesigning office space in ways that foster organizational commitment is an intriguing possibility. We pursue this research objective by reporting the results of a field experiment in which changes in office design were guided by a desire to alter employee perceptions of specific elements of the work environment that affect organizational commitment.

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2. The effect of office redesign on employees

Researchers with a variety of backgrounds, including architecture, environmental psychology, and management, have demonstrated that physical settings affect peoples' perceptions, attitudes, and behaviors (Brennan, Chugh, & Kline, 2002; Cohen, 2007; Kornberger & Clegg, 2004; McElroy & Morrow, 2010; Pitt & Bennett, 2008; Zalesny & Farace, 1987). This research has ranged from very micro-oriented design topics, such as desk placement (Morrow & McElroy, 1981) and seating arrangements (Sommer, 1969), to more macro-oriented issues such as organizations as physical structures (Pfeffer, 1982). This study takes a mid-level view by studying the effects of open-office designs on office occupants.

Research on open offices has traditionally looked at the contrast between private offices and cubicle workspaces and demonstrated that moving employees from private offices to cubicles results in negative reactions from employees due to increased distractions, noise and decreased privacy (Becker, 1981; Oldham & Brass, 1979). However, such changes can also result in positive affective reactions if office design results in positive interpersonal experiences for occupants (Oldham & Rotchford, 1983).

In an extensive review of the literature, Oldham, Cummings, and Zhou (1995) use social interference theory as a framework for assessing the diverse effects of office design on employee reactions. In essence, this framework suggests that elements of office design (e.g., density and openness) can cause unwanted or unexpected social interaction. One's ability to handle or control these interruptions and the degree to which they affect goal accomplishment affects the occupant's satisfaction with the office design and their work performance, work satisfaction and withdrawal behaviors. While their review offers considerable support for social interference theory, we propose that the model might shed more light on the consequences of office design changes if it were expanded to include how design characteristics might also facilitate work behaviors among employees. A broader and more balanced outlook on the effects of office design might also bring clarity to the largely atheoretical plethora of mixed findings that characterize office design research. This is especially true since the bulk of this research is 20 to 30 years old and involves large magnitude changes in office redesign, i.e., changes from private offices to cubicles that were more likely to be perceived as generating social interference.

Furthermore, work processes have changed significantly in recent years due to increased complexity of organizational problems and the need for organizational members to work both collaboratively and individually (Peterson & Beard, 2004). This type of work requires workspace that facilitates interaction as well as privacy. More contemporary open-plan office redesigns seek to balance the need for privacy and functional communication among employees by removing physical barriers that hinder the flow of work and communication, housing all personnel in a common open space, facilitating multiple and ever-changing workgroups, and promoting spontaneous interaction among employees (Zagenczyk, Murrell, & Gibney, 2007).

In summary, contemporary office redesign refers to more subtle alterations of the cubicle office arrangement, not to the demise of the private office. The motivation behind today's office redesign efforts includes modifying work environments to fit team-based operations, employee retention (Earle, 2003), and decreasing space requirements in order to cut occupancy costs (Pitt & Bennett, 2008). Consequently, Oldham et al.'s (1995) notion that officeholders' perceptions of how office design affects

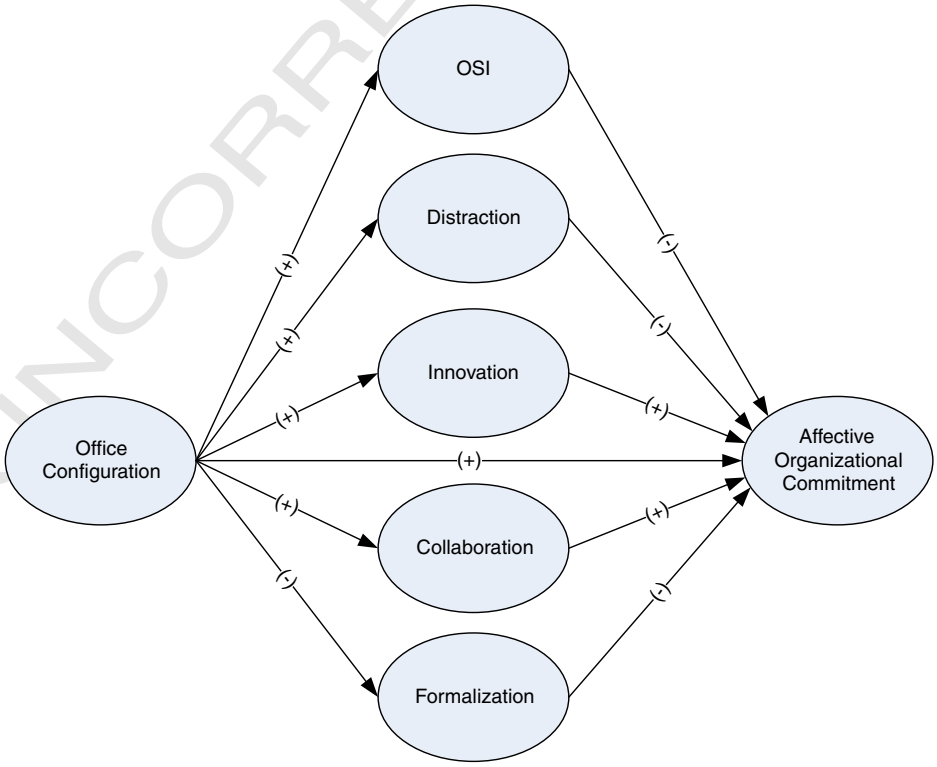

Fig. 1. Conceptual model of perceptions mediating relations between office configuration and affective organizational commitment. Pluses represent positive hypothesized relationships, and minuses represent negative hypothesized relationships.

their work environment remains relevant, even if their conceptualization of such perceptions is limited to social interference. However, we take a broader, more interpersonal view of employee perceptions of the work environment by viewing them not only in terms of personal reactions as specified by social interference theory, but also as employee perceptions of the collective social fabric of the organization. Specifically, this study looks at the effects of office redesign on perceptions of the work environment and how these perceptions, in turn, affect occupant affective commitment toward the organization (Fig. 1). Q5

2.1. Office redesign and organizational commitment

Organizational commitment, specifically affective organizational commitment (AOC), is a highly valued employee attitude. It focuses on an employee's identification with and involvement in an organization and emphasizes the bond between the employee and the organization (Allen & Meyer, 1990). Organizations with committed employees are more effective, and employees who exhibit high levels of AOC are more productive and less likely to quit (Cooper-Hakim & Viswesvaran, 2005). Business leaders view AOC as pivotal for attracting, motivating and retaining key talent (Michaels, Handfield-Jones, & Axelrod, 2001). Employees who are low in AOC are more likely to miss work and engage in counterproductive behaviors such as theft, sabotage and aggression (Luchak & Gellatly, 2007; Meyer & Allen, 1997). For these reasons, and because of the participating organization's interest in building commitment, AOC was selected as an outcome of practical importance.

Changes made to office environments typically entail unique combinations of elements making them difficult to assess other than holistically (Elsbach & Pratt, 2007). Nevertheless, most office redesigns are instituted with specific goals in mind. In this instance, the intent was to redesign office space to enhance employee AOC and in so doing, retain valued employees and enhance the company's image in the community. Explicit investigations into the effects of contemporary office redesign on AOC are quite sparse. Parish, Berry, and Lam (2008) observed that physical environments that are perceived as convenient, safe and pleasant (colorful, abundant natural light) are positively related to organizational commitment among service workers. Social interference issues, such as loss of privacy and unwanted interruptions, were common effects of large magnitude office design changes. Because contemporary office design changes involve updating and opening up existing cubicle arrangements rather than creating them, they are more likely to be regarded as an improvement in employee workspaces, and less likely to evoke negative responses previously observed in major redesign efforts.

Theoretically, office redesign can be conceptualized as an expression of organizational support. Organization support theory (OST) demonstrates that perceived organizational support contributes to employees' affective organizational commitment (e.g., Rhoades, Eisenberger, & Armeli, 2001). More specifically, OST stipulates that when employees experience high levels of support, such as an organization's investment in redesigned workspace, they are inclined to engage in the norm of reciprocity in order to repay the organization for its support. Consequently, employees are likely to view office modernization efforts positively, which, in turn, should make them view their organization more favorably. Thus, we hypothesize that:

Hypothesis 1. H1

Employees in more open-plan office configurations will exhibit higher levels of AOC than those in traditional, cubicle offices.

2.2. Office design and social interference

Oldham et al.'s (1995) extensive review of the impact of office design on employees examines the effects of four elements of office space configuration: distance, boundaries, density and openness, within the context of social interference theory. These four design elements are hypothesized to create unwanted social interference that, in turn, adversely affects employee attitudes and behavior. The purpose of this paper is not to reiterate this literature, but to focus on the two design elements, density and openness, that are particularly relevant to our study. The organization in question reduced the size of cubicles in order to accommodate more employees and increased the openness of the office space by reducing the height of partitions, increasing the amount of natural light, etc. Like most research on office design, the research on the effects of density and openness is somewhat equivocal, in part due to interaction effects among spatial elements and how those elements are operationalized and measured (Oldham et al., 1995). That said, Oldham et al. (1995) report that more studies report a negative than a positive effect for both density (e.g., Oldham & Rotchford, 1983) and openness (e.g., Oldham & Brass, 1979), although much of this research is based on the shift from conventional private offices to cubicles.

With respect to more subtle office design changes in density and openness, the social interference model would predict that shrinking the size of workspaces to increase employee capacity and decreasing cubicle walls to open up lines of sight and increase natural light would result in increased unwanted interactions, and consequently, negative reactions to such office design changes. Increasing density and lines of sight across an office environment make it readily apparent which officeholders are at their workstations and available for impromptu interaction. This potentially increases unwanted interactions (i.e., occupants will describe their office space as less adequate and more distracting). While interruptions are not always negative occurrences (Wajcman & Rose, 2011), office design changes that interfere with personal control over workspace lead to negative reactions on the part of the office occupant (e.g., attitudes and behaviors). From a social interference perspective, since changes in office density and openness are viewed as coming at the expense of personal comfort, the possibility of office redesign being seen as an investment by the organization in its employees will be lost. In the context of this study then, we hypothesize that to the extent

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these negative reactions to office redesign exist, those reactions will mediate the above relationship between more open offices and AOC.

Hypothesis 2. H2

Office space inadequacy mediates the negative influence of office redesign on affective organizational commitment.

Hypothesis 3. H3

Distraction mediates the negative influence of office redesign on affective organizational commitment.

2.3. Office design and perceptions of the work environment

The specific changes in office redesign (described in the Methods section), were instituted with the goal of trying to elicit favorable perceptions from employees since subjective perceptions of the work environment (often termed work climate) have an established record of affecting employee attitudes such as organizational commitment (Schneider, 2000). In addition, Kuenzi and Schminke (2009) conducted a review of work climate research and concluded that perceptions of the work environment have been shown to play an important mediating role between organizational variables. Drawing from their review, we selected three perceptions previously shown to be predictive of organizational commitment to examine as potential mediators of the relationship between office design and organizational commitment.

2.3.1. Innovation

Designing office space to support a culture of innovation is an emerging organizational practice (Kristensen, 2004; Moultrie et al., 2007). These design efforts range from the development of so-called "creativity rooms" (Wycoff & Snead, 1999) to more symbolic design elements such as bright color and artwork, glass partitioning and natural light that provide a stimulating atmosphere and signal receptivity to original ideas (Pitt & Bennett, 2008).

Implementation of open-plan offices serves to increase innovation because such designs facilitate employee interaction from diverse units and between employees of differential rank. Innovation stemming from increased communication among employees who typically have infrequent interaction can be explained by Granovetter's (1973) strength-of-weak-ties theory. In essence, open-plan offices provide enhanced access and exposure to individuals with non-redundant information, which is likely to spur innovative thought. Several empirical studies provide support for this contention by showing that employees with "weak" ties generate more novel ideas than those with strong ties (Baer, 2010; Perry-Smith, 2006).

In addition, innovative work environments have been linked to higher commitment. For example, innovative behavior has been construed as proactive behavior at work and found to be positively associated with AOC (Morrison & Phelps, 1999). Participation in innovative activities has also been viewed as a proxy for acceptance and support for organizational change and, as a result, to covary with AOC (Ng, Feldman, & Lam, 2010). More explicitly, Lok and Crawford (1999) found that nurses who perceived their work units as innovative displayed higher levels of AOC. In addition, perceptions of the hospital as innovative were also positively related to AOC.

This suggests that perceived high levels of innovation are viewed as a positive interpersonal experience that may arise from office redesign efforts and that this positive perception of the work environment may mediate the relationship between office redesign efforts and AOC. As a result, we hypothesize:

Hypothesis 4. H4

Innovation mediates the positive influence of open-office redesign on affective organizational commitment.

2.3.2. Collaboration

A longstanding impetus for office redesign has been to increase interaction and communication among employees, a trend that is increasingly being recognized (Moultrie et al., 2007). Typically this has entailed removing barriers between employees, lowering partitions between workspaces and creating dedicated meeting spaces to foster work-related interaction and communication (Ellington, 2007; Scott, 2005).

Workspace designs that foster accessibility and visibility among employees have been shown to increase collaboration. Wineman, Kabo, and Davis (2009), for example, found that workspace promoting circulation, co-awareness of others and opportunities for chance encounters (i.e., open-plan office designs) led to greater collaboration as measured by frequency of co-authorships. Lee and Brand (2005), along with Hua et al. (In press), report that the flexible use of space common in open-plan offices has a positive influence on group cohesiveness and collaboration. Finally, Peterson and Beard (2004) found higher levels of team collaboration during team meetings after the implementation of an open-plan office redesign.

Few studies have explicitly considered relations between collaboration per se and AOC. However, a number of research studies investigate similar perceptions such as participation in decision-making and employee support from peers. In some organizations, the nature of decision-making is perceived as hierarchical while in others it is more clan-based. Richard, McMillan-Capehart, Bhuian, and Taylor (2009) found that employees in hierarchical organizations exhibit less AOC while employees in clan

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organizations have higher levels of AOC. Participation has also demonstrated positive relations with AOC (Gaertner & Nollen, 1989; Meyer & Allen, 1988). Lok and Crawford (1999) observed that perceptions of work unit support, or the extent to which employees viewed co-workers as collaborative and relationship-oriented, were predictive of AOC. Gelade and Young (2005) observed that collaboration, as measured by perceptions of team climate, was positively related to AOC. Han, Chiang, and Chang (2010) observed a positive relationship between knowledge sharing and AOC. These studies suggest that perceptions of increased collaboration among office occupants emanating from office redesign efforts should mediate the relationship between office redesign and AOC.

Hypothesis 5. H5

Collaboration mediates the positive influence of office redesign on affective organizational commitment.

2.3.3. Formalization

Office design is a well-established vehicle for communicating and reinforcing status differences among employees (Elsbach & Pratt, 2007). Office space with more barriers and enclosures (e.g., higher partitions), which provide more privacy, are typically assigned to managers and others with high levels of authority (Brennan et al., 2002; Carlopi & Gardner, 1992). Organizations configured in this way tend to be more bureaucratic and formalized relative to other means of control such as professional expertise (Hall & Tolbert, 2005). Recognizing the potent symbolic effect of office design, Vilnai-Yavetz, Rafaeli, and Yaacov (2005) assert that reducing status barriers will promote less reliance on rules.

Formalization has been suggested as a way to enhance AOC since the 1970s. The explanatory mechanism is that explicit rules, policies and procedures (i.e., higher levels of formalization) clarify role expectations, decrease role ambiguity, and thus increase employees' AOC (Hall & Tolbert, 2005). More recently, Organ, Podsakoff, and MacKenzie (2006) have extended this theorizing by indicating that formal rules make organizational expectations clearer, enhancing perceptions of fairness and procedural justice. Heightened perceptions of fairness and justice, in turn, contribute to higher levels of AOC. The empirical evidence associated with this contention is mixed, however. Numerous investigations have found a positive relationship between formalization and AOC (e.g., Agarwal, 1993; Dornstein & Matalon, 1989; Mathieu & Hamel, 1989; Morris & Steers, 1980; Organ et al., 2006) but negative relationships have been observed among those working in sales (Agarwal, 1999; Ramaswami, Agarwal, & Bhargava, 1993). Still other studies have found the constructs to be unrelated (Lee & Mathur, 1997; Michaels, Dubinsky, Kotabe, & Lim, 1996).

Several explanations are offered for these diverse findings. First, cross cultural research has shown a more negative relationship between formalization and AOC for high individualism/low power distance countries like the U.S. compared to low individualism/high power distance countries like India (Agarwal, 1993) and Korea (Lincoln & Kalleberg, 1996). A second explanation is offered by Sommer, Bae, and Luthans (1996) who argue that the more employee-focused an organizational structure is, the greater level of commitment to it. Formalization, which relies on rules to determine behavior, could be seen as decreasing employee locus of control and increasing the focus on the system of rules in place to guide behavior, which would result in lower levels of commitment. This is also consistent with Salancik's (1977) argument that anything that reduces individual responsibility will adversely affect commitment. Given this and that fact that the sample used in this study is a U.S. sample, we offer the following hypothesis:

Hypothesis 6. H6

Formalization mediates the positive influence of office redesign on affective organizational commitment.

3. Method

3.1. Context and sample

A mid-western financial services organization contacted the authors in order to have a third party evaluate the effects of office renovations. Top management had several interrelated goals for the renovation. They wanted the redesign to promote a change in organizational culture from one they thought to be overly bureaucratic to one that was more egalitarian and open to new ideas. Top management also anticipated that the redesign would enhance the organization's image among its employees as a good place to work and that this investment in employees would in turn enhance employees' pride in and commitment to the company. Lastly, the organization also recognized that there were economies of scale in housing more employees in less space.

The office arrangement used within this company consisted of cubicles of three different sizes, 50, 100, and 125 ft^2, to which employees of different ranks (non-titled, titled employees, and officers, respectively) were assigned. The individual cubicles were separated by 65″ partitions. The redesigned space consisted of standardized 48 ft^2 cubicles for all employees, except for vice presidents. The redesigned office environment increased the workspace density by 14%, going from an average of 168 ft^2 to 148 ft^2 per employee and the number of workstations increased from 177 to 204. All new furniture was purchased, the décor was updated, brighter colors were selected, and partition height was decreased by 5 to 9 in in order to increase natural light. In addition, common meeting/gathering areas were incorporated into the floor layout along with 4–5 person conference rooms (also available for personal calls and/or private conversations), and existing white noise was modified in order to decrease audible distractions. The result was a brighter, more modern looking, more open, office arrangement with better lines of vision throughout the floor and more natural lighting.

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At the time the authors were contacted, 165 employees had been moved into the redesigned offices. Since these employees were not randomly assigned to be moved, an additional sample of 185 employees who remained in the traditional office cubicles was selected in a manner that matched the characteristics of those who did participate in the redesign project. Participation in the study was limited to those employees who had been in their current office location for at least six months. Of the total sample of 350 employees invited to participate, 121 of the employees who moved and 136 of those who did not move provided usable responses to the survey, giving us a total of 257 respondents for a response rate of 73.43%. The sample of respondents was 37% male and 63% female, with an average age of 34.8 years and an average tenure with the organization of 7.84 years. The sample was well educated with 74.4% having a college education or more. Because whole departments were moved to the new offices (or not moved) we were unable to obtain a matched sample related to job type, but did obtain data from stayers who were in similar functional areas to those who moved. For example, human resources and finance were two departments that were moved into the new offices, so we made a point of sampling stayers from two comparable departments not involved in the move; training and development and investor financial services. Chi-square and T-tests confirmed that there were no differences between the sample of employees who moved into the redesigned office space and those who did not in terms of their gender, age, organization tenure, level of education, or their rank in the organization, thus confirming our matched sample.

3.2. Measures

3.2.1. Office space inadequacy (OSI)

Office space inadequacy adapts three items developed by Brennan et al. (2002) to assess the degree to which employees feel that the amount of workspace they have is inadequate. All measures in the study use a seven-point response format (1 = strongly disagree to 7 = strongly agree) to assess respondent level of agreement with each item, unless otherwise specified. The three items used to measure OSI were: "I have enough storage space for work materials at my workspace" "I have enough storage space for personal items in my workspace", and "My workspace is large enough for my needs." All three items were reverse scored such that a high score indicates that respondents perceived that their workspace is inadequate for their needs.

3.2.2. Distraction (DIS)

Distraction was measured using Lee and Brand's (2005) five item distraction scale: "I find it difficult to concentrate on my work," "I experience auditory distractions in my personal workspace," "I have adequate privacy in my individual workspace" (reverse coded), "I experience visual distractions in my individual workspace," and "my individual workspace is too noisy." A high score indicates a high distraction work environment.

3.2.3. Innovation

This construct was measured using three items formulated by Patterson et al. (2005) to assess the degree to which employees perceived that the organization's culture fostered innovation. This scale used a 4-item response framework (1 = definitely false to 4 = definitely true). The items used were: "New ideas are readily accepted here," "Assistance in developing new ideas is readily available," and "Employees are always searching for new ways of looking at problems." The higher the score, the more innovative the culture is perceived to be.

3.2.4. Collaboration

Five items were specifically developed for use in this study to capture employee perceptions of the degree of collaboration in carrying out work: "I confer with my co-workers to discuss work-related issues," "Collaborating with co-workers is a common occurrence here at (the organization)," "Co-workers in my office location seldom visit with one another about work-related issues" (reverse coded), "Employees in my office location keep to themselves and have little interaction with others on work-related issues" (reverse coded), and "Co-workers often get together to brainstorm work-related issues." A high score equates to employees' perceptions that collaboration is a common occurrence.

3.2.5. Formalization

Patterson et al.'s (2005) 5-item formalization scale measuring the degree that an organization is perceived to be driven by rules, regulations, and procedures was used: "People can ignore formal procedures if it helps get the job done" (reverse coded), "It is not necessary to follow procedures to the letter around here" (reverse coded), "Nobody gets too upset if people break the rules around here" (reverse coded), "It is considered extremely important here to follow the rules", and "Everything has to be done by the book". A high score indicates that employees perceive the culture of this organization to be very formal. The last two items did not load on to the formalization latent construct and were deleted from the measure.

3.2.6. Affective organizational commitment (AOC)

AOC was evaluated using a five item short form of Meyer and Allen's (1997) affective commitment scale: "I would be happy to spend the rest of my working life with (this organization)," "I feel like 'part of the family' at (this organization)," "I feel 'emotionally attached' to (this organization)," "Working for (this organization) has a great deal of personal meaning for me," and "I feel a strong sense of belonging to (this organization)." A high score indicates a strong sense of affective commitment.

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3.2.7. Control variables

Prior research has demonstrated that attitudes and behaviors at work can be influenced by demographic characteristics (Mowday, Porter, & Steers, 1982). Therefore, we included two demographic variables (gender and organizational tenure) to reduce the possibility of spurious relationships based on these types of personal characteristics.

4. Results

4.1. Construct validity of the measurement model

While most measures were well-established and validated, collaboration was novel. For this reason, and for the sake of robustness, we performed several tests to assess the construct validity of the measurement model associated with all six scales. First, we performed an exploratory factor analysis (EFA) with a varimax rotation using SPSS 17. The EFA yielded six factors with factor loadings ranging from .55 to .90 with zero cross loadings.

4.1.1. Convergent validity of the measurement model

A construct with high convergent validity consists of indicators sharing a high proportion of variance. Table 1 estimates convergent validity by summarizing the reliability statistics of the measurement model.

We tested the measurement model using confirmatory factor analysis (CFA). Each of the six scales contained three to five items. All factor loadings were statistically significant ($p<.001$) with standardized loading estimates of greater than .5 indicating convergence on a common point (Anderson & Gerbing, 1988). There were no significant cross loadings or correlated errors. We also examined the measures for multicollinearity using variance inflation factors (VIF). VIF evaluates the degree to which each variable is explained by the others. VIF values of less than 10 would confirm that multicollinearity is not significantly present in the measurement model. Our measurement model met this criterion. We then computed average variance extracted (AVE) for each measure. A general rule of thumb is if the AVE is greater than .5 then the variance captured by the construct is larger than the variance due to measurement error (Fornell & Larker, 1981). All constructs had an AVE greater than .5. Another indicator of convergent validity is reliability. The Cronbach's alpha values of our measurement model ranged from .77 to .92, indicating good internal reliability. Furthermore, we performed a construct reliability test with results ranging from .67 to .90. While formalization's construct reliability was slightly below the .7 rule of thumb threshold (Fornell & Larker, 1981), all other indicators were satisfactory.

The revised measurement model produced the following fit statistics: $\chi^2 = 407.171$, $df = 236$ with a $\chi 2/df$ ratio<3 (Byrne, 1989, p.55), a Comparative Fit Index (CFI) = .949 (Bentler, 1990), a Tucker–Lewis index (TLI) = .940 (Bentler & Bonett, 1980), and RMSEA = .053 (below the .08 threshold; Browne & Cudeck, 1993). The chi-square statistic is significant; however, the other indicators of relative fit (e.g., CFI, TLI, and RMSEA) unequivocally suggest that the hypothesized measurement model is a good representation of the measures.

Table 1
The measurement model statistics.

Construct	Indicator	Standardized loading	Measurement error variance	AVE[a]	Construct reliability	Cronbach's alpha
Affective organizational commitment	AOC1	.628	.965	.660	.854	.901
	AOC2	.765	.706			
	AOC3	.822	.525			
	AOC4	.877	.371			
	AOC5	.935	.206			
Office space inadequacy	OSI1	.885	.754	.785	.775	.916
	OSI2	.852	.824			
	OSI3	.920	.474			
Distraction	DIS1	.815	.777	.591	.702	.867
	DIS2	.836	.902			
	DIS3	.573	2.067			
	DIS4	.737	1.672			
	DIS5	.849	.752			
Innovation	Innov1	.775	.152	.565	.903	.785
	Innov2	.847	.130			
	Innov3	.614	.255			
Collaboration	Collab1	.538	.661	.516	.827	.845
	Collab2	.670	.441			
	Collab3	.767	.467			
	Collab4	.886	.197			
	Collab5	.683	.868			
Formalization	Form1	.729	.886	.531	.669	.771
	Form2	.690	.832			
	Form3	.765	.646			

[a] Average variance extracted.

4.1.2. Discriminant validity of the measurement model

Discriminant validity is the extent to which one construct is distinct from others. A rigorous discriminant validity test is to compare the AVE for any two constructs with the square of the correlation estimate between the two constructs (Fornell & Larker, 1981). Table 2 reports these comparisons. The diagonal elements in bold are the AVEs, and the off-diagonal elements are the squared correlations between two constructs. All AVEs are larger than the corresponding row or column entries, thus we are confident our model has discriminant validity.

Given the results of the EFA and CFA including factor loadings, average variance extracted, coefficient alpha, construct reliability, goodness-of-fit of the measurement model, and discriminant validity check, we are confident in the acceptability of the measurement model. The factors in the model possess good reliability, low levels of multicollinearity and are both convergent and discriminant. Table 3 reports the descriptive statistics for all study variables.

4.2. Common method bias

When all variables are obtained from the same source, there is the potential for common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) in spite of attempts to minimize it by varying the scales within the survey instrument and reverse coding items. To assess the extent of common method bias, we performed Harman's single factor test. The results show six distinct factors in the model with the greatest covariance explained by one factor of 22%. We also utilized the approach suggested by Podsakoff et al. (2003) by creating a common latent factor in AMOS and adding a marker variable (satisfaction with computer equipment). The common latent factor loadings were insignificant and the indicator's substantive variances were substantially greater than their method variances. Moreover, the common variance computed (the squared factor loadings on the common latent factor) was zero. Therefore, we are confident that common method bias is not a concern (Williams, Edwards, & Vandenberg, 2003).

4.3. Structural model

We evaluated two structural models for this research. The first was a social interference model with move status mediated by OSI and distraction. The structural model tested was estimated using AMOS 17.0. The model includes two endogenous variables—OSI and distraction, one exogenous variable—office configuration, and one dependent measure—AOC, controlling for the number of years within the organization and the gender of the respondent.

A total of 14 parameters were estimated. The χ^2 statistic of 9.324 is within the acceptable limit (Byrne, 1989; Carmines & McIver, 1981; Marsh & Hocevar, 1985) with 7 degrees of freedom and a $p = .230$. Model validity also is confirmed by the low values of such fit statistics as the ratio of chi-square to degrees of freedom ($\chi^2/df = 1.332$), a Comparative Fit Index (CFI) = .990 (Bentler, 1990), a Tucker–Lewis index (TLI) = .979 (Bentler & Bonett, 1980), and RMSEA = .036 (below the .08 threshold; Browne & Cudeck, 1993). All of these parameters are indicative of a structural model that fits the data well and yielded a squared multiple correlation (SMC) of .10. Results of the structural model are shown in Fig. 2 and provide support for the overall relationship between office configuration and AOC (H1) and for the mediating role of OSI (H2). These results do not support Hypothesis 3 entailing distraction as a mediator. Q8

A second structural model was used to determine the extent to which positive perceptions of the work environment created by office redesign efforts would add to the variance in AOC explained by the social interference model. Therefore three additional endogenous variables were added as mediators of the relationship between move status and AOC—innovation, collaboration and formalization. All other variables and controls were retained.

A total of 26 parameters were estimated. The χ^2 statistic was 36.201 with 19 degrees of freedom and a $p = .010$. Model validity also is confirmed by the low values of such fit statistics as the ratio of chi-square to degrees of freedom ($\chi^2/df = 1.905$), a Comparative Fit Index (CFI) = .949 (Bentler, 1990), a Tucker–Lewis index (TLI) = .904 (Bentler & Bonett, 1980), and RMSEA = .059 (below the .08 threshold; Browne & Cudeck, 1993).

As shown in Fig. 3 and in Table 4, office configuration indirectly influences AOC through innovation and collaboration, but not formalization, which shows that office redesign can result in favorable work perceptions that in turn impact AOC positively. These findings are supportive of Hypotheses 4 and 5, but not Hypothesis 6. The addition of innovation, collaboration and formalization

Table 2
Construct correlations and discriminant validity.

Constructs	AOC	OSI	DIS	Innov	Collab	Form
Affective organizational commitment (AOC)	**.66**					
Office space inadequacy (OSI)	.01	**.79**				
Distraction (DIS)	.01	.30	**.59**			
Innovation (Innov)	.12	.01	.01	**.57**		
Collaboration (Collab)	.09	.00	.01	.13	**.52**	
Formalization (Form)	.01	.05	.07	.01	.01	**.53**

The diagonal elements in bold are average variance extracted values. The off-diagonal elements are the square of the correlation estimates between constructs. For discriminant validity, the diagonal elements should be larger than any of the corresponding row or column entries. All correlation coefficients were significant at $p < .01$ level.

Table 3
Descriptive statistics and correlations.

	Mean	*SD*	1	2	3	4	5	6	7	8	9
1. Move status[a]	1.47	.50	–								
2. Gender[b]	1.63	.48	−.02	–							
3. Years of service	7.84	7.79	−.10	.09	–						
4. Affective org commitment	5.08	1.08	.15*	−.03	.14*	–					
5. Office space inadequacy	3.50	1.54	.51**	.03	−.09	−.11	–				
6. Distraction	4.13	1.39	.47**	.05	−.14*	−.12	.62**	–			
7. Innovation	2.95	.54	.15*	.07	−.15*	.32**	−.06	−.05	–		
8. Collaboration	5.81	.82	.18*	.05	.02	.28**	−.00	.09	.32**	–	
9. Formalization	4.76	1.08	−.23**	.09	.01	.10	−.21**	−.23**	.08	−.08	–

Note:
* Correlation is statistically significant at $p<.05$.
** Correlation is statistically significant at $p<.01$.
[a] 1 = not moved, 2 = moved.
[b] 1 = male, 2 = female.

more than offset the effects of negative reactions of office space inadequacy and distraction on the office redesign–AOC relationship. The addition of these positive perceptions of the work environment served to increase the amount of variance in AOC by nearly 12% over that explained by the social interference model (i.e., SMC increased from .100 to .218). The addition of these perceptions resulted in neither negative reaction serving in a mediating capacity, thus providing no support for Hypotheses 2 and 3 in this expanded model. In addition, we followed the bootstrapping method proposed by Preacher and Hayes (2004) with 5000 bootstrap resamples (Shrout & Bolger, 2002). The results confirmed the findings of the Sobel (1982) with the indirect effects of innovation and collaboration failing to include zero with a 95% confidence interval. Therefore, we conclude that perceptions of innovation and collaboration do indeed mediate the relationship between office design and AOC.

5. Discussion

This study sought to increase our understanding of how changes in office configuration can be used to increase employees' affective organizational commitment. By drawing on social interference theory and expanding it to include broader perceptions of the work environment, we also sought to explain *the underlying mechanisms* regarding how changes in the work environment affect employee attitudes. Specifically, the results of this study provided some support for social interference theory in that our test of the model that included only personal and undesirable consequences of office redesign explained 10% of the variation in affective organizational commitment. The variation was primarily due to the mediating effects of office space inadequacy, but this support entailed only consideration of how office reconfiguration affects the individual office holder personally. When combined with perceptions of the work environment that were potentially *desirable* reactions to office redesign, a fuller explanation emerged.

Adding positive consequences to the model resulted in explaining an additional 11% of the variation in affective organizational commitment. Practically speaking, the ability to increase AOC via office redesign more than doubled. This suggests that planned changes to the office landscape can be instrumental in increasing affective organizational commitment.

This study contributes to our understanding of how changes in office design affect affective organizational commitment. Contingent on the model tested, office space inadequacy, innovation and collaboration demonstrated mediating effects, thereby illuminating how changes in office design can influence affective organizational commitment. Overall, these findings support

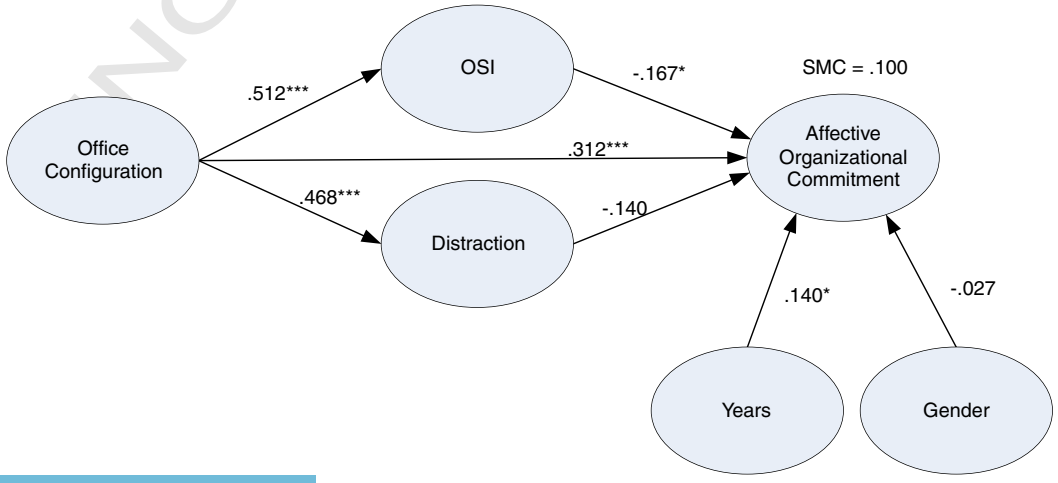

Fig. 2. Results of testing the social interference model. SMC = Squared multiple correlation value.* $p<.05$. ** $p<.01$. *** $p<.001$.

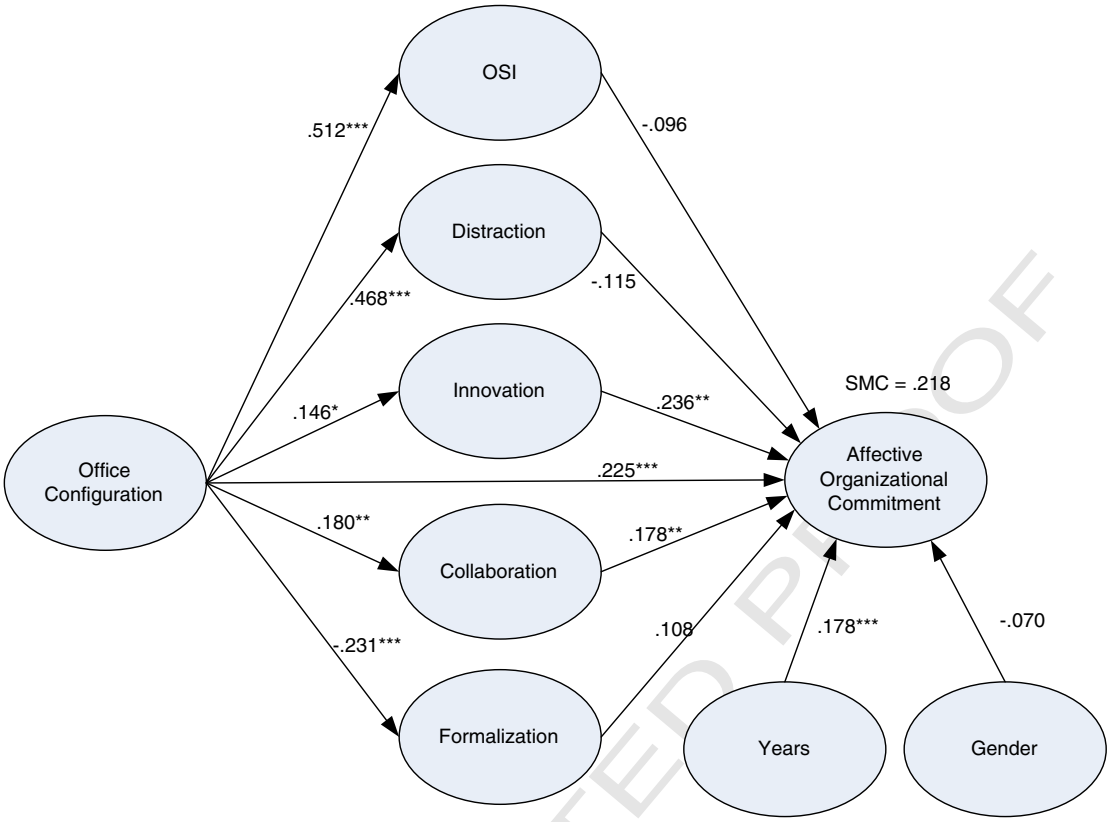

Fig. 3. Multivariate structural equation modeling results for study hypotheses. AMOS estimated standardized path (regression) coefficients are display. SMC = Squared multiple correlation value.* $p<.05$. ** $p<.01$. *** $p<.001$.

revising Oldham et al.'s (1995) social interference model to include interpersonal, i.e., perceptions of the broader work environment, as well as personal reactions to office redesign. Indeed, social interference theory might not only benefit from expansion, but also a name change to "workplace design and social interaction theory" in order to capture both the positive and negative consequences of office redesign as well as its broader effects. Such a revised model would help clarify office design literature stipulating diverse effects (e.g., need for collaboration versus privacy/concentration; (Roper & Juneja, 2008)).

This research also holds promise because of its consistency with other theoretical models, such as OST. Viewing office redesign as an example of how organizations can demonstrate support for employees by changing work environment perceptions in ways that subsequently increase organizational commitment is a novel application of OST. We believe OST offers a sound, if unexplored, explanation for how organizations might purposely choose to modify their physical environments to enhance employee attitudes like organizational commitment.

Lastly, the results underscore the importance of considering the joint consequences of office redesign. The expanded model's results clearly indicated that some mediators (innovation and collaboration) are sufficiently strong as to override the effects of others (i.e., office space inadequacy was no longer a significant predictor in the presence of the other mediators). The inconsistent findings of prior studies (cf. Elsbach & Pratt, 2007) might also be seen as a function of failing to simultaneously consider desirable/undesirable consequences and personal/social consequences. Thus further tests of this model may help clarify prior research findings.

5.1. Limitations and future research

Several study hypotheses did not receive support. The lack of support for Hypothesis 3 may indicate that distraction was simply not that salient in this office environment. However, since the relations were in line with those hypothesized, they simply

Table 4
Sobel test results of mediating effects of office redesign on affective organizational commitment.

	Test statistic	Std. error	p value
1. Office space inadequacy	−1.25	.08	.21
2. Distraction	−1.56	.07	.11
3. Innovation	1.98	.04	.05
4. Collaboration	1.98	.03	.05
5. Formalization	−1.67	.03	.09

may not have been strong enough, given the sample size, to be statistically significant. The lack of support for Hypothesis 6 (entailing formalization) may be due to the nature of the financial services business which is procedurally dominated and more regulated than other industries. In other words, the formalization of the industry may have precluded the effects of organizational formalization from materializing.

Despite the strength of relying on a naturally occurring quasi-field experiment research design, employees were not randomly assigned to the two experimental conditions, nor were we able to utilize a pre-test post-test research design. All of the employees were from a single division of the firm, which provided continuity of purpose and senior leadership between movers and non-movers. Despite this and the matched sample, we cannot be sure that some other difference between these two groups of employees, other than their work environment, did not cause the differences in their perceptions. Future research employing a true longitudinal research design where employees are assessed prior to and after the move, compared to a control group would minimize alternative explanations.

Additionally, there is the issue of the generalizability of our results (i.e., data were only from the financial services sector). Future research efforts are needed to determine if these findings would be replicated in call centers, sales, and other cubicle-based work environments.

Finally, the revised model proposed here is incomplete. For example, we only examined two of Oldham et al.'s (1995) social interference factors. Additional mediating factors merit consideration, both favorable and unfavorable, and individual as well as those linked to the work environment. Other individual differences should also be taken into account. Maher and von Hippel (2005), for example, found that individual differences in capacity to handle overstimulation from open-plan offices significantly affected satisfaction and performance.

5.2. Conclusion

This research confirms Elsbach and Pratt's (2007) and others' conclusions that changes in the physical environment yield offsetting results and helps elucidate the nature of these conflicting findings. When viewed solely from a personal level, increased office density and openness can produce negative reactions on the part of individual officer holders, as specified by social interference theory. However, when viewed in terms of the broader effects of such changes, the effects are more positive. Previous researchers have suggested looking beyond individual reactions to include other experiences, such as friendship opportunities (Oldham & Rotchford, 1983), but this research suggests that reactions to office reconfigurations should also be expanded to include interpersonal work-related experiences, such as work collaboration and innovation. That is, to truly understand the effects of office design on employees, one needs to move beyond individual idiosyncratic reactions to such changes and consider the effects of such changes on work processes, particularly given that our results suggest that these broader effects may offset personal inconveniences caused by changes in the physical office environment.

Finally, this study suggests that changes in the physical environment of offices constitute an additional means by which organizations can influence the commitment of their employees. Our results are in line with the work of Fedor, Caldwell, and Herold (2006) showing a relationship between organizational change efforts that improve work functioning and organizational commitment (i.e., we demonstrate that increasing perceptions of work collaboration and innovation enhance organizational commitment). The key for organizations contemplating changes to office design is to promote employee awareness of the interpersonal and organizational benefits of the change, while expressing appreciation for the sacrifices employees may be making in terms of personal discomfort. If this can be accomplished, then employees are more likely to see the office redesign as an investment in them, which may, in turn, be reciprocated by even higher levels of organizational commitment.

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