Colonial Academic Alliance Undergraduate Research Journal

Volume 1 Article 8

10-20-2010

Effects of Office Layout on Job Satisfaction, Productivity and Organizational Commitment as Transmitted through Face-to-Face Interactions

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In any organization, communication is essential. Modern-day organizations increasingly rely on e-mail, conference calls, and web-based meetings that allow individuals to communicate from afar (Igbaria & Tan, 1998). These tools, while certainly useful, also limit face-to-face interaction. This may be problematic as face-to-face interactions and communication within the workplace are crucial to outcomes such as productivity, job satisfaction and organizational commitment (Campbell & Campbell, 1988; Kirschner et al., 2009; Mesmer-Magnus & DeChurch, 2009; Reagans & Zuckerman, 2001; Short, 1974; Strubler & York, 2007).

Given these latter findings, organizations have an interest in promoting face-to-face interactions that manifest themselves in group work, teamwork, and impromptu interactions. One way to do so is to use workspace as a tool. As a few studies mention, humans are subject to the constraints of their physical environment – people cannot walk through walls and have to stand to walk to the other side of the room (Pfeffer, 1982; Davis 1984). Despite these natural hindrances of working in an office, the layout itself can promote face-to-face interactions Gerstberger & Allen, 1968; Penn, 1999; Peponis et al., 2007; Rashid et al., 2006). This can be executed by controlling movement within the space, and by controlling spatial interconnectedness.

The current study is an effort to investigate these ideas. Specifically, this study examines the effect that office layout has on outcomes such as productivity, job satisfaction and organizational commitment. In the following pages, I first discuss the importance of face-to-face interactions in organizations and how these interactions enhance productivity, job satisfaction and organizational commitment through collaboration. I then touch on the effects of face-to-face communication that occurs in informal, impromptu interactions, and its effects on these outcomes. Lastly, I discuss the ways in which the office layout can be manipulated to foster informal, impromptu interactions and thus encourage face-to- face interactions and enhance these outcomes.

Importance of Face-to-Face Communication

Face-to-face interactions are crucial to collaboration between employees. The social presence theory (Short, Williams, & Christie, 1976 as cited in Ramirez & Zhang, 2007) suggests that non-verbal cues, which are only available via face-to-face meetings, are essential to communication within a group. Relationships can be strengthened with frequent communication and face-to-face interactions, resulting in a higher network density. As defined by Reagans and Zuckerman (2001), network density is the "average strength of the relationship between team members" (p. 502). When employees meet face-to-face, cohesion is enhanced and they may understand each other better on personal levels. Effective collaboration relies heavily on face-to-face interactions, suggesting that the underlying characteristics of face-to-face interactions increase network density.

These underlying characteristics of face-to-face communication include interpersonal factors and "socio-emotional" information, which are present with face-to-face interactions. For example, in an experiment by Short (1974), pairs of 96 civil servant participants were asked to collaborate with their partners, communicating through strictly audio means, a live video, or face-to-face (16 pairs in each setting). Afterwards, each participant completed a questionnaire that documented the agreement reached and rated the task as well as the partner. Short (1974) found that strictly audio communication lacks interpersonal information essential to collaboration that face-to-face interactions provide. This suggests that face-to-face interactions in the workplace could promote interpersonal information sharing.

Face-to-Face Communication in Collaborative Work Settings

Face-to-face interaction is especially important in a work context when employees must work collaboratively on job tasks. Research on group work and teamwork provides especially strong support for this idea. In administering learning, retention and transfer tasks to a group of 70 high school biology students, Kirschner, et al. (2009) studied the effects of group work on performance, and found that communication within these groups is essential to coordination and team success (Kirschner et al., 2009). Their theory suggests that information retention takes less mental effort for individuals learning in the presence of others than those learning alone because the cognitive load is distributed over a number of people. Strubler and York (2007) studied teamwork among 500 university staff members. Not only did Strubler and York (2007) find collaboration to increase satisfaction and control over the participants' work, they also found an enhancement in productivity. Lastly, Reagans and Zuckerman (2001) found that frequent communication between employees with varying skills, information and experience increases the group's capacity for creativity and productivity.

Similarly, the extensive meta-analysis conducted by Mesmer-Magnus and DeChurch (2009) on the effects of teamwork strongly supports the notion that effective information sharing between team members increases both performance and productivity through interaction. That is, the more that individuals share information with group members, the higher the group's performance and productivity is as a whole. In sum, face-to-face interactions, such as those that often occur within groups and team work, play an important role in fostering outcomes such as greater information retention and coordination (Reagans & Zuckerman, 2001), and ultimately, higher productivity.

Face-to-Face Interactions in Informal Communication and Impromptu Interactions

Although face-to-face interactions that occur in formal collaborative relationships (e.g., work teams) are important to productivity, the more subtle face-to-face interactions like informal communication and impromptu interactions also likely

affect productivity, job satisfaction and organizational commitment as well. Campbell and Campbell (1988) define informal communication as "relatively unstructured information exchanges that tend to occur in face-to-face encounters during 'off-task' moments" (p. 212). These seemingly trivial interactions can increase employees' sense of belonging, and thereby enhance work performance and increase their identification with and commitment to the organization (Campbell & Campbell, 1988). Similarly, Rashid, et al. (2006) state that informal communication is often seen as a way to strengthen "organizational culture", interpersonal relations, and to share information. In fact, information often spreads faster and more efficiently if the interaction is informal instead of formal (Davis, 1984). Impromptu, or unplanned, interactions are the interactions within which informal communication takes place. Thus, increases in impromptu interactions and thereby the amount of informal communication within an organization should also lead to positive outcomes such as enhanced network density, productivity, job satisfaction, and identification with and commitment to the organization. Organizational commitment can be defined as a combination of identification with the organization, perception of the costs of leaving the organization, and obligation to stay with the organization (Allen & John P. Meyer, 1990). To this end, the current study investigated the relationships among these various constructs through a self-report online survey. Based on the reasoning above, I offer the following hypotheses:

> *Hypothesis 1: More frequent formal and informal face-to-face interactions will be positively related to H1a) job satisfaction, H1b) self-reported productivity, and H1c) organizational commitment.*

Effects of Layout on Ease of Face-to-Face Communication

Given these predicted benefits, organizations have an interest in increasing the likelihood and frequency of face-to-face interactions. One way to do so is by creating a physical layout conducive to frequent face-to-face interactions. Intuitively, and as noted by Penn, et al. (1999), the layout of a workplace affects how employees move about the office. On a basic level, the office layout can create a connected, interactive space or can separate work areas. By administering a survey investigating the frequency of contact with the employees in spatially isolated workspaces, Penn et al. (1999) found that employees are more likely to interact with their coworkers in spaces that are more accessible. That is, Penn et al. (1999) concluded that the spatial configuration of an office does have a direct impact on the frequency of reported interactions. Similarly, Peponis, et al. (2007) found that with more available locations for interaction (work-related or social) in a communication design firm called ThoughtForm, the density of interactions increased. That is, the roughly 50 employees at ThoughtForm interacted more frequently with a new workplace layout than they did in the old workplace layout.

Although density of interactions may not have a direct effect on an individual's productivity, the increase in probability of interacting with other employees also increases the probability of teamwork. Teamwork can then lead to better retention of information (Kirschner et al., 2009) and in turn, higher productivity and the like (Strubler & York, 2007).

A study by Gerstberger and Allen (1968) supports the theory that employees will seek to obtain information from the source that is the least costly to them. By surveying electrical engineers in an organization, Gerstberger and Allen compared the costs and benefits of using different information channels such as customers, literature and technical service. The results strongly suggest that the engineers in this company use the channel that will cost them the least (in choosing efficiency or reliability of a source, for example) in order to gain information. Therefore, if face-to-face, impromptu interactions were the information channel that required the least amount of effort, then face-to-face communication should be the most frequently used information channel between employees. This can be facilitated by manipulating the office layout.

Manipulating Layout to Facilitate Informal, Impromptu, Face-to-Face Interactions

Spatial arrangement can increase impromptu interactions (Peponis et al., 2007), and employees tend to choose the easiest method of communication (Gerstberger & Allen, 1968). Given that these interactions can lead to stronger collaboration and productivity (Campbell & Campbell, 1988; Rashid et al., 2006), adjusting the workplace to promote such interactions is in an organization's best interest. Ways to increase the probability of impromptu interactions and ease of communication within an office fall under two categories: movement control and spatial interconnectedness. One way to control movement is through the use of integration, a spatial measurement defined by the accessibility of a local "line," or pathway, within an office. Integration of pathways encourages people to choose to use the same pathways as others out of convenience. Hillier et al. (1990, as cited in Penn et al., 1999), Hillier and Penn (1991, as cited in Penn et al., 1999) and Penn and Hillier (1992, as cited in Penn et al., 1999) found that the mean integration of an office positively correlates with the mean degree of "usefulness" (as defined by perceived status, knowledge and skills) of other employees, both within and between departments, as reported by individuals.

Penn et al. (1999) speculate that the increase in mean degree of "usefulness" could correlate with the degree of interactions. This suggestion is consistent with the integration of a workspace, which can directly assist or impede interactions within or between departments. Peponis et al. (2007) also found an increase in unplanned interactions when ThoughtForm moved to a new location that had a higher mean integration than their previous location. Based on this evidence, the following hypothesis seems warranted for the current study:

Hypothesis 2: The level of individual integration will positively relate to the frequency of the individual's impromptu and unplanned face-to-face interactions.

Movement within an office can also be manipulated through spatial interconnectedness, a broad, global measurement of accessibility in a workplace. This includes distance between employees, employee visibility, and employee location. Allen (1970, as cited in Rashid et al., 2006) found that the greater the distance between employees, the less likely they are to communicate. The length of the axial lines, or the length of the pathways available to employees, predicted their frequency of communication. Similarly, when observing an organization's relocation, Peponis et al. (2007) found that a decrease in perceived distance between employees correlated with an increase in ease of communication. In accordance with the phenomenon proposed by Peponis et al. (2007), Penn et al. (1999) found that distance greatly affects "eagerness" to travel for face-to-face interactions. This finding directly relates to the Gerstberger and Allen (1968) study in which employees chose the least costly method to gather information.

Visibility is another facet of spatial interconnectedness within an office that can predict face-to-face interactions. After making between 20 and 30 observations in four different organizations and work spaces, Rashid et al. (2006) focused on the simple phenomenon that the layout dictates whose workspaces are passed when other employees move about the office. By quantifying visibility through axial map drawings and spatial syntax software, Rashid et al. (2006) concluded that visibility and location play a role in the frequency of face-to-face, impromptu and informal interactions. Muchinsky (1977) argues that if people have the opportunity to initiate face-to-face interactions, they also have a higher level of job satisfaction.

Backhouse and Drew (1992) videotaped interactions in a workplace with high visibility, and found that over 80% of the interactions were impromptu. When one employee is in motion and the other is at a visible workplace, the deciding factor between an unplanned interaction and no interaction is nonverbal cues. Unplanned interactions are discouraged if the employee in motion is focused and looking ahead, or if the employee at the desk is leaning forward and focusing. Similarly, unplanned interactions are encouraged if the employee in motion is looking around, or if the employee at the desk is leaned back and looking around.

While the Backhouse and Drew (1992) findings weigh on the notion that movement encourages unplanned interactions, Rashid et al. (2006) focus on the extent of visibility in the study, and argue that in fact visibility is a better predictor of face-to-face interactions than movement. However, Penn et al. (1999) make note of situations in which lack of visibility promotes unplanned interactions between a seated and a moving person. If two people cannot see each other, then there is no way to know whether or not the other is available. The lack of

visibility promotes unplanned interaction simply because there is no opportunity to plan. That said, it may be that a higher level of visibility is ideal despite the argument Penn et al. (1999) put forth. Although the nonverbal cues between two employees in a space with high visibility may decrease the probability of unplanned interactions, it leaves room for either individual to stay focused and prevent interruption. In the long run, the leniency provided by visibility and last-minute predictable interactions allows employees more control over their work. I believe that control over work and unplanned interactions and the balance between them are influential in job satisfaction and productivity. Thus, the following hypothesis is appropriate:

> *Hypothesis 3: Employees' level of visibility within the admissions office will positively correlate with the frequency of the individual's impromptu and unplanned face-to-face interactions.*

Spatial interconnectedness is also determined by location of employees within an office space. Simply put, the presence of people instigates interactions, so people are more likely to interact face-to-face if they are in close proximity to one another (Altman & Stokols, 1987). Working in close proximity to group members is important to facilitate communication and encourage task-related interaction. As mentioned in the context of group work and teamwork, effective information sharing with multiple people increases performance and productivity (Mesmer-Magnus & DeChurch, 2009).

As hypothesized above, face-to-face interactions through group work, teamwork, and impromptu, informal communication enhance network density and therefore productivity and job satisfaction. Taken together, these ideas imply the following:

> *Hypothesis 4: The frequency of face-to-face interaction will partially mediate the relationships between office layout (with regard to integration, spatial interconnectedness, visibility and location) and H4a) job satisfaction, H4b), self-reported productivity, and H4c) organizational commitment.*

Thus, the present study sought to support the mediation model in which the office layout (consisting of integration, spatial interconnectedness, visibility and location) affects the nature and frequency of the face-to-face interactions (such as unplanned, impromptu interactions). These interactions should then influence the outcomes, including job satisfaction, productivity and organizational commitment, as seen in Figure 1. The purpose of this study was to investigate these ideas.

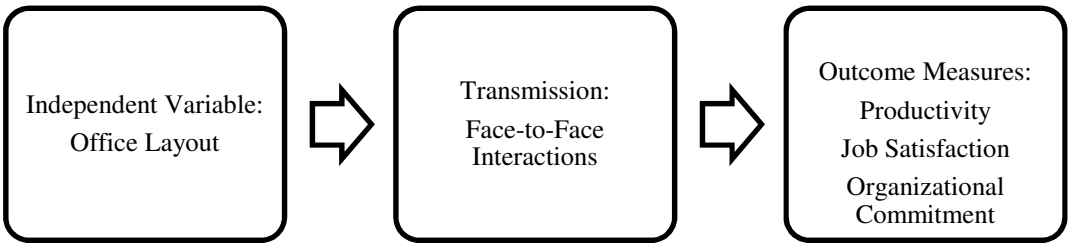

Figure 1. Proposed model for the present study.

METHOD

Overview

Employees in a university administrative office completed a self-report survey that measured each of the study variables.

Participants

Participants were 28 university administrative office employees including staff and interns. The majority of the participants were not enrolled in classes. Length of time spent working in the office ranged from one to fifteen years, and the participants worked anywhere from 24 to 60 hours per week. No other demographic data were requested in the survey in an effort to maintain anonymity.

Materials and Procedure

The employees took an online survey containing measures of each of the key variables. Some of these measures were from a survey created for a large corporation and others were established measures from the organizational literature. In addition, some measures consisted of items created specifically for this study. All measures appear in the appendix.

Outcome Measures. Job satisfaction, productivity, and organizational commitment were measured using seven-point Likert scales. The participants were asked to evaluate the accuracy of each statement on the scale ranging from 1, "strongly disagree" to 7, "strongly agree". There was also a "cannot rate" option. The survey asked for a short explanation for those who cannot rate the item.

The job satisfaction measure consisted of three questions such as "In general, I am satisfied with my job." The productivity measure contained 5 questions such as "I am productive when I am at work." An additional measure contained items combining productivity with workspace qualities. A sample item is "The workspace supports my individual work productivity." The organizational commitment measure included nine items, such as, "For me, this is the best of all jobs" and "I find that my values and the values of the admissions department are very similar."

Workspace Measures. Facets of the workspace (integration, distance and visibility) were measured through a survey consisting of self-reported items and observations. Like the outcome measures, participants were asked to use a seven-point Likert scale to rate how accurate items are. The integration measure had three items such as "People frequently pass by my workspace." Two items such as "I am able to sit near the people I need to work with" measured distance, and four

items including "I have easy visibility to other people in the workplace" measured visibility. After conducting exploratory factor analyses, however, the items intended to measure distance and integration respectively, loaded on one factor that is referred to as *accessibility* and is further explained in the results and discussion sections of this paper.

Other items asked participants to express as a percentage the time they spend on various activities. For example, one question asked the participants to divide up their time (in percentages) spent between working alone, engaging in impromptu face-to-face interactions, scheduled face-to-face interactions, remote real-time communication with others and remote delayed communication with others.

Interactions. Frequency of interactions within the office were assessed on a six-item measure along a seven-point Likert scale. One such item is "I interact with many people when I am moving about the office".

Open Response Questions. These questions were meant to allow any input from the participants that was not covered by the other questions. One item is "If you could change anything about the workspace, what would it be and why?"

RESULTS

Prior to examining the study hypotheses, I conducted exploratory factor analyses on the measures to ensure that the items performed as anticipated. In general, these analyses supported the a priori factor structures of the various measures. The one exception that warrants mention is that items meant to tap distance and integration, respectively, loaded on one factor. Taking into account the content of these items, this overarching factor is labeled as "accessibility". This factor refers to the proximity of one employee to another and the frequency with which the employees pass by others' workspaces. The coefficient alpha reliability for this and the other variables are presented in Table 2. As seen there, the reliability for all of the study variables was adequate and, in most cases, quite high.

To test the hypotheses, I computed bivariate correlations. These correlations appear in Table 1. According to Hypothesis 1, more frequent impromptu interactions were expected to be positively related to job satisfaction, productivity and organizational commitment. As seen in Table 1, frequency of impromptu interactions does not significantly correlate with productivity, job satisfaction or organizational commitment. Therefore, Hypothesis 1 is not supported by the present study.

As noted above, distance and integration loaded on one factor. Therefore, the hypotheses involving these variables were tested by using the accessibility factor. Hypothesis 2 states that the degree of accessibility will positively relate to the frequency of the individual's informal and impromptu interactions. The

correlation between accessibility and frequency of impromptu interactions was statistically significant ($r = .631$, $p < .01$), which supports Hypothesis 2, indicating that higher integration levels and lower distance between employees may foster impromptu interactions.

According to Hypothesis 3, the visibility of the employees' workplaces should be positively correlated with productivity, job satisfaction and organizational commitment. The correlations between visibility and the outcome measures were weak ($r = .044$), resulting in a lack of support for Hypothesis 3.

Hypothesis 4 predicts that the average physical distance between employees will have a negative relationship with productivity, job satisfaction and organizational commitment. Accessibility (in place of a distance measure) was significantly correlated with productivity ($r = .408$, $p < .05$) but showed no relationship with job satisfaction or with organizational commitment. Thus, Hypothesis 4 is partially supported by these data.

The present study also found a few important correlations that were not directly related to the hypotheses. As seen in Table 1, job satisfaction and organizational commitment were significantly correlated ($r = .413$, $p < .05$) but neither was highly correlated with productivity.

Also, additional variables were included in the surveys that were not related to the hypotheses. These led to some noteworthy findings. As seen in Table 2, the percent of time spent working alone was significantly negatively correlated with job satisfaction ($r = -.446$, $p < .05$), percent total time spent in unscheduled face-to-face interactions ($r = -.619$, $p < .01$), and percent total time spent in scheduled, face-to-face interactions ($r = -.751$, $p < .01$). Thus, it appears that individuals who spend a significant amount of time working alone are relatively dissatisfied with their jobs and interact with their coworkers infrequently. Being interrupted while trying to concentrate was significantly positively correlated with both unscheduled and scheduled face-to-face interactions ($r = .495$, $p < .05$, $r = .634$, $p < .01$, respectively), highlighting the notion that any type of interaction while trying to concentrate is a disruption. Both productivity and job satisfaction had a significant negative relationship with time spent with the immediate workgroup ($r = -0.524$, $p < .05$, $r = -.427$, $p < .05$). Hence, it seems as though spending time with the immediate workgroup is counterproductive and decreases job satisfaction. Informal and unplanned interactions were positively correlated with all three outcomes (though not significantly). Also, time spent traveling within the office positively correlated with both accessibility and frequency of interactions though neither was significant. That is, the more an individual moves about the office the more accessible their coworkers are. Lastly, as seen in Table 2, the items that measure the outcomes and the workplace together was significantly correlated with not being distracted ($r = .568$, $p < .01$). When measured separately the outcome items

and workplace items do not correlate significantly with not being distracted; however, they do correlate significantly with not being distracted when the two constructs are combined into one item.

Table 1

Bivariate Correlations of Outcome Measures, Workspace Measures and Interactions

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Productivity	-															
2. Job Satisfaction	0.037	-														
3. OC	0.278	.413*	-													
4. PT spent Working Alone	0.234	-.446*	-0.19	-												
5. Time Spent in U-FTFI	-0.192	0.28	0.212	-.619**	-											
6. Time Spent in S-FTFI	-0.032	0.398	0.265	-.751**	0.361	-										
7. Remote RT CWO	-0.295	0.22	-0.171	-.562**	-0.027	0.266	-									
8. Remote D CWO	-0.15	0.214	0.023	-.618**	0.078	0.138	.522**	-								
9. Interrupted	0.112	0.167	0.317	-.518**	.495*	.634**	-0.147	0.102	-							
10. Not distracted	-0.08	0.091	0.143	0.237	-0.397	-0.305	0.331	-0.008	-.569**	-						
11. Work and Outcomes	-0.026	0.253	0.283	0.05	0.175	-0.08	-0.105	-0.154	-0.144	.568**	-					
12. Percent of Total Interactions spent with IW	-.524*	-.427*	-0.154	0.368	0.028	-0.368	-0.307	-0.329	-0.202	-0.047	0.095	-				
13. Finding a Place to Work	-0.128	-.594**	-.445*	0.13	-0.142	-0.152	-0.056	0.042	0.121	-0.154	-0.351	0.373	-			
14. Frequency of Interactions	0.234	0.204	0.233	-0.307	.611**	0.305	-0.462	0.034	.555**	-.393*	0.212	0.032	-0.078	-		
15. Visibility	0.102	-0.066	-0.037	0.068	0.006	-0.162	-0.254	0.174	0.193	-0.242	0.044	0.077	0.046	0.3	-	
16. Accessibility	.408*	-0.056	-0.02	0.108	0.109	-0.1	-.533**	0.057	0.262	-0.214	0.154	0.032	0.165	.631**	.412*	-

Notes. OC = organizational commitment. PT working Alone = percent time spent working alone. Time spent in U-FTFI = time spent in unscheduled face-to-face interactions. Time Spent in S-FTFI = time spent in scheduled face-to-face interactions. Remote RT CWO = remote real-time communication with others. Remote D CWO = remote delayed communication with others. Percent of total interactions spent with IW = percent of total interactions spent with immediate workgroup. *p < .05. **p < .01. All tests two-tailed.

Table 2

Alpha Reliability Coefficients

Variable	Reliability
Productivity	0.562
Job Satisfaction	0.896
Organizational Commitment	0.829
Frequency of Interactions	0.784
Visibility	0.738
Accessibility (integration and distance)	0.669

DISCUSSION

The purpose of this study was to investigate the effects of the workplace characteristics of integration, physical distance and visibility on impromptu interactions and job-related outcomes (job satisfaction, productivity and organizational commitment). Among the most important findings from the study was the significant positive relationship between accessibility and frequency of impromptu interactions as predicted by Hypothesis 2. This is consistent with the Allen (1970, as cited in Rashid et al., 2006) study in which less distance correlated with a higher likelihood of communication. Similarly, the current study also found a significant positive relationship between accessibility among employees and productivity.

The results also support various notions that were not predicted in the hypotheses. One such finding was the significant positive relationship between organizational commitment and job satisfaction, and a lack of a relationship between productivity and either of the other outcome measures. According to these data, employees' organizational commitment relates to their job satisfaction, but neither relates to productivity. This is consistent with findings in other organizational research (e.g. Wall, Kemp, Jackson, & Clegg, 1986).

Another unforeseen finding was the negative relationship between job satisfaction and percent of time spent alone at work. As seen in Table 1, four types of employee interactions (unscheduled face-to-face, scheduled face-to-face, remote real-time and remote delayed communication) are all positively correlated with job satisfaction. We can therefore speculate that with a larger sample size, higher job satisfaction may in fact have a significant positive relationship with most types of interaction within the office.

One exception to a potential increase in job satisfaction with interactions is the interactions within the immediate workgroup. Both productivity and job satisfaction have a significant negative relationship (and organizational commitment, though non-significant) with time spent with the immediate workgroup. This finding suggests a few possibilities. One possibility is that, with a larger sample size, a curvilinear relationship between these variables would emerge. In other words, there could be an optimal frequency of interaction that

enhances productivity most; too much interaction or too little interaction could decrease productivity. A second possibility is that the communication within these workgroups is relatively ineffective. Collaboration skills and effective information sharing within work groups have been found to be positively correlated with performance and productivity (Kirschner, et al., 2009; Mesmer-Magnus & DeChurch, 2009; Strubler & York, 2007), suggesting that the participants in the current study may be unhappy with their workgroups because they lack effective communication skills. Perhaps with communication training within immediate workgroups, employees in the current sample could reverse the negative relationship between time spent in the immediate workgroup and productivity and job satisfaction. Another possibility is that the nature of the jobs within this particular office may cater more towards individual work rather than group work, resulting in little time spent with the immediate workgroup to begin with.

In accordance with the findings in the study by Campbell and Campbell (1988), informal and unplanned interactions were positively correlated (though not significantly) with all three outcome measures. This finding supports the notion that impromptu interactions, though distracting, can enhance the individual's sense of belonging within the organization.

Percent of time spent alone at work also had a significant positive relationship with being interrupted while trying to concentrate. The more time the participants spent working alone, the more they felt interrupted; at the same time, they experienced less interactions with others (unscheduled face-to-face, scheduled face-to-face, remote real-time and remote delayed). This can be explained by the nature of working alone—by definition, it does not include other people. As supported by these data, any type of interaction is an interruption, because working alone signifies lack of interaction with others. According to Backhouse and Drew (1992), it is possible that a lack of or misinterpretation of non-verbal cues allows interruptions. A heightened awareness of sending and receiving non-verbal cues within the office could alter the negative relationship between time spent working alone and interruptions.

A common concern with employee interactions is the level of distraction. The items measuring the outcomes and the workplace together (such as "The workspace supports collaboration and teamwork" and "I am efficient and productive working in the work environment") were significantly correlated with not being distracted. This suggests that although workspace and the outcomes when separated do not support this finding, when the participants consider job satisfaction, productivity and organizational commitment within the context of the work environment, they perceive less distraction. This could be due to a problem among the items (such as wording the items in a positive light) or due to a

difference in the participants' cognitive framework when assessing the workplace characteristics and outcomes together.

The outcome constructs were negatively (though not significantly) correlated with travel time within the office, possibly because the participants perceive making necessary trips around the office as a nuisance. Nevertheless, consistent with Hypothesis 2, travel time within the office does positively (though not significantly) correlate with accessibility and with frequency of interactions. This corresponds to the findings by Penn et al. (1999), in which spatial configuration of an office had a direct impact on the frequency of interactions. As the proposed model and hypotheses in this study do not specifically incorporate the *time* spent travelling within the office, and the methods in the present study do not measure the spatial configuration of the office, a subsequent study should incorporate distance travelled as well as time spent travelled in the research model.

In future studies, researchers also should further revise measurements of the key independent variables. Unlike self-report items, more objective measurements actually quantify aspects of the office layout like integration, distance, and visibility. Also, social network analysis could provide more accurate assessments of frequency and type of interaction (Selfhout, Burk, Branje, Denissen, van Aken, & Meeus, 2010). This type of measurement assesses unique patterns of interaction and relationships among different individuals, thereby providing a more nuanced examination of the effects of these variables on the study outcomes. Moreover, with maps of the office, level of integration can be assessed visually and other constructs such as density of interactions can be measured. The effects of the office layout can also more easily be measured with a survey before and after a physical workspace change within the organization.

Despite the benefits of quantitative data, the open-ended questions added a dimension to the present study that numerical data could not. Participants mentioned a few influential workspace characteristics that were not addressed in the other items. In response to the question, "If you could change anything about your workspace, what would it be and why?" participants suggested replacing fluorescent lights, regulating the temperature, creating a break room, and working near a window. Adjustments such as choosing a chair or closing a door to minimize distraction and maximize privacy arose in response to needing more control over the workspace. These responses suggest that small changes to workspaces can dramatically impact job satisfaction, organizational commitment and productivity; in fact, simply asking employees their opinions and preferences about the workspace and the various factors affecting it could do so in and of itself. As eloquently expressed by Alain de Botton (2006) in his book *The Architecture of Happiness*, most people seem oblivious to the physical environment because contemplating its power and the blatant lack of recognition

of this power is troublesome. Many organizations have yet to realize how influential the workspace can be, and how apt manipulation thereof can truly work in their favor.

The present study was not without some limitations. One obvious limitation is the small sample size. The results would clearly be more reliable if the response rate had been higher. With a larger sample size, some of the non-significant but higher correlations could be statistically significant. With statistically significant correlations, future studies can be more certain of the relationship between variables. Another limitation is that the data were collected in one setting, and in a context in which employees held a variety of jobs. Perhaps by taking data from multiple offices and restricting the sample to one job type, other studies could reduce the effects of potential confounding variables. Despite these limitations, the current study suggests some important and, in some cases, counterintuitive, findings which beg future inquiry.

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APPENDIX

1. The following statements concern job satisfaction. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
All in all, I am satisfied with my job.	○	○	○	○	○	○	○	○
In general, I don't like my job.	○	○	○	○	○	○	○	○
In general, I like working in the Office of Admissions.	○	○	○	○	○	○	○	○
I feel positive and up most of the time I am working.	○	○	○	○	○	○	○	○
I look forward to going to work.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

2. The following statements concern productivity. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
I am productive at work.	○	○	○	○	○	○	○	○
I adequately complete my assigned duties.	○	○	○	○	○	○	○	○
I fulfill my responsibilities specified in the job description.	○	○	○	○	○	○	○	○
I fail to perform essential duties.	○	○	○	○	○	○	○	○
I perform tasks that are expected of me.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

3. The following statements concern organizational commitment. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
For me, this is the best of all jobs.	○	○	○	○	○	○	○	○
I am extremely glad that I chose to work at Mason's Office of Admissions over other jobs that I was considering at the time.	○	○	○	○	○	○	○	○
I find that my values and the values of the Office of Admissions are very similar.	○	○	○	○	○	○	○	○
Working in the Office of Admissions really inspires the very best in me in the way of job performance.	○	○	○	○	○	○	○	○
I talk up the Office of Admissions to my friends as a great place to work.	○	○	○	○	○	○	○	○
I would be very happy to spend the rest of my career with the Office of Admissions.	○	○	○	○	○	○	○	○
I enjoy discussing the Office of Admissions with people outside it.	○	○	○	○	○	○	○	○
I really feel as if the Office of Admissions' problems are my own.	○	○	○	○	○	○	○	○
I think that I could easily become as attached to another work organization as I am to the Office of Admissions.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

4. The following statements concern workplace characteristics. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
Adequate spaces are available for unscheduled, impromptu meetings.	○	○	○	○	○	○	○	○
I am able to sit near the people I need to work with.	○	○	○	○	○	○	○	○
I have easy visibility to other people in the workplace.	○	○	○	○	○	○	○	○
Workspaces provide sufficient visual privacy.	○	○	○	○	○	○	○	○
I pass my coworkers frequently when we are both moving about the office.	○	○	○	○	○	○	○	○
I am too far away from my coworkers to communicate face-to-face.	○	○	○	○	○	○	○	○
My workspace is in a good location within the office.	○	○	○	○	○	○	○	○
People frequently pass by my workspace.	○	○	○	○	○	○	○	○
I can see many other people in their workspaces while I am sitting at my workspace.	○	○	○	○	○	○	○	○
I can see many other people moving about the office while I am seated at my workspace.	○	○	○	○	○	○	○	○
I frequently engage in unplanned, impromptu interactions.	○	○	○	○	○	○	○	○
I prefer to work with my office door open.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

5. The following statements concern workplace experiences. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
I am not distracted by activity in nearby areas or people passing by when I work.	○	○	○	○	○	○	○	○
I interact with many people when I am moving about the office.	○	○	○	○	○	○	○	○
I can manage distractions and interruptions when I want to focus on my work.	○	○	○	○	○	○	○	○
There is too much activity around my workspace such that it affects my work.	○	○	○	○	○	○	○	○
There is too much informal, casual conversation around me such that it affects my work.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

6. The following statements concern group work. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
My coworkers are frequently available for face-to-face interactions.	○	○	○	○	○	○	○	○
The unscheduled, face-to-face interactions I have with coworkers are high quality and productive.	○	○	○	○	○	○	○	○
It is easy to interact face-to-face with people who work in a different physical location.	○	○	○	○	○	○	○	○
The quality of collaborating remotely is as effective as it is when we collaborate in person.	○	○	○	○	○	○	○	○
I get useful information through unplanned conversations.	○	○	○	○	○	○	○	○
I can share information with coworkers quickly and efficiently.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

7. The following statements concern workplace policies and practices. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
Informal and social interactions at the office are frequent	○	○	○	○	○	○	○	○
Informal and social interactions are viewed as value-added work.	○	○	○	○	○	○	○	○
Group parties and events commonly take place in the workplace.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

8. The following statements concern both the outcomes and the workplace. Please read the statement carefully and choose the option that best describes how much you agree with the statement. If you chose "?", you will be asked to provide more information.

	Strongly disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	?
I am efficient and productive working in the work environment.	○	○	○	○	○	○	○	○
Overall, I am satisfied with the workplace.	○	○	○	○	○	○	○	○
I feel a sense of pride in the workplace.	○	○	○	○	○	○	○	○
The workplace is a fun and exciting place to be.	○	○	○	○	○	○	○	○
The workspace inspires creativity and innovation.	○	○	○	○	○	○	○	○
The workspace supports collaboration and teamwork.	○	○	○	○	○	○	○	○
The workspace supports my individual work productivity.	○	○	○	○	○	○	○	○
The workplace makes it more likely that I would recommend Mason's Office of Admissions department as a great place to work.	○	○	○	○	○	○	○	○
The workplace makes it more likely that I would want to remain working at Mason's Office of Admissions.	○	○	○	○	○	○	○	○
There is a strong sense of team spirit and camaraderie in the workplace.	○	○	○	○	○	○	○	○

If you chose "?", please state your reasoning

9. What percent of your work time do you spend in each of the following locations? Percentage (0 – 100%)

Your individual workspace (assigned or shared)	
Elsewhere in your department/workgroup area (others' offices, meeting rooms, break areas, etc.)	
Traveling within the office	
Other (please describe in the Specify Other box below)	

10. When working in the Office of Admissions what percent of your total work time do you spend on the following activities? Percentage (0 – 100%)

Working alone	
Unscheduled, face-to-face interaction with others (impromptu conversations, informal meetings, etc.)	
Scheduled face-to-face interaction with others (meetings, briefings, training, etc.)	
Remote, real-time communication with others (phone calls, conference calls, videoconferences, Chat/IM/text message, etc.)	
Remote, delayed communication with others (email, etc.)	

11. When working in the Office of Admissions, what percentage of your total work interactions are with each person or group? Percentage (0 - 100%)

Your manager	
Your immediate workgroup	
Other colleagues in your function (outside your immediate workgroup)	
Other (Please describe in the Specify Other text box below)	

12. With each answer as its own percentage, on an average day, what proportion of your time spent...

working alone is productive?	
working with others (meeting, collaborating, etc.) is productive?	

13. The following items describe situations that can inhibit your personal work productivity. For each item, please estimate how many minutes of productive work time you lose in an average day because of each of these productivity inhibitors.

Finding and locating people	
Finding a place to meet	
Finding a place to work	
Waiting for information from others	
Waiting for a decision	
Being interrupted while trying to concentrate	
Storing, retrieving or looking for physical work materials	
Setting-up workspaces and other office-related logistics	
Getting to other parts of your building or to other buildings	
Dealing with equipment or technology issues/problems	

The following questions are meant to shed light on the ways the Office of Admissions' workspace can be improved. Your responses will be taken into consideration when the workplace undergoes change in the future.

1. If you could change anything about your workspace, what would it be and why?
2. Have you ever been surprised by the impact of the workspace, or have you ever had a different reaction to the workspace than you expected (negative or positive)?
3. Do you feel like you have control over your workspace?
4. If there are any experiences you have had (positive or negative) relating to the workspace, please describe them.

Please answer the following questions. All information is strictly for academic purposes and will be kept confidential.

1. What is your position at Mason's Office of Admissions?
2. Are you currently enrolled in classes at Mason?

   ○ Yes

   ○ No

3. How long have you worked in Mason's Office of Admissions?

   Years ☐

4. On average, how many hours a week do you work in Mason's Office of Admissions?

   Hours per week: ☐