Get Up, Stand Up:
The Effects of a Non-Sedentary Workspace on Information Elaboration and Group Performance

Andrew P. Knight (knightap@wustl.edu)

Markus Baer (baer@wustl.edu)

Washington University in St. Louis

Campus Box 1133

One Brookings Drive

St. Louis, MO 63130-4899

Forthcoming, *Social Psychological and Personality Science*

Author Notes

Andrew Knight is Assistant Professor of Organizational Behavior at the Olin Business School, Washington University in St. Louis. His research interests include group dynamics, affect, and diversity. He received his PhD from the University of Pennsylvania's Wharton School.

Markus Baer is Associate Professor of Organizational Behavior at the Olin Business School, Washington University in St. Louis. His research interests include the determinants of the various activities comprising creativity and innovation in organizations. He earned his PhD from the University of Illinois, Urbana Champaign.

Abstract

Non-sedentary work configurations (e.g., standing meetings), which encourage standing rather than sitting in the course of work, are becoming increasingly prevalent in organizations. In this paper we build and test theory about how non-sedentary arrangements influence interpersonal processes in groups performing knowledge work – tasks that require groups to combine information to develop creative ideas and solve complex problems. We propose that a non-sedentary workspace increases group arousal, while at the same time decreasing group idea territoriality, both of which result in better information elaboration and, indirectly, better group performance. The results of an experimental study of 54 groups engaged in a creative task provide support for this dual pathway model and underscore the important role of the physical space in which a group works as a contextual input to group processes and outcomes.

Keywords: arousal, group, information elaboration, physical space, territoriality

The physical space in which people work is changing. On the heels of research showing that sedentary work – in which people sit at desks working on computers or around conference tables attending meetings – adversely affects people's health (Levine, 2010), organizations are increasingly experimenting with non-sedentary workspace designs and practices (Bennett, 2012; Lohr, 2012). Among the practices that public health scholars advocate for curbing the adverse effects of sedentary work – which include cardiovascular disease, obesity, and a shortened lifespan (Healy et al., 2013; Katzmarzyk, 2010; Neuhaus, Healy, Dunstan, Owen, & Eakin, 2014) – is the standing meeting. In a standing meeting, people eschew the use of chairs while developing ideas and solving problems.

Advocated primarily for their intrapersonal health benefits (e.g., Neuhaus et al., 2014) or for their efficiency (e.g., Bluedorn, Turban, & Love, 1999), little is known about how a non-sedentary workspace influences interpersonal dynamics in groups. Groups have become the locus of knowledge work in organizations (Mohrman, Cohen, & Mohrman, 1995), charged with solving complex problems and generating and implementing creative ideas (Hennessey & Amabile, 2010; Wuchty, Jones, & Uzzi, 2007). And, organizations spend billions of dollars annually on workspace design and furniture (Windle, 2012), ultimately in the hopes of enhancing group and organizational effectiveness. Accordingly, there is an urgent need to understand how workspace configurations might influence the effectiveness of groups engaged in knowledge work.

Does a non-sedentary workspace promote or inhibit the performance of groups engaged in knowledge work, endeavoring to solve problems with creative solutions? Lay wisdom provides conflicting accounts of the potential effects of a non-sedentary workspace on groups engaged in knowledge work. Some practitioners claim that "nothing creative has ever been done

while sitting…" (Thompson, 2011). Others advise making group workspaces as comfortable as possible, with plush chairs available for group members to lounge in, so that group members do not feel rushed (Berkun, 2004). The purpose of this paper is to bring clarity to the question of how a non-sedentary workspace influences interpersonal dynamics in groups engaged in knowledge work. In short, we propose a dual-pathway conceptual model, in which a non-sedentary workspace enhances group performance by increasing group arousal and decreasing territorial behavior, both of which shape the extent to which people collaboratively elaborate upon information and ideas. We find support for this model in an experimental study of groups working to develop a creative university recruitment video.

The Effects of a Non-Sedentary Workspace on Interpersonal Processes in Groups

To ground our predictions about how a non-sedentary workspace might influence interpersonal dynamics in groups, we draw upon the input-process-output model (McGrath, 1964). According to this model, outputs (e.g., group performance) are a function of the raw material that people have available (i.e., inputs) and what they do with it (i.e., processes). To date, scholars' investigations of inputs have focused most heavily on group-level characteristics, such as group composition (van Knippenberg & Schippers, 2007). Far less frequently examined are contextual inputs – characteristics of the environment in which a group operates (Hackman & Katz, 2010; Sundstrom, Mclntyre, Halfhill, & Richards, 2000). Contextual inputs include, for example, attributes of the geography in which a group works or – of particular relevance to the research reported in this paper – features of the physical space in which a group works. Scant research has explored how such contextual factors influence group dynamics; and, to our knowledge, no studies have developed and tested predictions about how a non-sedentary workspace might shape interpersonal processes in groups engaged in knowledge work.

A key interpersonal process for groups engaged in knowledge work – such as creative or complex decision-making tasks – is information elaboration (Homan, van Knippenberg, Van Kleef, & De Dreu, 2007; Homan, Hollenbeck, Humphrey, van Knippenberg, Ilgen, & Van Kleef, 2008; van Knippenberg, De Dreu, & Homan, 2004). Information elaboration is "the exchange of information and perspectives, individual-level processing of information and perspectives, the process of feeding back the results of this individual-level processing into the group, and discussion and integration of its implications" (van Knippenberg et al., 2004, p. 1011). Research indicates that groups engaged in knowledge work benefit from the exchange and integration of members' different perspectives and ideas (Baer, Leenders, Oldham, & Vadera, 2010; Hargadon & Bechky, 2006; Hoever, van Knippenberg, van Ginkel, & Barkema, 2012). When members share and exchange their ideas, critique and refine one another's contributions, and combine and build upon each other's insights, the group as a whole is apt to perform at a high level on knowledge work tasks. Building on these findings, we develop predictions below about how a non-sedentary workspace shapes information elaboration in groups and indirectly influences group performance through two distinct pathways.

The Pathway of Group Arousal

The first pathway that we identify is physiological; we expect that working in a non-sedentary workspace is physiologically arousing and that arousal contributes to information elaboration. By physiological arousal, we mean activation of the autonomic nervous system and, in particular, the sympathetic nervous system – the bodily system that prepares an organism to act upon its environment (e.g., Blascovich, 1990; Blascovich, Vanman, Mendes, & Dickerson, 2011; Duffy, 1957). We predict that a non-sedentary workspace increases arousal because people working in such a space are prone to move more than people working in a space outfitted with

chairs. The underlying rationale for adopting standing meetings as a remedy for the adverse health effects of sedentary work is that standing meetings promote increased activity levels (and, hence, promote energy mobilization and expenditure) through physical motion. Relative to people engaged in sedentary work, those who use non-sedentary practices must engage in more frequent "micro movements," such as shifting their weight from one leg to the other or adjusting their posture (Levine, Eberhardt, & Jensen, 1999; McCrady & Levine, 2009). Extrapolating these effects to group-based work, we expect that people working in a non-sedentary space will be more physiologically aroused than those working in a sedentary space.

Physiological arousal, in turn, likely promotes information elaboration. A primary function of arousal is to signal the importance or significance of environmental stimuli and prepare the body for action. In social situations, joint experiences of arousal promote affiliation and collective sensemaking, both of which are essential for motivating collective action (Gump & Kulik, 1997; Schachter, 1959; Townsend, Kim, & Mesquita, 2013). As Bartel and Saavedra (2000, p. 224) noted, "high arousal group moods may be adaptive for work groups because they motivate collective action toward goal attainment." Arousal may thus stimulate group members engaged in knowledge work to adopt collective and collaborative problem-solving approaches, exchanging, considering, and building upon one another's individual ideas – all defining behaviors of information elaboration (van Knippenberg et al., 2004).

The Pathway of Group Idea Territoriality

The second pathway that we identify is behavioral. Specifically, we suggest that the space in which a group works may influence the extent to which group members engage in territorial behavior vis-à-vis their individual ideas. By territoriality we mean "an individual's behavioral expression of his or her feelings of ownership toward a physical or social object"

(Brown, Lawrence, & Robinson, 2005 p. 578). Territoriality captures the social and behavioral manifestations of feelings of possessiveness over an object – whether the object is tangible (e.g., a chair) or intangible (e.g., an idea).

Sundstrom and Altman (1989) theorized that the environment in which groups work demarcates group boundaries and governs the flow of people, information, and resources into and out of the group. We extend these ideas by suggesting that the physical workspace influences not just how a group interacts with external stakeholders, but also how the members of a group interact with one another. A major challenge for people engaged in knowledge work is to integrate their individual contributions to yield truly novel and useful idea combinations (Hargadon & Bechky, 2006). The process of developing an idea can create strong feelings of individual ownership and lead the initial developer to use territorial behaviors to protect the idea from modification by others (Brown et al., 2005). Territoriality is especially likely when ambiguity exists regarding who owns an object (Brown et al., 2005), which is generally the case when people work together to develop ideas.

Theory and research on embodiment (e.g., Barsalou, 2008; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Rie, 2005; Zhong & House, 2012) suggest that there is a bi-directional connection between physicality (e.g., posture, physical location) and cognition and behavior, such that alterations in physicality can induce changes in mindsets and how individuals interact with others. As Barsalou (2008, p. 630) noted, "bodily states are not simply effects of social cognition; they also cause it." Embodiment theory suggests that the physical context can trigger associated cognitions through a pattern completion process, such that individuals associate cognitions and behavioral patterns with certain embodiments. In line with this perspective, we suggest that the physical orientation of group members towards one another and

their work – that is members' embodiment during the course of group work – may influence their cognitions about and behaviors towards their ideas.

In the typical sedentary group environment, outfitted with a conference table and chairs, each person owns and claims an individual workspace – one of the chairs and a place at the table (Brown & Robinson, 2011). A non-sedentary workspace eliminates this prominent marker of individual ownership in the room and, thus, may decrease the extent to which people engage in territorial behaviors in the course of their work. By eliminating chairs, physical work patterns may shift away from individually-owned spaces, which physically compartmentalize people, to a broader space that the group owns and collectively occupies. The physical work pattern encouraged by a non-sedentary space may trigger a less individually-oriented mindset and reduce feelings of individual ownership over ideas compared to the physical work pattern of a sedentary space, in which each individual group member occupies his or her own space in the room. With a decreased urge to shelter and protect their ideas, we expect that individuals working in a non-sedentary workspace will be less territorial than individuals working in a sedentary space.

Decreased territoriality should, in turn, translate into increased information elaboration (Avey, Avolio, Crossley, & Luthans, 2009; Brown et al., 2005). Information elaboration entails group members considering, combining, and integrating one another's distinct perspectives to collaboratively develop ideas. Territorial behaviors dissuade group members from engaging in this collective process. When group members mark and defend their individual contributions, other members feel discouraged from building upon and extending their contributions.

A Dual Pathway Mediation Model

Both arousal and idea territoriality, we propose, influence the degree to which group members engage in information elaboration. That is, we hypothesize that the effects of a non-

sedentary (versus sedentary) workspace on information elaboration are mediated by arousal and idea territoriality. Further, and replicating prior research (Hoever et al., 2012), we expect that information elaboration is positively related to group performance on a knowledge work task. Consistent with prior findings (e.g., Bluedorn et al., 1999), we do not posit a direct effect of a non-sedentary workspace on group performance; rather, we posit an indirect effect of the physical workspace through the interpersonal processes that it provokes. That is, it is not the workspace that enhances group performance, but the ways that the workspace alters group dynamics. Thus, we suggest that a non-sedentary workspace indirectly enhances distal group performance by increasing the proximal process of information elaboration.

Method

Sample and Procedure

We conducted a group-based experiment using a sample of 214 undergraduate students at a university in the Midwestern United States. Students (52% male; Mean age = 19.62, SD = 1.28) received course credit for participation. Upon individually registering for a one-hour timeslot, participants received a link to a web-based survey to provide demographic information. At their scheduled time, participants arrived at the lab to complete a group-based creativity task. There were between three and five participants per study session, yielding a sample of 54 groups with an average group size of 3.98 (*SD* = 0.86). Once all participants were present and had reviewed consent materials, they were instructed to fasten a sensor (described below) around their wrists and complete a survey. Participants were then informed they would work together in a room down the hall for 30 minutes to develop and record a university recruitment video.

The configuration of the room in which people worked was the primary experimental manipulation, with two conditions – the sedentary workspace and the non-sedentary workspace.

Both conditions used the same room, a 13.5 × 8.5 foot conference room with a whiteboard, two easels with notepads and markers, and a 4 × 3 foot rectangular table. To stimulate group members' thinking, there were brochures about the university on the table. In the *sedentary workspace*, there were 5 office chairs arranged around the table. The chairs were pushed in so that the amount of space available in the room was not meaningfully altered. In the *non-sedentary workspace*, the chairs were removed from the room.

Participants worked together for 30 minutes. At the conclusion of their time, an assistant returned and recorded the group's video. Participants then returned to the initial room where they began the study to complete a survey, in which they provided their perceptions of how they worked with one another. Participants then removed the sensors and were debriefed.

Measures

To minimize concerns of common method and single source biases, we collected multiple types of data from several sources. Specifically, we collected data from (a) self-report surveys; (b) wearable sensors; (c) third-party ratings of video recordings of group interactions; and, (d) third-party ratings of the videos that groups created.

Group arousal. Participants wore around their wrists a wireless sensor that sampled and recorded electrodermal activity (EDA) throughout the study (Poh, Swenson, & Picard, 2010). EDA is an indicator of sympathetic nervous system activity, long-associated in psychological research with arousal (Blascovich et al., 2011; Dawson, Schell, & Filion, 2000; Duffy, 1957). To operationalize group arousal, we first calculated a baseline score for each individual, using the average EDA recorded during the initial 15 minutes of the study session when participants received instructions and completed a survey. We scaled individuals' EDA samples during the 30-minute group task relative to this baseline to account for between-individual differences in

skin conductance (Dawson et al., 2000; Blascovich et al., 2011). Next, we calculated the average scaled EDA (i.e., scaled relative to each individual's baseline) for the group across samples from members during the task, which served as our operationalization of group arousal during the 30-minute task.

Group idea territoriality. We used post-task survey responses provided by participants to operationalize idea territoriality. Participants responded to four items (e.g., "Everyone in my group was protective of his/her ideas.") adapted from Avey et al. (2009), reflecting on their interactions using a 5-point scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. The measure showed acceptable interitem reliability ($\alpha = 0.72$) and group members agreed with one another about territoriality (Median $r_{wg(j)} = 0.83$). Accordingly, we used the mean of members' responses to operationalize idea territoriality at the group level.

Group information elaboration. Following van Knippenberg and colleagues (e.g., van Ginkel & van Knippenberg, 2009), we used third-party ratings of video recordings of group interactions to measure information elaboration. Three research assistants blind to the hypotheses were trained to use a behaviorally-anchored coding scheme to assess on a minute-by-minute basis how much group members were "attentive to one another through active listening, reframing of ideas, and/or building off of one another's ideas." Raters used a scale ranging from 1 = *Not at all* to 5 = *Entire time*. Raters exhibited acceptable interrater agreement (Median $r_{wg} = 0.74$) and information elaboration was stable across time within groups (Median $r_{wg} = 0.87$). We operationalized information elaboration by averaging across raters and time.

Group performance. We asked three additional assistants, who had experience as student representatives for the university, to independently rate the overall quality of each group's recruitment video. Raters were instructed, "Group members were told that their videos

would be scored according to both creativity (i.e., how novel and useful the idea for the video was) and polish (i.e., how well-executed their video idea was).” Raters were asked to provide their assessment of performance using a five-item measure ($\alpha = 0.83$). Sample items include “The idea for this video was very creative,” “This video was well-executed,” and “This video was of very high quality.” The raters were reliable in their perceptions of video quality (Median $r_{wg(j)} = 0.91$), so we used the mean of the raters’ scores to operationalize performance.

Results

We examined as a manipulation check the extent to which participants in the non-sedentary condition perceived their space as more conducive to movement using two items that members completed after the task ($\alpha = 0.72$): (1) We felt free to roam around the room we worked in and (2) The room where we worked invited people to move around. Participants in the non-sedentary condition ($M = 3.48$, $SD = 0.57$) rated these items significantly higher than participants in the sedentary condition ($M = 2.82$, $SD = 0.59$) ($F_{1,52} = 16.59$, $p < 0.001$).

We next examined the effect of condition on each of the variables in our model. Because our sample comprised groups of different sizes, we used general linear models, examining the effect of condition controlling for group size. The results of these analyses are presented in Table 1. Consistent with our conceptual model, working in a non-sedentary space marginally increased group arousal (B = 0.09, $p = 0.06$), decreased group territorial behavior (B = -0.25, $p = 0.05$), and increased information elaboration (B = 0.34, $p = 0.02$). As expected, there was no significant direct effect of condition on group performance. We also examined the pattern of bivariate relationships (Table 2) among the endogenous variables in our model, which was in line with our conceptual model although the bivariate correlation between group territorial behavior and information elaboration (r = -0.21, $p > .10$) did not reach statistical significance.

We used path analysis to provide a comprehensive test of our conceptual model and estimate the indirect effects of the physical workspace on information elaboration and group performance. Given significant relationships between group size and group arousal (B = 0.09, p = 0.001) and group size and group performance (B = 0.35, p = 0.01), we controlled for group size. Figure 1 presents the results of the path model used to test our predictions. We used bootstrapping, with 5,000 draws, to calculate indirect and total effects of condition on group processes and outcomes (Mackinnon & Fairchild, 2009). The model depicted in Figure 1 fit the data well (χ^2_5 = 5.86, CFI = 0.97, RMSEA = 0.06, SRMR = 0.06). As predicted, working in a non-sedentary space increased group arousal (β = 0.25, $p < 0.05$) and group arousal was positively related to information elaboration (β = 0.27, $p < 0.05$). The 95% bootstrapped confidence interval (CI) for the indirect effect of non-sedentary space on information elaboration, through group arousal, was significant (0.003, 0.35). Also as predicted, working in a non-sedentary space decreased idea territoriality (β = -0.28, $p < 0.01$), which was negatively related to information elaboration (β = -0.32, $p < 0.05$). The indirect effect of non-sedentary workspace on information elaboration, through territoriality, was significant (95% CI = 0.001, 0.39). Together, the total indirect effect of workspace on information elaboration – that is, the sum total indirect effect through both the arousal and territoriality paths – was significant (95% CI = 0.05, 0.52). And, as the link between information elaboration and performance was positive and significant (β = 0.31, $p < 0.01$), the total indirect effect of workspace on performance – again, the sum total indirect effect of workspace through both the arousal and territoriality paths – was positive and significant (95% CI = 0.01, 0.50). In all, the model in Figure 1 explained 20% of the variance in group arousal, 8% of the variance in territoriality, 18% of the variance in

information elaboration, and 22% of the variance in performance. The results thus supported our predictions about the effects of a non-sedentary workspace on group processes and outcomes.

Discussion

The purpose of this research was to extend research on the effects of non-sedentary work configurations to the domain of interdependent group work, examining how the physical space in which a group works influences interpersonal dynamics and, ultimately, group outcomes. The premise for our research was that group members engaged in knowledge work in a non-sedentary workspace would become more physiologically aroused and less territorial over their individual ideas. Both group arousal and idea territoriality, we argued, would influence information elaboration and, more distally, group performance. The results of our experimental study support our dual pathway model and underscore the influence that physical space can have on how people work with one another in groups.

Our study is the first that we know of to validate the *interpersonal* effects of non-sedentary work configurations. Our findings suggest that, in addition to the physiological benefits of non-sedentary work designs, getting people out of their chairs at work may increase their capacity for collaborative knowledge work. Research on how attributes of the physical environment, such as lighting or sound, influence individual behavior in the workplace has a long history (e.g., Roethlisberger & Dickson, 1939; Zhong & House, 2012). And yet, the vast majority of investigations have focused on how aspects of the physical environment influence *intrapersonal* variables. For example, researchers have proposed that wall color or the presence of windows influences individual creativity (Dul, Ceylan, & Jaspers, 2011; Dul & Ceylan, 2011). More recently, Oppezzo and Schwartz (In Press) demonstrated the benefits of physical movement – specifically, of walking – for individual creativity. Extending this line of inquiry,

our research demonstrates that the physical environment influences group arousal and idea territoriality, which together shape the degree to which group members build collaboratively on one another's ideas in the course of a knowledge work task.

We found that the interpersonal effects of physical space indirectly affect performance for groups engaged in knowledge work. Like Bluedorn et al. (1999), we did not observe direct effects of workspace on performance. Instead, we found that the physical space shapes performance indirectly by affecting group members' arousal and territorial behavior, which together influence information elaboration. Our findings show that altering the physical space does not have a simple, deterministic effect on group performance. Instead, altering the physical space changes how people interact with one another, which is most proximally related to performance. Our research contributes to the literature on groups by connecting aspects of the physical environment to group performance through physiological, behavioral, and interpersonal processes.

Strengths, Limitations, and Future Directions

We integrated several types and sources of data – including physiological data, self-report data, and observational data – to draw inferences about how physical space influences interpersonal dynamics in groups. Our use of multiple data streams mitigates concerns of inflated relationships due to common method variance. Further, our use of a sensor to unobtrusively measure arousal highlights the potential for researchers to use new technologies to assess interpersonal dynamics in groups.

Despite these strengths, our conclusions must be interpreted with the limitations of our study in mind. Our measure of territoriality was administered after the group task. In deciding to measure territoriality after the task, we weighed the costs of interrupting groups and sensitizing

participants to the concepts under investigation with the benefits of measuring this pathway before groups completed their task. Our ultimate choice to measure territoriality after the task may have influenced participants' responses. These concerns are mitigated by the fact that participants received no feedback prior to completing the post-task survey; nonetheless, we acknowledge that contamination may have occurred. Future studies should replicate our findings using a measure of this mediator administered during the task rather than after it.

We studied groups engaged in a 30-minute task, which may be a boundary condition of our findings. Estimates of typical meeting duration in organizations vary. Panko and Kinney (1995) reported that nearly 75% of meetings are 30 minutes or less; Cohen and colleagues (2011) found an average meeting length of 73 minutes (SD = 41). The 30-minute meeting length that we studied thus likely generalizes directly to many situations commonly found in organizations. Still, future research is needed to explore the temporal boundary conditions around our finding that a non-sedentary workspace enriches interpersonal processes in groups engaged in knowledge work. It is possible that the benefits of a non-sedentary space would dissipate or even reverse over longer periods of time if people become fatigued or irritable. However, one promising approach for longer meetings might be for group members to oscillate between standing and sitting over the course of the meeting. Recent research (Oppezzo & Schwartz, In Press) suggests that the beneficial effects of movement on creativity persist even after individuals sit down. Thus, it might be possible to use a standing format for the first 30 to 45 minutes of a meeting and then switch to a sitting format without sacrificing performance. Research is needed to examine such questions.

Because we examined one performance episode, our findings cannot speak to the durability and permanence of the effects of a non-sedentary workspace across multiple group

interactions. Although we do not have data on groups engaging in multiple tasks, we believe it is unlikely that members would become habituated to the effects that we proposed and found in this study. The physiological and behavioral changes that we observed stem ultimately from physical effects (e.g., motion, physical location in space), rather than from perceptions of the novelty of the environment (Oppezzo & Schwartz, In Press). In post-hoc analyses we explored the possibility that the novelty of the environment might account for our results using a three-item measure that group members completed after the group task (e.g., "The room we worked in helped us feel creative."). We found a non-significant effect of condition on members' ratings of the novelty of the room (B = -0.05, $p = 0.70$), suggesting that people in the non-sedentary condition did not view their environment as more novel and conducive to creativity than those in the sedentary condition. Nonetheless, research would be useful to unpack how people respond to a non-sedentary environment across multiple group interactions.

Implications and Conclusions

The most important implication of this study is that the physical context in which a group works can shape interpersonal dynamics and, ultimately, group performance. Adopting a non-sedentary workspace may have benefits not just for individual physical health, but also for group performance on knowledge work tasks. By increasing arousal and reducing territoriality, a non-sedentary workspace enhances the extent to which people engage in collaborative information elaboration – a key ingredient to high performance on knowledge work. These findings are important both theoretically and practically. Theoretically, the physical space in which a group works is an important contextual input that scholars have, to date, largely ignored (Hackman & Katz, 2010). The manipulation that we investigated in this research – in which we simply removed chairs from the room – was relatively small, yet produced meaningful differences in

group arousal and group idea territoriality. Practically, office configurations and furniture are aspects of the workplace over which leaders often have direct control. Our results suggest that, if leaders aspire to enhance collaborative knowledge work, they might consider eschewing the traditional conference room setup of tables and chairs and, instead, clear an open space for people to collaborate with one another.

References

Avey, J., Avolio, B., Crossley, C., & Luthans, F. (2009). Psychological ownership: Theoretical extensions, measurement, and relation to work outcomes. *Journal of Organizational Behavior*, *30*, 173–191.

Baer, M., Leenders, R., Oldham, G., & Vadera, A. (2010). Win or lose the battle for creativity: The power and perils of intergroup competition. *Academy of Management Journal*, *53*(4), 827–845.

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology, 59*, 617-645.

Bartel, C. A., & Saavedra, R. (2000). The collective constrution of work group moods. *Administrative Science Quarterly*, *45*, 197–231.

Bennett, D. (2012, June). Kill your desk chair--and start standing. *BloombergBusinessweek*.

Berkun, S. (2004). How to run a brainstorming meeting. *Scott Berkun*. Retrieved January 10, 2013, from http://www.scottberkun.com/essays/34-how-to-run-a-brainstorming-meeting/

Blascovich, J. (1990). Individual differences in physiological arousal and perception of arousal: Missing links in Jamesian notions of arousal-based bheaviors. *Personality and Social Psychology Bulletin, 16*, 665-675.

Blascovich, J., Vanman, E. J., Berry Mendes, W., & Dickerson, S. (2011). *Social psychophysiology for social and personality psychology*. Los Angeles, CA: Sage.

Bluedorn, A. C., Turban, D. B., & Love, M. S. (1999). The effects of stand-up and sit-down meeting formats on meeting outcomes. *Journal of Applied Psychology*, *84*(2), 277–285.

Brown, G., Lawrence, T., & Robinson, S. (2005). Territoriality in organizations. *Academy of Management Review*, *30*(3), 577–594.

Brown, G., & Robinson, S. (2011). Reactions to territorial infringement. *Organization Science*, *22*(1), 210–224.

Cohen, M. A., Rogelberg, S. G., Allen, J. A., & Luong, A. (2011). Meeting design characteristics and attendee perceptions of staff/team meeting quality. *Group Dynamics: Theory, Research, and Practice, 15*, 90-104.

Dawson, M. E., Schell, A. M., & Filion, D. L. (2000). Electrodermal activity. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (2nd ed., pp. 200–223). New York, NY: Cambridge University Press.

Duffy, E. (1957). The psychological significance of the concept of “arousal” or “activation.” *Psychological Review*, *64*(5), 265–275.

Dul, J., & Ceylan, C. (2011). Work environments for employee creativity. *Ergonomics*, *54*(1), 12–20.

Dul, J., Ceylan, C., & Jaspers, F. (2011). Knowledge workers' creativity and the role of the physical work environment. *Human Resource Management*, *50*, 715–734.

Gump, B. B., & Kulik, J. A. (1997). Stress, affiliation, and emotional contagion. *Journal of Personality and Social Psychology*, *72*(2), 305–19.

Hackman, J., & Katz, N. (2010). Group behavior and performance. In S. T. Fiske, D. T. Gilbert, & L. G (Eds.), *Handbook of social psychology* (5th ed., pp. 1208–1251). New York, NY: Wiley.

Hargadon, A., & Bechky, B. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, *17*(4), 484–500.

Healy, G. N., Eakin, E. G., Lamontagne, A. D., Owen, N., Winkler, E. a H., Wiesner, G., Dunstan, D. W. (2013). Reducing sitting time in office workers: Short-term efficacy of a multicomponent intervention. *Preventive Medicine*, *57*(1), 43–48.

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, *61*, 569–598.

Hoever, I. J., van Knippenberg, D., van Ginkel, W., & Barkema, H. G. (2012). Fostering team creativity: Perspective taking as key to unlocking diversity's potential. *Journal of Applied Psychology*, *97*(5), 982–996.

Homan, A. C., Hollenbeck, J. R., Humphrey, S. E., van Knippenberg, D., Ilgen, D. R., & Van Kleef, G. A. (2008). Facing differences with an open mind: Openness to experience, salience of intragroup differences, and performance of diverse work groups. *Academy of Management Journal, 51*, 1204-1222.

Homan, A. C., van Knippenberg, D., Van Kleef, G. A., & De Dreu, C. K. W. (2007). Bridging faultlines by valuing diversity: Diversity beliefs, information elaboration, and performance in diverse work groups. *Journal of Applied Psychology, 92*, 1189-1199.

Katzmarzyk, P. T. (2010). Physical activity, sedentary behavior, and health: paradigm paralysis or paradigm shift? *Diabetes*, *59*(11), 2717–2725.

Levine, J. (2010). Health-chair reform: Your chair: Comfortable but deadly. *Diabetes*, *59*(11), 2715–2716.

Levine, J., Eberhardt, N., & Jensen, M. (1999). Role of nonexercise activity thermogenesis in resistance to fat gain in humans. *Science*, *283*, 212–214.

Lohr, S. (2012, December 1). Taking a stand for office ergonomics. *New York Times*.

Mackinnon, D. P., & Fairchild, A. J. (2009). Current Directions in Mediation Analysis. *Current Directions in Psychological Science*, *18*(1), 16–20.

McCrady, S. K., & Levine, J. A. (2009). Sedentariness at work: How much do we really sit? *Obesity*, *17*(11), 2103–2105.

McGrath, J. E. (1964). *Social psychology: A brief introduction*. New York: Holt, Rinehart & Winston.

Niedenthal, P. M., Barsalou, L. W., Winkielman, P., Krauth-Gruber, S., & Rie, F. (2005). Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review, 9*, 184-211.

Neuhaus, M., Healy, G. N., Dunstan, D. W., Owen, N., & Eakin, E. G. (2014). Workplace sitting and height-adjustable workstations: A randomized controlled trial. *American Journal of Preventive Medicine*, *46*(1), 30–40.

Oppezzo, M., & Schwartz, D. L. (In Press). Give your ideas some legs: The positve effecty of walking on creative thinking. *Journal of Experimental Psychology: Learning, Memory, and Cognition*.

Panko, R. R., & Kinney, S. T. (1995). Meeting profiles: Size, duration, and location. *Proceedings of the 28th Annual Hawaii International Conference on System Sciences.*

Poh, N., Swenson, N. C., & Picard, R. W. (2010). A wearable sensor for unobtrusive, long-term assessment of electrodermal activity. *IEEE transactions on bio-medical engineering*, *57*(5), 1243–52.

Roethlisberger, F. J., & Dickson, W. J. (1939). *Management and the worker: An account of a research program conducted by the Western Electric Company, Hawthorne Works, Chicago*. Cambridge, MA: Harvard University Press.

Schachter, S. (1959). *The psychology of affiliation: Experimental studies of the sources of gregariousness*. Palo Alto, CA: Stanford University Press.

Sundstrom, E., & Altman, I. (1989). Physical environments and work-group effectiveness. *Research in Organizational Behavior*, *11*, 175–209.

Sundstrom, E., Mclntyre, M., Halfhill, T., & Richards, H. (2000). Work groups: From the Hawthorne studies to work teams of the 1990s and beyond. *Group Dynamics: Theory, Research, and Practice*, *4*(1), 44–67.

Thompson, T. (2011). Building a great brainstorm. *Travel 2.0*. Retrieved January 10, 2013, from http://travel2dot0.com/2011/08/8-tips-to-build-a-great-brainstorm

Townsend, S. S. M., Kim, H. S., & Mesquita, B. (2013). Are You Feeling What I'm Feeling? Emotional Similarity Buffers Stress. *Social Psychological and Personality Science*.

Van Ginkel, W. P., & van Knippenberg, D. (2009). Knowledge about the distribution of information and group decision making: When and why does it work? *Organizational Behavior and Human Decision Processes*, *108*(2), 218–229.

van Knippenberg, D., De Dreu, C. K. W., & Homan, A. C. (2004). Work group diversity and group performance: an integrative model and research agenda. *Journal of Applied Psychology*, *89*(6), 1008–1022.

van Knippenberg, D., & Schippers, M. C. (2007). Work group diversity. *Annual Review of Psychology*, *58*, 515–541.

Windle, S. (2012). Officue furniture manufacturing in the US. *IBISWorld*, (December), 1–36.

Zhong, C., & House, J. (2012). Hawthorne revisited: Organizational implications of the physical work environment. *Research in Organizational Behavior*, *32*, 3–22.

Table 1

Results of general linear models examining the effects of physical workspace

	Group Arousal		Group Idea Territoriality		Information Elaboration		Group Performance	
Intercept	-0.27	(0.11)	2.20	(0.31)	3.65	(0.36)	2.88	(0.58)
Group size	0.09	(0.03)*	-0.02	(0.07)	0.08	(0.08)	0.35	(0.14)*
Non-sedentary space	0.09	(0.05)+	-0.25	(0.12)*	0.34	(0.15)*	0.00	(0.23)

Note. N = 54 groups. Entries represent unstandardized coefficients, with standard errors in parentheses.
+ $p < 0.10$, * $p < 0.05$, two-tailed

Table 2

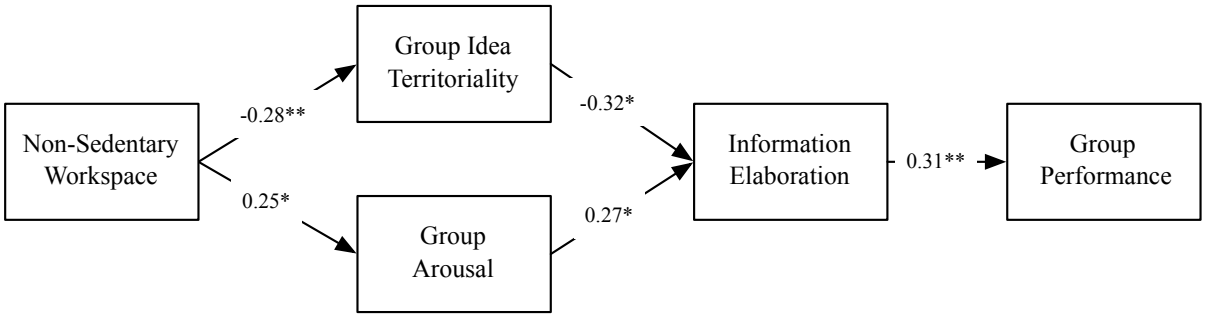
Means, Standard Deviations, and Intercorrelations among Study Variables

	M	SD	1	2	3	4	5
1. Group size	3.98	0.86	–				
2. Group arousal	0.12	0.18	0.37*	–			
3. Group idea territoriality	2.00	0.44	0.02	0.13	(0.72)		
4. Group information elaboration	4.09	0.52	0.05	0.21	-0.29*	–	
5. Group performance	4.29	0.86	0.35*	0.21	-0.13	0.32*	(0.83)

Note. N = 54 groups. Interitem reliability values are in parentheses along the diagonal.
$^{+}$ $p < 0.10$, * $p < 0.05$, two-tailed

Figure 1

Results of path analysis used to test model of the effects of a non-sedentary workspace



Note. N = 54 groups. Values are standardized parameter estimates. Groupsize (not depicted) was included as a control for all endogenous variables. Model fit: $\chi^2_5 = 5.86$, CFI = 0.97, RMSEA = 0.06, SRMR = 0.06

* $p < 0.05$, ** $p < 0.01$, two-tailed